This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

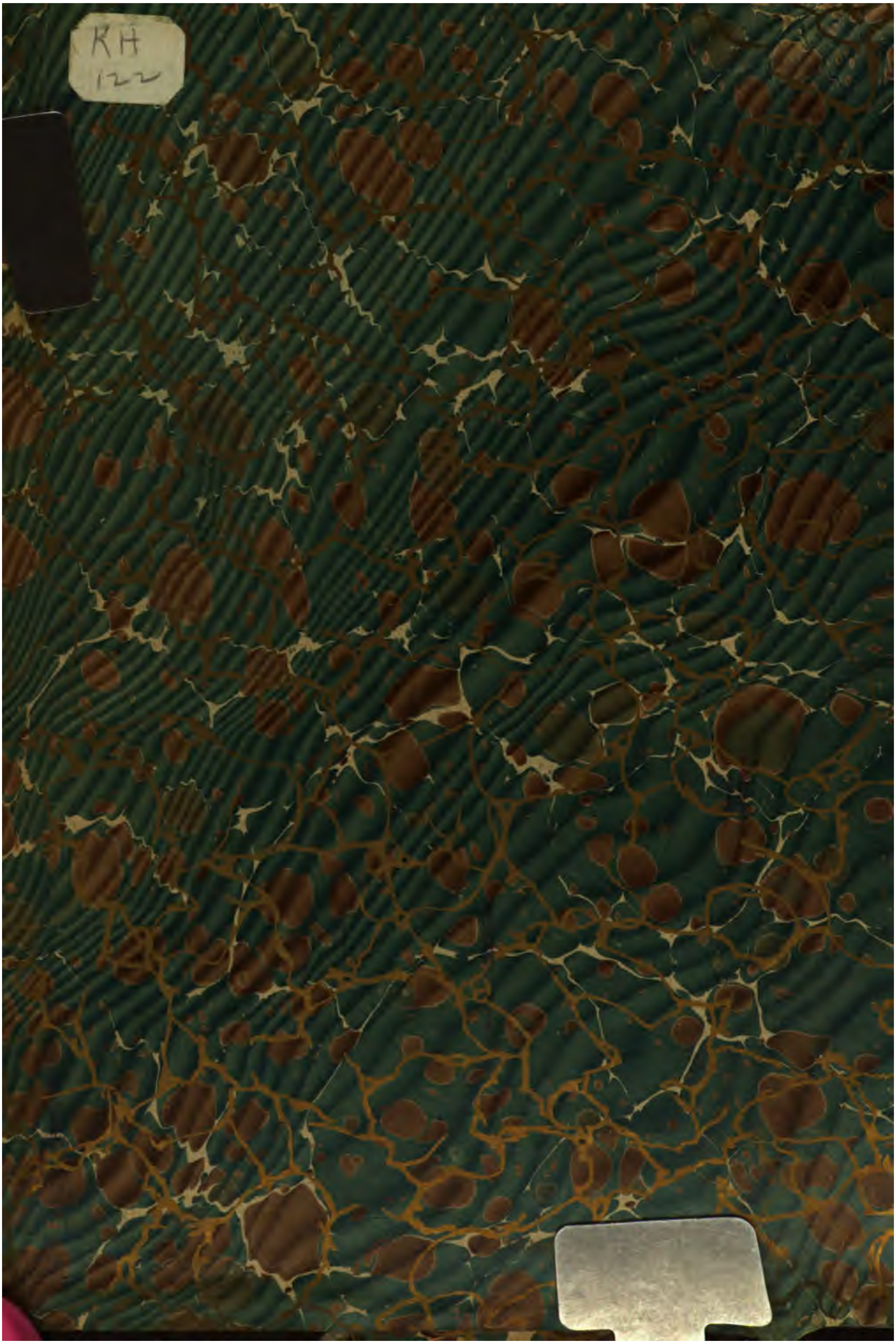
+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

NEDL TRANSFER
HN 2STB 0

RH
122



THE NEW INTERNATIONAL ENCYCLOPÆDIA

EDITORS

DANIEL COIT GILMAN, LL. D.
PRESIDENT OF JOHNS HOPKINS UNIVERSITY (1876–1901)
PRESIDENT OF CARNEGIE INSTITUTION

HARRY THURSTON PECK, PH. D., L. H. D.
PROFESSOR IN COLUMBIA UNIVERSITY

FRANK MOORE COLBY, M. A.
LATE PROFESSOR OF ECONOMICS
IN NEW YORK UNIVERSITY

VOLUME XVII

NEW YORK
DODD, MEAD AND COMPANY
1904

KH 122

HARVARD COLLEGE LIBRARY
FROM THE
EDWARD S. HAWES ESTATE
1942

Copyright, 1904
BY DODD, MEAD AND COMPANY

All rights reserved

HILL AND LEONARD, NEW YORK CITY, U. S. A.

ILLUSTRATIONS IN VOLUME XVII.

COLORED PLATES

Facing Page

University Gowns—American Usage 144

University Gowns—British Usage 146

Vases, Greek—I. 236

Vases, Greek—II. 238

Waders 452

Wood-Warblers, American 502

Water Birds 550

MAPS

United States, Eastern 50

United States, Western 52

United States, Physical 54

Gold, Silver, and Copper in the United States 60

Wheat in the United States 66

Oats in the United States 68

Density of the Population in the United States 102

Early Colonial Grants 110

United States in 1789 and 1808 116

United States in 1816 118

United States in 1852 124

United States, Showing Accessions of Territory 138

Uruguay 172

Utah 180

Venezuela 266

Vermont 292

Victoria 334

Virginia 374

Wales 472

Washington 524

Washington, D. C. 530

West Indies 654

West Virginia 660

Wisconsin 806

Wyoming 900

ENGRAVINGS

Van Dyck, Sir Anthony ("Queen Henrietta" of England) 224

Vegetables, Garden 254

Velazquez ("Æsop") 258

FACING PAGE
VERONESE, PAUL ("The Marriage at Cana") 300
VERSAILLES 304
VICTORIA, QUEEN 336
VIENNA 340
VINCI, LEONARDO DA ("The Last Supper") 358
VIOLINS 366
VULTURES 446
WAGNER, RICHARD 458
WASHINGTON—THE CAPITOL 530
WASHINGTON, GEORGE 536
WATT, JAMES 582
WATTEAU ("The French Comedy") 584
WEAVER-BIRDS—TYPES OF NESTS 598
WESTMINSTER ABBEY 656
WHALES 668
WHISTLER (Portrait of the Artist's Mother) 690
WHITEFISH, SMELTS, ETC. 698
WILD GOATS AND SHEEP 726
WILLOWS 756
WINCHESTER CATHEDRAL 768
WINDSOR CASTLE 776
WIRELESS TELEGRAPHY—I. 802
WIRELESS TELEGRAPHY—II. 804
WOLVES AND WILD DOGS 826
WOODPECKERS 850
WORDSWORTH, WILLIAM 868
WOUWERMAN ("The Smithy") 876
WRENS, WARBLERS, ETC. 880
XEROPHYTES 908
YACHTS 912
YACHTING 914
YACHTING 916
YAM, SWEET POTATO, ETC. 922
YELLOWSTONE, GREAT FALLS OF 934
YORK MINSTER 946
YOSEMITE VALLEY 948
YUCCA 962

KEY TO PRONUNCIATION.

ā	as in ale, fate. Also see ĕ, below.
ā̇	“ “ senate, chaotic. Also see ĕ, below.
â	“ “ glare, care.
ă	“ “ am, at.
ä	“ “ arm, father.
ȧ	“ “ ant, and final *a* in America, armada, etc. In rapid speech this vowel readily becomes more or less obscured and like the neutral vowel or a short u (ŭ).
a	“ “ final, regal, where it is of a neutral or obscure quality.
a̱	“ “ all, fall.
ē	“ “ eve.
ē̇	“ “ elate, evade.
ĕ	“ “ end, pet. The characters *ĕ*, ä, and ȧ are used for *ä* in German, as in Gärtner, Gräfe, Hähnel, to the values of which they are the nearest English vowel sounds. The sound of Swedish *ä* is also indicated by *ĕ*.
ẽ	“ “ fern, her, and as *i* in sir. Also for *ö*, *oe*, in German, as in Göthe, Goethe, Ortel, Oertel, and for *eu* and *oeu* in French, as in Neufchâtel, Crèvecœur; to which it is the nearest English vowel sound.
e	“ “ agency, judgment, where it is of a neutral or obscure quality.
ī	“ “ ice, quiet.
ī̇	“ “ quiescent.
ĭ	“ “ ill, fit.
ō	“ “ old, sober.
ō̇	“ “ obey, sobriety.
ô	“ “ orb, nor.
ŏ	“ “ odd, forest, not.
o	“ “ atom, carol, where it has a neutral or obscure quality.
oi	“ “ oil, boil, and for *eu* in German, as in Feuerbach.
o͞o	“ “ food, fool, and as *u* in rude, rule.
ou	“ “ house, mouse.
ū	“ “ use, mule.
ū̇	“ “ unite.
ŭ	“ “ cut, but.
ụ	“ “ full, put, or as *oo* in foot, book. Also for *ü* in German, as in München, Müller, and *u* in French, as in Buchez, Budé; to which it is the nearest English vowel sound.
û	“ “ urn, burn.
y	“ “ yet, yield.
B	“ “ the Spanish Habana, Cordoba, where it is like a *v* made with the lips alone, instead of with the teeth and lips.
ch	“ “ chair, cheese.
D	as in the Spanish Almodovar, pulgada, where it is nearly like *th* in English then, this.
g	“ “ go, get.
G	“ “ the German Landtag, and *ch* in Feuerbach, buch; where it is a guttural sound made with the back part of the tongue raised toward the soft palate, as in the sound made in clearing the throat.
H	as *j* in the Spanish Jijona, *g* in the Spanish gila; where it is a fricative somewhat resembling the sound of *h* in English hue or *y* in yet, but stronger.
hw	“ *wh* in which.
K	“ *ch* in the German ich, Albrecht, and *g* in the German Arensberg, Mecklenburg; where it is a fricative sound made between the tongue and the hard palate toward which the tongue is raised. It resembles the sound of *h* in hue, or *y* in yet; or the sound made by beginning to pronounce a *k*, but not completing the stoppage of the breath. The character K is also used to indicate the rough aspirates or fricatives of some of the Oriental languages, as of kh in the word Khan.
ṉ	as in sinker, longer.
ng	“ “ sing, long.
N	“ “ the French bon, Bourbon, and *m* in the French Etampes; where it is equivalent to a nasalizing of the preceding vowel. This effect is approximately produced by attempting to pronounce 'onion' without touching the tip of the tongue to the roof of the mouth. The corresponding nasal of Portuguese is also indicated by N, as in the case of São Antão.
sh	“ “ shine, shut.
th	“ “ thrust, thin.
TH	“ “ then, this.
zh	as *z* in azure, and *s* in pleasure.

An apostrophe ['] is sometimes used to denote a glide or neutral connecting vowel, as in tā'b'l (table), kăz''m (chasm).

Otherwise than as noted above, the letters used in the respellings for pronunciation are to receive their ordinary English sounds.

When the pronunciation is sufficiently shown by indicating the accented syllables, this is done without respelling; as in the case of very common English words, and words which are so spelled as to insure their correct pronunciation if they are correctly accented. See the article on PRONUNCIATION.

THE NEW INTERNATIONAL ENCYCLOPÆDIA

TYPEWRITERS. Machines for producing legible characters without the aid of movable type.

EARLY TYPEWRITERS. The first typewriter of which we have any record was patented in England as early as 1714. Over a century later, in 1829, the first American typewriter, called a typographer, was patented by W. A. Burt. In 1833 a typewriter was produced in France, having a separate key lever for each letter. In 1844 and in 1846 typewriting machines were invented in England, which, like many of the other early machines, were designed primarily for the use of the blind and so produced embossed characters. Between 1840 and 1860 Sir Charles Wheatstone invented several typewriters which are now in the South Kensington Museum.

Among early American inventors were Charles Thurber and A. E. Beach. The Thurber machine, brought out in 1843, is simply a set of type-bars in a vertical position around a horizontal brass wheel, sixteen inches across, which revolves about a central post, the characters being brought into position by hand from either direction. Common types are inserted in the lower ends of the type-bars. In 1856 A. E. Beach, who, as early as 1847, had constructed a fairly successful but never perfected typewriter, took out a patent for a machine intended to print embossed letters for the blind. This is worthy of record, because it covered a principle afterwards developed into the modern typewriter—namely, a basket of levers arranged on a circle, so as to deliver their impressions on a common centre.

Beach was followed by S. W. Francis. To the Beach principle of a circle of type-bars Francis added the pianoforte action. Another of the early inventors was Thomas Hall, who was carrying on independent experiments about the same time as Beach and Francis. Although his machine embodied the principle of a circle of type-bars, yet their movement, instead of being from below upward, was from above downward, converging at a common centre, an inked ribbon intervening between the type and the paper. But Hall was compelled to abandon his efforts without realizing his great expectations, and only a few of his typewriters were ever made. In 1881 he took out a patent on a typewriter made on an entirely different plan. It had a perforated dial plate, two inches square, containing seventy-five characters. Underneath this dial plate in his latest machine, called the Century, patented in 1889, was a rubber-faced cylinder with letters on its surface corresponding to those on the dial plate. When the stylus is brought to any perforation in this dial plate, the cylinder beneath is turned to present the corresponding letter to the paper, and the stylus being pressed into the hole the letter is printed. The under cylinder revolves against an inked pad.

About 1867 Charles Latham Sholes, Samuel W. Soule, and Carlos Glidden, of Milwaukee, Wis., began to experiment on the construction of a typewriter, and from their experiments the Remington typewriter had its origin. The first crude working model was completed early in 1868. Soule dropped out of the enterprise almost immediately and Glidden finally disposed of his interest also. Sholes, encouraged by the suggestions and financial aid of James Densmore, of Meadville, Pa., who early purchased an interest in the machine, continued his experiments. Several models were built and were tested by practical stenographers. One after another these machines were demolished, and Sholes would probably have given up the enterprise if it had not been for the energy and perseverance of Densmore.

In 1873 the inventors considered the machine sufficiently perfected to warrant manufacture upon a larger scale than their facilities or means permitted. A successful effort was made to interest the gun manufacturers, E. Remington & Sons, of Ilion, N. Y., in the manufacture of the machine. In spite of all the money and ingenuity already expended upon the device, it was still in a very defective condition. More than a year of patient work by the skilled mechanics of the Remington factory followed, resulting in a complete remodeling of the crude device of the inventors. The first model was put upon the market in 1874. It retained only the principles of the original construction. It may be briefly described as follows: Pivoted about a horizontal ring are type-bars, some thirty-eight in number, with steel types inserted in their lower ends, and so arranged as to rise vertically to a common centre. The short arms of these levers are connected by wire rods with the levers proceeding from the keyboard. The paper to be printed passes around a rubber cylinder, and the lower side of this cylinder receives the impact of the types. An inked ribbon intervenes between the type and the paper. This ribbon, in the operation of the machine, is gradually unwound from a spool at one side of the machine to another on the other side, and when the spool is exhausted the motion is reversed. With each release of a key by the finger of the operator, a ratchet movement at the back of the cylinder allows the carriage to move along one space, thus making room for the next letter. The tension is kept on the carriage by a coiled spring and strap. At the end of a line the carriage is drawn back to the starting point by means of an arm depending in front, and the same movement turns the cylinder, and carries the paper to make ready for the following line.

In 1877 an improvement was introduced, whereby each type-bar in the circle was made to carry two characters, adjusted to separate common centres. By depressing a shift key the carriage is thrown backward to the second centre, which is adjusted to receive all the capital letters and many other characters placed in relation thereto.

In 1894 an improved model, having a lighter and stronger paper carriage, was placed upon the market. The shifting movement was accomplished by a new mechanism, and improvements in the spacing mechanism, greatly increasing the speed of the machine, were also introduced. An automatic ribbon reverse was later included.

The Remington may be regarded as the pioneer machine. Its first competitor was the Caligraph, largely promoted by George W. N. Yost, who had for a time obtained a small interest in the sale of the Remington machine in its early years. This machine, like the Remington, had a circular basket of type-bars, and in many respects resembled its rival. In this machine the so-called shift from capital to small letters was done away with, and there was a separate lever and type-bar for each character. Horizontal levers, with which the keys were connected, were also hinged at the front, instead of the back. The carriage was supported, and was adjusted much the same as in the Remington, but was actuated by a torsion spring about a rod extending from the front to the back of the machine frame, where a vertical arm connected with the carriage frame above. The cylinder had a polygonal surface, the impressions being received on the faces. This machine has in recent years been superseded by an entirely new model, known as the New Century, which involves in many cases a radical departure from the earlier construction. Mr. Yost retired from the company and introduced another machine, which bears his name. The Yost does not employ an inked ribbon, like most typewriters, but its type-bearing levers, when at rest, occupy a position in which the types are all arranged within and bear against a circular inking ring or pad, and when a key is struck, its lever leaves the inking pad, moves inward and backward toward the centre, and then rises and strikes an upward blow in the centre, and prints the letter on the paper.

The first Hammond machine was invented by James B. Hammond in 1880-83. Its central principal was the type-wheel, a favorite device of John Pratt, who labored for a long time, but unsuccessfully, to make his invention a practical success. The arrangement of the original keyboard of the Hammond differed materially from that of the Remington, being almost semicircular. In 1890, however, a new model, termed the Universal Hammond, was introduced, having a keyboard with three banks of keys, like other standard machines. Still later, a light rubber shell or shuttle, supported by a metal backing, was substituted for the wheel. In this latest machine the ninety types are cast in true alignment upon a curved plate of vulcanite, called the 'shuttle,' in the form of an arc of a circle. The backing for the shuttle is a heavy cast-iron ring called 'anvil,' and may be compared to a wheel having a slot in the centre of its face in which the steel web of the shuttle slides. This forms a guide for the shuttle in its horizontal movements. The anvil is stationary and firmly fixed to a vertical shaft by which it may be raised to bring either of the three rows of type into the printing position. As these shuttles are interchangeable, it is possible for the one machine to produce any number of different alphabets or styles of type.

In 1889 the Chicago typewriter was placed upon the market and at once attracted attention on account of the simplicity of its mechanism and its comparatively low price. It has a longitudinally placed steel type-wheel, arranged to be held both longitudinally and circumferentially by stop-pins engaging directly with notches in the ends of the type-wheel. Like the Hammond and other type-wheel machines, the type is interchangeable and can readily be removed and replaced by type of another style or language.

In 1889 the Smith-Premier was also placed upon the market and rapidly assumed its rank among standard machines. This typewriter, like the Remington, is a type-bar machine, but has a separate key for each character, the keyboard being rectangular, with seven banks of keys. A novel feature of the machine is the type-cleaner, a revolving brush, fitted with a threaded shaft which, upon being turned with a detachable crank, is brought in contact with the type and brushes the entire set.

In 1892 the Blickensderfer machine was introduced, and, like the Chicago, at once attained great popularity on account of its simplicity and low cost. With the exception of the Blickenslerfer, the machines described were all introduced prior to 1890. During the closing decade of the century many new machines were brought upon the market, so that at its close there were over 100 different machines, on which nearly 1700 patents had been granted. Besides the so-called standard machines, there are a large number of 'try' machines in use.

Typewriters for printing in books have also been invented and have proved very successful. The Elliot & Hatch book typewriter is a well-known example of this class of machines in which the whole carriage and system of type-levers move and the book remains stationary.

Manifolding. Reprints may be secured by the ordinary copy-press (see Copying Machines), copying ink being used on the typewriter ribbon or pad. By the use of carbon paper alternately between thin sheets of ordinary paper, the typewriter itself can be made to produce several copies at a time, while by the use of a special kind of paper on a sheet of cloth stencils may be made for the mimeograph. See Copying Machine.

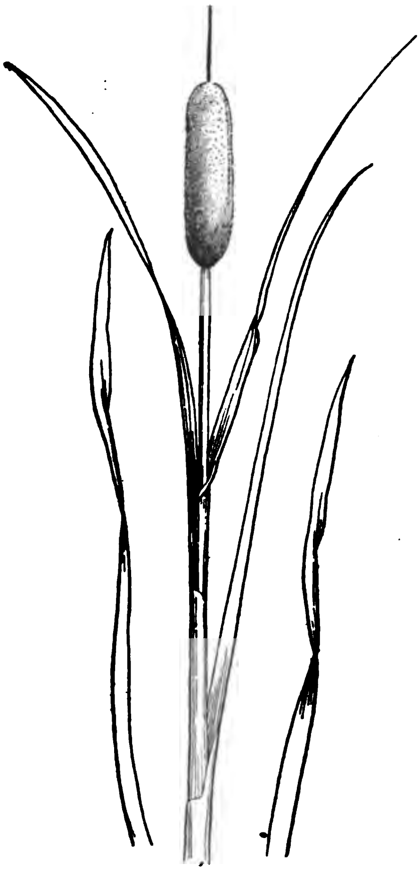
The rapid growth of the use of the typewriter is noteworthy. It was placed on the market in the early seventies and its usefulness was soon appreciated by courts of law, business houses, and governmental departments. In the early eighties its use became general in all departments of Government except the Department of State. It was first used for instructions to diplomatic and consular officers in 1895. The official communications of the Department to diplomatic officers of foreign countries were first executed upon the typewriter in 1897. Ceremonial letters addressed to sovereigns are still hand-written. The Twelfth Census contains an account of an interesting list made by the United States Department of Labor of the comparative speed of typewriting and hand labor. "In this instance the unit required was the copying of 1000 words of statute law; this was accomplished by the typewriter in 19.5 minutes, or at the rate of 51 words per minute, while a copyist with a pen required 1 hour and 14.8 minutes, or about four times as long. The quantity of work done by the typewriter depends to a great extent upon the skill of the operator, but it is true also that the proficiency of the copyist enters largely into the quantity of the work performed by him. However, it is possible to determine an average, and the figures given may be accepted as a fair and reasonable comparison of the two methods."

Typewriters are now an essential part of the equipment of telegraph offices, for so rapidly can messages be transcribed that the receiving operator can not only keep pace with the sender, but can maintain speed so great as to bring about the abbreviation of the telegraphic code.

Recently attention has been directed to the production of power typewriters, in which the operator has merely to touch a key with sufficient force to release latent mechanism, whereupon power from some external source completes the impression. In electrical typewriters, of which several have recently been patented, the impression mechanism is operated by magnets, the operator closing the circuit when he touches the key.

Statistics. According to the census of 1900 there were in the United States 47 typewriter factories, in which a combined capital of $8,400,431 was invested. These factories produced in 1900 144,873 typewriters, valued at $5,624,172. Of the total product $2,697,544 worth, or nearly half the total number, were exported. The enormous growth of the industry during the last decade of the century is shown by the fact that in 1890 there were only 30 factories, having a capital of $1,421,783 and producing an output valued at $3,630,126. That is, the number of establishments increased 56.7 per cent.; the capital invested, 490.8 per cent.; and the value of the product, 91 per cent.

TYPHA (Neo-Lat., from Gk. *τύφη*, *typhē*, cat-tail). A genus of widely distributed marsh plants of the natural order Typhaceæ. Two species are American, *Typha latifolia* and *Typha angustifolia*, and are popularly known as cat's-tail or reed-mace. The former, which is the commoner, is sometimes called bulrush. It grows to the height of five or six feet. The astringent rootstocks are rich in starch and the young shoots of both species are much eaten by the Cossacks of the Don, and are sometimes used in England under the name of Cossack asparagus. The pollen of Typha is inflammable, like that of Lycopodium, for which it is used as a substitute. *Typha angustifolia* and *Typha elephantina* are employed in India and Europe for making mats and baskets, chair bottoms, etc. The leaves of Typha are commonly used in the United States in cooperage to place between the staves and in the seams of barrel heads.



CAT-TAIL (*Typha latifolia*).

TYPHLOP'IDÆ. See Blindworm (2).

TYPHOID FEVER (from Gk. *τυφώδης*, *typhōdēs*, delirious, from *τῦφος*, *typhos*, stupor, mist, vapor, smoke, from *τύφειν*, *typhein*, to smoke; connected with Skt. *dhūpa*, smoke) or Enteric Fever. A specific disease, infectious chiefly or entirely through the excretions, having a febrile period of about three weeks, and characterized by ulceration of the intestinal lymph follicles, swelling of spleen and mesenteric glands, and parenchymatous changes in many organs.

Typhoid fever is due to the presence in the body and to the effects upon the body tissues of a specific micro-organism known as the typhoid bacillus, or bacillus typhosus. This is a small bacillus with rounded ends about two micromillimeters in length and about one-third as broad. It is motile and grows at room temperature on the ordinary culture media, preferably in the presence of air or oxygen, but capable of life without. See Plate of DISEASE OF GERMS. Whether growing in the body or on artificial culture media, the bacillus produces a poisonous substance known as typhotoxin, belonging to the same general class as the toxins of diphtheria, tetanus, etc. During typhoid fever the bacillus is found regularly in the intestinal and mesenteric lymph nodes and as a rule in the spleen. In the early stage of the disease, when the nodes are simply enlarged, few or no bacilli are present in the bowel evacuations. Later, when ulceration of the nodules has occurred, the bacilli are usually found in the stools. In urine and bile it is quite common to find the typhoid bacillus, and in these secretions they may persist long after the passage of the fever, thus furnishing possible sources of infection long after the danger is supposed to have passed. Typhoid bacilli have also been reported in the blood, lungs, pleura, liver, kidney, uterus, and in other organs in which typhoid lesions occur; also in typhoid serous exudates and in the heart in typhoid endometritis.

Contraction of typhoid fever is believed to be always caused by the taking of the bacilli into the mouth and thence into the intestine. Food and drink are usually the vehicles which serve for the entrance of the bacillus, water and milk being probably the most frequent sources of infection. The latter is especially dangerous from the fact that the typhoid bacillus not only lives but multiplies in it. Water and milk, however, are only dangerous when they actually contain the typhoid bacilli which have entered into them from the excretions of persons suffering from the disease.

The initial seat of activity of the typhoid bacillus is undoubtedly in the intestines. Here the bacillus first sets up a catarrhal inflammation of the mucous membrane. This is followed by the most characteristic lesion of typhoid, namely, inflammation of the intestinal lymph nodes. Both solitary nodules and Peyer's patches are affected, although it is in the latter that the changes are usually most marked. There is first congestion of the nodule and of the surrounding tissues, then increase in the size of the nodule. This increase in size of the nodule appears to be due to a proliferation of its cellular elements. Thus there is more or less extensive increase in number of the lymphoid cells and of the endothelial cells which line the lymph sinuses. When the inflammation is severe it may extend not only peripherally to the tissues laterally adjacent, walls involving the muscular and serous coats. These changes are apparently due to the presence in and effects upon the nodules of the typhoid bacillus. Such inflamed nodules may undergo resolution. The results of the inflammation may be absorbed or cast off, or both, and the nodules return to their normal condition. On the other hand, in the more severe grades of the infection, the nodules, instead of undergoing such early repair, go on to necrosis and to the formation of the so-called typhoid ulcers. These ulcers are formed in Peyer's patches, gradually increase in size, and discharge into the intestines. (See PEYER'S GLAND.) Not infrequently they open up blood vessels of considerable size and thus cause one of the gravest accidents of typhoid fever, namely intestinal hemorrhage. Or an ulcer may eat its way through the muscular and serous coats and, opening into the peritoneum, produce what is known as a 'perforation.' This, probably the gravest accident of typhoid, allows bacteria and intestinal contents to soil the peritoneum and leads frequently to the setting up of a general and rapidly fatal peritonitis.

Changes in the liver and spleen are of common occurrence in typhoid fever. Of the two the spleen is most frequently affected. This might be expected on account of the character of the spleen as a lymphatic organ. The changes consist of congestion with proliferation of the cellular elements of the spleen and consequent increase in the size of the organ. Of the conditions which may be present in the liver, the most common is a simple acute degeneration, such as occurs in other infectious diseases.

Lesions not distinctly a part of, but more properly the result of, the typhoid lesions also occur. Thus, in addition to the inflammation of the intestinal lymph nodes already described, there may be extensive involvement of the intestinal mucous membrane. This may lead to gangrene of considerable areas or to the formation of false membranes. Extension of the inflammation through the muscular coat may cause infection of the serous coat and, setting up a localized peritonitis, result in the formation of adhesions. Involvement of lymph glands in other parts of the body may be secondary to the typhoid lesions in the intestinal glands.

Cases of typhoid infection resembling septicæmia, presenting no characteristic lesions and recognizable only by the finding of the bacillus typhosus, have been reported.

Typhoid fever is widely distributed throughout the world, but is especially prevalent in the temperate zones. From its prevalence during the autumn it has been called autumnal fever. Young adults are usually attacked, the affection being comparatively rare among children and old persons. Hot and dry weather are favorable for its development.

The incubation period of enteric fever lasts from 8 to 14 days or, exceptionally, longer. The onset is gradual, feelings of lassitude and malaise being followed by nausea, loss of appetite, headache, pains in the back and extremities, nosebleed, and perhaps a distinct chill. For a few days the patient may go about his work, but at the end of that time is compelled to go to bed. This may be reckoned the definite onset of the disease. The fever is very characteristic. During the first week the temperature rises steadily by a degree or a degree and a half a day until 103° to 105° F. is reached; during the second week the fever remains high; during the third week, in cases of moderate severity, it gradually declines, and in the fourth week convalescence begins. The pulse is rapid, full and soft, and the respirations increased in number. About the 7th to the 10th day the patient presents the typical appearance of enteric fever. He is dull, listless, and apathetic, the eyes are bright, the pupils dilated, the face pale, with flushed cheeks and dark lips. The tongue is dry and red, with a band of white fur on each side. At the end of the first week a rose-pink rash appears on the abdomen. It consists of from ten to thirty raised circular spots, which fade on pressure. These spots last only two or three days, but successive crops appear. The abdomen is distended and tender, and several offensive yellow stools may be passed daily. Death may occur at the end of the second week, from hemorrhage or perforation of the bowel. The third week is marked by great weakness, muscular tremors, delirium, and failing heart, although the fever is slowly dropping, and death may take place from exhaustion. Hemorrhage of the bowel is heralded by a rapid collapse. Convalescence in the average case sets in during the fourth week. The fever abates and appetite and strength gradually return. In a certain number of cases relapses occur; these are, as a rule, shorter and milder than the original attack, but are similar in character. One attack of enteric fever confers immunity from others. The mortality ranges from 10 to 30 per cent.

There are several clinical varieties of typhoid fever. *Mild* and *abortive* forms are characterized by a shorter course and speedy recovery (8 to 10 days), although the onset may be sudden and severe and the symptoms similar in kind to the graver attacks. In the *latent* or *ambulatory* type the onset is mild and the patient does not take to his bed until the disease is well advanced. Hemorrhage or perforation of the bowel may be the first marked symptom of this type; in other instances delirium sets in and the patient goes through a very severe attack. This form is very fatal. *Hemorrhagic* typhoid is a rare form characterized by cutaneous or mucous hemorrhages. Exceptionally, typhoid runs its course without elevation of temperature (the *afebrile* type).

To prevent the spread of typhoid the following precautions are observed. The stools and urine of patients are thoroughly disinfected by immersion in strong solutions of corrosive sublimate, carbolic acid, or chlorinated lime. In districts having a defective drainage system the dejecta may finally be disposed of by mixing with sawdust and burning or burying in trenches after saturation with chloride of lime. Bed pans, rectal thermometers, syringes, tubes, and all other utensils coming in contact with the patient's discharges are disinfected by boiling and immersion in antiseptic solutions. Bedclothes and linen are similarly disinfected. During epidemics drinking water and milk should be boiled and raw vegetables such as lettuce and celery avoided.

Careful nursing and regulated diet are of first importance in the treatment. The patient is strictly confined to bed from the beginning of the disease until the temperature has been normal for at least a week. A liquid diet has been found best throughout the course of the attack. The best food is milk, to which may be added lime water or vichy; or it may be peptonized. Broths, consommé, albumen water, or beef juice are given where milk disagrees or to vary the diet. The patient is urged to take plenty of cool water, and the juice of an orange or lemon may be given at intervals. Food is taken about every three hours during the day, and once or twice at night if there is great exhaustion.

Control of the fever is the most important element in the direct treatment of typhoid, and this is best accomplished by means of cold water, by sponging, the wet pack, and bathing. Sponging is valuable when a full bath cannot be given and for children and delicate persons. The cold pack consists in wrapping the patient in a sheet wrung out of water at 60° or 65° and sprinkling cold water over the body with an ordinary watering pot or similar device. The full bath, or 'cold tubbing,' was introduced by Brand of Germany, and this treatment is now almost universally followed in hospitals. By its use the fever is reduced, sleep is obtained, all the symptoms are rendered less intense, and the mortality greatly lowered. In giving the Brand bath the entire body except the head is immersed in water, beginning at a temperature of 70°, which is gradually lowered by adding pieces of ice. The bath lasts 15 or 20 minutes and is given whenever the fever rises above 102½° F., or on an average of once in three hours. Vigorous rubbing of the trunk (with the exception of the abdomen) and extremities in order to prevent chilling and to increase the stimulating effect of the bath is kept up while the patient is immersed. After tubbing the patient is wrapped in blankets and hot-water bottles put to the feet. This procedure is usually followed by a refreshing sleep. The drug treatment of typhoid is symptomatic. Bathing renders febrifuges unnecessary. Antipyrine and phenacetin are sometimes given, but they tend to depress the heart. Intestinal antiseptics, such as turpentine, salol, and carbolic acid, render the stools less offensive and prevent the production of gas. Return to solid food must be gradual on account of the danger of perforation through intestinal ulcers.

Widal's Test for Typhoid Fever. This is a comparatively newly discovered method of diagnosis. It depends upon the fact that the blood of typhoid-fever patients acquires the property of causing a reaction when brought into contact with active typhoid bacilli. In the actual test a small amount of blood or serum (either fresh or dried), diluted, is mixed with a fresh pure culture of the typhoid bacillus. The result may be watched in a hanging drop with a high-power lens. It consists in a destruction of the motility of the bacilli and their agglutination, that is their collection into larger or smaller clumps. The reaction may not occur in the first stages of the disease. A positive result with quite dilute serum makes the diagnosis of typhoid almost certain, although the reaction does sometimes occur in other diseases, especially in the one often most difficult to differentiate clinically from typhoid fever, namely acute miliary tuberculosis.

Serum inoculations for the prevention of typhoid fever have been recently introduced. The method is known as Haffkine's. The fluid injected is an emulsion of the typhoid bacillus after the bacilli have been killed by heat. Favorable results from the use of this serum have been reported. See Serum Therapy.

Consult Curschmann, "Typhus and Typhoid Fevers," in *Nothnagel's Encyclopedia* (Eng. trans., Philadelphia, 1901); Osler, *Studies in Typhoid Fevers* (Baltimore, 1895) and *Problems of Typhoid Fever in the United States* (ib., 1899); and Strümpell, *Textbook of Medicine* (Eng. trans., New York, 1901).

TYPHON (Lat., from Gk. Τυφών), or TYPHOEUS. In Greek legend, the offspring of Gæa, or Earth, and Tartarus. He was a fire-breathing monster with one hundred serpent heads, who after the overthrow of the Titans strove to wrest the power from Zeus. He was finally smitten by the thunderbolt and cast into Tartarus. By Echidna he was the father of many monsters who were destroyed by Hercules. Typhon seems to be the personification of the volcanic elements, and the scene of the conflict is at first in the volcanic regions of Lydia and Phrygia, and later about Etna and Stromboli, while the description in Hesiod of the battle with Zeus is a vivid picture of a violent eruption. For the Egyptian Set-Typhon, who later influenced the Greek story, see SET.

TYPHOON (Port. *tufão*, from Ar. Pers. *tūfān*, tempest, hurricane, from *tūfānidan*, to roar, cry out; cf. Gk. Τυφῶν, *Typhōn*, Typhon (q.v.); also Chin. *t'ai fung*, great wind, Formosan Chin. *tai fŭng*, typhoon). The name applied to the hurricanes that visit the waters east of Asia. From a meteorological point of view the typhoon is a special case of the so-called cyclonic storm. Typhoons usually originate far to the east and nearer the equator than Manila; they move toward the west or west-northwest, but gradually curve so that they often pass northward or northeastward along the coasts of China and Japan. Typhoons appear to be quite as severe on the average as the West Indian hurricanes; the barometer falls even lower at the centre, and the rainfall is probably heavier. Knowledge of the laws of typhoons is now sufficient to justify cautious predictions of their paths and the issuance of storm warnings to navigators. All the baguios and typhoons of the North Pacific Ocean have been classified as follows by Doberch, Algué, and Bergholz:

Group 1 occur between December and March; the storms originate between 5° N. and 12° N., and 145° E. and 143° E.; move at first toward the north-northwest; reach the vertices of their parabolic orbits in latitude 15°-19° N. and then turn toward the north-northeast.

Group 2 occur in April and May or October and November; originate between 129° E. and 147° E. and 5° N. and 12° N.; move toward the northwest; have their vertices in latitude 16°-21°, and then move toward the northeast.

Group 3 occur between June and September; originate between 139° E. and 126° E. and 20° N. and 8° N., move at first toward the northwest by north; have their vertices at 21°-25° N. and then turn to the northeast by east.

When typhoons reach the China Sea in the months of December-March they generally continue onward toward the east-northeast, and are lost in the interior of the country. Those that occur in the summer and spring months recurve much more frequently, attain higher latitudes, and are frequently destructive in Japan and adjacent waters; occasionally these continue moving northeast until they reach Bering Sea or the Aleutian Islands. Full details of typhoons are published regularly by the meteorological offices of Hong Kong, Tokio, and Manila, and their general tracks, together with occasional special studies, are published on the Pilot Charts of the Pacific Ocean, published monthly by the United States Hydrographic Office.

TYPHUS FEVER (Neo-Lat., from Gk. τῦφος, stupor, mist, vapor, smoke), JAIL FEVER, SHIP FEVER, or SPOTTED FEVER. An acute, specific and highly contagious fever, endemic, and also prevailing in epidemics, especially in times of destitution and in the presence of overcrowding and bad ventilation, presumably due to a micro-organism, as yet undiscovered, and attended with no characteristic lesion of the tissues, as in the case of typhoid fever, but with serious alteration of the blood. It is ushered in by an abrupt onset, with marked nervous symptoms, rheumatic pains, rigors, and headache. A maculated eruption appears, most commonly on the fifth day of the disease, of slightly elevated spots, disappearing on pressure at first, afterwards persistent and darker, and there is early prostration of the nervous and muscular systems. Delirium usually comes on during the second week, sometimes of an acute and noisy character, but oftener of a low, wandering kind, with a tendency to stupor. The fever terminates by a crisis, which generally occurs on or about the fourteenth day, after which recovery is very rapid.

In former centuries typhus fever was a common scourge, in times of war and famine, under the names of jail fever, camp fever, ship fever, and the like. It is a disease of the temperate and cold zones, and this fact is regarded as caused to a considerable extent by the mode of life adopted by a great majority of the peoples of cold countries congregating, as multitudes of them do, in badly ventilated habitations. At the present time the disease is limited to half-civilized countries and to the slums of seaport cities. Local outbreaks sometimes occur on ships, and in jails and poorhouses. The mortality in different epidemics varies from 12 to 20 per cent. The disease is much more fatal after middle age than in the young. It was for a long time confused with typhoid fever (q.v.), but it differs from this in many ways.

The treatment of typhus is symptomatic. As the disease is exceedingly contagious, patients are promptly isolated and all objects that may have come in contact with them thoroughly disinfected. The high temperature is reduced by means of cold sponging, the cold pack, or bathing, and by the administration of quinine, antifebrine, or phenacetin. All patients are benefited by small doses of the mineral acids, and mild saline laxatives. For the headache and delirium cold applications to the head are indicated. Alcohol is used as a stimulant throughout the attack, to combat the great prostration. During convalescence such tonics as strychnine and quinine are most useful. The patient may be nourished by liquid foods.

TYPICAL PHRASE (Lat. *typicalis*, from *typicus*, from Gk. τυπικός, *typikos*, relating to a type, conformable, from τύπος, *typos*, type, figure, impress, blow). In dramatic music, the recurrence of a theme or phrase to mark the similarity of the dramatic situation between the part where such a phrase occurs and the part where it was first heard. The typical phrase is essentially different from the leitmotiv. Whereas the leitmotiv constitutes the basic material and is employed like a theme in a symphony, the typical phrase is only a quotation, and can do nothing more than recall a similar situation (q.v.).

TYPOGRAPHICAL UNION OF NORTH AMERICA, THE INTERNATIONAL. The labor organization of the printers and those engaged in kindred trades, the oldest national trade union in the United States. It was organized in 1850 as the National Convention of Journeymen Printers, but assumed the name National Typographical Union in 1852, and the present name in 1869. The International Typographical Union is an industrial union and claims jurisdiction over all branches of the printing and kindred trades, except those over which jurisdiction has been conceded by agreement. In 1902 the International Typographical Union concluded an 'arbitration agreement' with the American Newspaper Publishers' Association to last until 1907, by which the former undertakes to arbitrate all trade differences with members of the Publishers' Association who agree by contract to accept arbitration. About 90 per cent. of the publishers have concluded such contracts.

In organization the International Typographical Union is a typical industrial union. Provision is made for the separation of the different trades into trade district unions, which retain a large measure of autonomy, although they combine for purposes of defense, in each jurisdiction where there are unions of more than one trade, in allied printing trades councils. The International itself, however, strictly regulates the maximum hours of labor of all members, the number of days' work per week, the method of securing work and the discharge of employees (through foremen, who must belong to the union), the employment of substitutes, type standards in the fixation of piece scales, the use of sub-lists (lists of authorized substitute workers), and the interchange between newspapers, not owned by the same company, of matter previously used either in the form of type, matrices, or photo-engraved plates. Of the receipts from the regular dues, one-sixth is apportioned to the general fund, one-fourth to the defense fund, one-fourth to the burial fund, and one-third to the endowment fund of the Union Printers' Home at Colorado Springs, Colo. In the fiscal year ending May 31, 1902, the receipts amounted to $151,141 and the expenditures to $145,760. The average membership in 1901 was 34,948. The official organ, *The Typographical Journal*, is published monthly at the headquarters in Indianapolis, Ind.

TYPOGRAPHY. See PRINTING.

TYR, tīr (Icel. *Tȳr*, AS. *Tīw*, OHG. *Zio;* connected with Lat. *Ju-pitar*, Gk. Ζεύς, *Zeus*, the chief god, Skt. *dyāuṣ*, sky, and ultimately with Lat. *deus*, OIr. *día*, Lith. *dévas*, Skt. *dēva*, god). The old Norse name of a Teutonic deity. It is possible that in the early common Germanic system Tyr was the foremost god, whose place was later taken by Odin. In the Eddas he is represented as the son of Odin, and was the god of war and fame. When the Æsir (q.v.) persuaded the wolf Fenrir (q.v.) to allow himself to be bound with the cord Gleipnir, Tyr put his right hand in the wolf's mouth, as a pledge that he would be loosened, and when the gods refused to release Fenrir the wolf bit the hand off at the wrist. At the twilight of the gods he met his death at the same time with his enemy the monster dog Garm. See RAGNARÖK; SCANDINAVIAN AND TEUTONIC MYTHOLOGY.

TYRANT (Lat. *tyrannus*, from Gk. *τύραννος*, master, sovereign, connected with Skt. *turaṇyu*, pressing forward, *tar*, *tur*, to pass through, Lith. *tureti*, to have). A name given in modern times to an arbitrary and oppressive ruler, but by the ancient Greeks applied not necessarily to one that exercised power badly, but merely to one that obtained it illegally, or to one who held the sovereignty originally established by usurpation. While tyrants appear sporadically at all periods in Greek history, they were especially numerous during the seventh and sixth centuries B.C., when it was not difficult for an ambitious and unscrupulous man, often a noble, to appear as a leader of the populace and by its aid secure power. Often a violent seizure of the power was welcomed as affording relief from present evils. In other cases the 'tyrant' of the nobles was a lawgiver to the *demos*. These early tyrants seem usually to have ruled generously toward the poorer classes, but toward other nobles they were naturally suspicious and frequently stern and cruel. While there are cases in which ancient testimony declares the 'tyrant' a true tyrant in the modern sense, the greater number of these men seem to have aimed at a just rule, and the glory and prosperity of their States, and were frequently the patrons of literature and the fine arts. This is especially noticeable in the Sicilian tyrants of the fifth century B.C. After the Persian Wars, the development of democracy and the rise of Athens led to the passing away of this form of government, to revive with the general weakening of the Greek States. This later period of tyranny, which begins in the fourth century B.C., is not marked by so wide an extension of the evil, but, on the other hand, a few of the possessors of the power are men of extraordinary ability, who, having proved capable of restoring or rescuing an enfeebled State, have seized or been given the supreme control. Such were Dionysius I. of Syracuse and Jason of Pheræ. In general this second series of tryants were more cruel and arbitrary than the earlier generation. The *Thirty Tyrants* of Athens were only an oligarchical board established in the interest of Sparta in B.C. 404, and owed the name 'Tyrants' to later writers, their contemporaries referring to them as 'The Thirty.' Consult: Plass, *Die Tyrannis bei den Griechen* (Bremen, 1852); Zeller, *Ueber den Begriff der Tyrannis bei den Griechen* (Berlin, 1887); Schömann-Lipsius, *Griechische Alterthümer* (4th ed., ib., 1897).

TYRANT FLYCATCHER. See FLYCATCHER.

TYRCON'NEL, RICHARD TALBOT, Earl and titular Duke of (1630-91). Viceroy of Ireland. He was the youngest son of Sir William Talbot, of County Kildare, Ireland, a prominent Roman Catholic politician during the reign of James I. He fought against Cromwell at Drogheda and after the death of Charles I. lived in Spain and Flanders. In his youth he was notorious as a sharper and bully and under the Protectorate he was recommended as a man fit to assassinate Cromwell. Soon after the Restoration he endeavored to obtain the favor of the royal family by blackening the reputation of Anne Hyde, so as to furnish the Duke of York with a pretext for breaking his promise of marriage to her. Though unable to injure her reputation, he succeeded in gaining the favor of the Duke, and contrived to make himself welcome at the palace both as a votary of its pleasures and as a counselor in affairs of State. Immediately on the accession of James II. he was made Earl of Tyrconnel, and put in command of the troops in Ireland. He now aimed, by means of the Irish army, to make the King independent of Parliament. To this end he discharged Protestant soldiers, and favored Roman Catholics in every possible way, admitting them not only to the army, but to offices and corporations. This service he performed so well that in 1687 the King made him Lord Deputy of Ireland. His arrival in that country spread terror and dismay through the English Protestant population, who had already suffered under his military rule. Finding themselves without protection and their property a prey to marauders, many of them left the country, commerce declined, and economic conditions became wretched. But this state of affairs did not last long. On the arrival of James II. in Ireland in 1689, after his flight from England, he created the Earl Duke of Tyrconnel. After the fatal battle of the Boyne (1690), in which the Duke held high command, he retired to France. In 1691 he returned to Ireland, to further the cause of James. Notwithstanding the defeat of Aughrim (July 12, 1691), and the capitulation of Galway, Tyrconnel made preparations for the defense of Limerick, binding himself and his countrymen by oath not to surrender until they received permission from James, then at Saint Germain. At the same time, however, he dispatched a letter in which he stated his conviction that all was lost. On August 11th, before an answer could arrive, he was stricken with appolexy, and died on the 14th.

TYRE, tīr (Lat. *Tyrus*, from Gk. Τυὸός, from Phœnician *Ṣūr*, rock). The most important city of ancient Phœnicia, situated on the Mediterranean coast about 50 miles south of Beirut (Map: Turkey in Asia, F 6). It derived its name from the double rock lying just off the coast, which was the site of the earliest settlement. At present this portion of the city is connected with the mainland by a causeway which goes back to the days of Alexander the Great; before the Greek period, however, the older Tyre was an island divided by a natural canal into two parts. It has now been definitely ascertained that the old sanctuary to Melkart, the Baal or chief deity of Tyre, stood on the southwestern part of the little island, and with this determination the priority of the settlement of the island over the adjoining coast is also determined. From the island settlement the city grew until it included as a suburb the adjoining coast land, and after the union of island and coast the entire settlement was known as the city of Tyre. From a strategic point of view, the situation of Tyre was most favorable, while its admirable ports predestined it for the commercial rôle it was to play. Those ports were chiefly two, the 'Sidonian port' and the 'Egyptian harbor.' Whether Tyre or Sidon is the oldest settlement of Phœnicia is a question not easily answered. On the whole, the evidence is in favor of the latter, though the view formerly held, which made Tyre an offshoot of Sidon, must be abandoned in the light of recent researches. Herodotus records a tradition which traced the settlement of Tyre back to the twenty-eighth century B.C. The date may be somewhat too early, though when Egypt began her campaigns for the possession of Western Asia under Thothmes I. (c.1510 B.C.) Tyre was already a flourishing and important centre. A new period of prosperity began for Tyre with the decline of Egyptian control (c.1400 B.C.), and though we know little of the history of the place for the next three centuries the important position which it occupied when Tiglathpileser I. of Assyria (c. 1130 B.C.) opened his successful series of campaigns to the West justifies the conclusion that in the interval Tyre more than maintained her supremacy over Sidon and surrounding districts. It was a period of commercial extension, followed by a decline due to internal disturbances. It was not until c. 870 B.C., that, so far as present knowledge goes, an Assyrian king, Asshurnasirpal, included Tyre and Sidon in his campaigns and obtained tribute from these two cities as well as from Byblos and Arvad. Among the kings of this period known to us from a list of Menander preserved by Josephus is Hiram (B.C. 969-936), from whom Solomon, apparently as a vassal of Tyre, obtained material and workmen for his building operations. (See HIRAM; SOLOMON.) After the days of Asshurnasirpal, the compact between Tyre and Assyria remained uninterrupted, with the exception of short intervals. To save her commerce and her position of supremacy, Tyre preferred to pay tribute rather than risk an encounter at arms with Assyria. In the days of Sennacherib (B.C. 705-681), however, Tyre paid for a manifestation of independence by an encounter with the Assyrian monarch, which ended in a momentary defeat for the Assyrians. Tyre, however, was cut off from communication with the coast, and after enduring a siege of five years, according to Menander's annals, was obliged to submit (c. 700 B.C.) Tyre recovered from this blow and entered into a combination with Egypt to resist the advance of Esarhaddon, the successor of Sennacherib, who had to content himself with receiving the homage of King Baal of Tyre without actually capturing the city; but Asshurbanipal, his successor, finally succeeded toward the end of his reign (B.C. 668-626) in forcing the city to surrender. Tyre became an Assyrian vassal, but her commercial position was unaffected, and the fall of Assyria (c. 607 B.C.) enabled her once more to assert her independence. A fatal blow was dealt her by Nebuchadnezzar II. The city withstood a dire siege for thirteen years. At the end of that time (B.C. 572) her strength was exhausted, she yielded, and her old rival Sidon profited by the loss of trade which followed, to take up the superior position in the commercial world. The last native ruler of Tyre was Ittobaal. He was followed by governors appointed at the dictation of Babylonian rulers until the Persian conquest of Babylonia.

From that time on till the days of Alexander the Great the history of Tyre is that of a steady decline. It was taken by Alexander in B.C. 332

after a seven months' siege, and by Antigonus seventeen years later, after a siege of fourteen months. During the Roman period and in the Middle Ages it was still an important commercial town. It was captured by the Crusaders under Baldwin II. in 1124 and remained in the hands of the Christians till 1291, when it was taken and destroyed by Malik al-Ashraf, ruler of Egypt and Syria. It has never recovered its old importance. The present town (Ar. *Ṣūr*) has about 6000 inhabitants and offers few attractions. Consult: Jeremias, *Tyrus bis zur Zeit Nebukadnezars* (Leipzig, 1891); Krall, "Studien zur Geschichte des alten Aegyptens, iii., Tyros und Sidon," in *Sitzungsberichte der kaiserlichen Akademie der Wissenschaften zu Wien*, vol. cxvi. (1888); Prutz, *Aus Phönizien* (Leipzig, 1876); Lucas, *Geschichte der Stadt Tyros zur Zeit der Kreuzzüge* (Berlin, 1896).

TYRNAU, or **TIRNAU**, tẽr′nou (Hung., *Nagy-Szombat;* Slav, *Trnava*). A town of Hungary, on the River Trnava, 25 miles northeast of Pressburg. It has a cathedral, dating from 1389, and a large episcopal palace. Tyrnau has manufactures of cloth, linen, vinegar, sugar, and malt products, and has a general trade, especially in wine. Population, in 1900, 13,281, mostly Slovaks and Magyars.

TYR′OL, or **TIR′OL**, *Ger. pron.* tê-rōl′. A crownland of Austria, united with Vorarlberg under one administration. It is bounded on the north by Bavaria, on the east by Salzburg and Carinthia, on the south by Italy, and on the west by Switzerland and Vorarlberg (Map: Austria, B 3). Area about 10,300 square miles. Tyrol is almost entirely covered by the Alps. It resembles Switzerland, except that it has no large lakes. The Lago di Garda, however, enters on the south. Through the northern part extends the valley of the Inn, with the Lech Alps on the northwest. The Inn is the most important river in the crownland. It becomes navigable at Hall, just below Innsbruck. The watershed in Tyrol between the Danube and the Po, separating northern from southern Tyrol, is formed by the Oetzthal Alps on the west (reaching about 12,500 feet) and by the Zillerthal Alps toward the east. The famous Brenner Pass lies between and marks the chief depression of the divide. In the Zillerthal group rises the Drave. It flows through the Pusterthal, and leaves Tyrol on the extreme eastern boundary. The southern end of Tyrol is mainly occupied by the valley of the Adige, with the remarkable Dolomite Alps on the east. The Adige flows south and enters Italy west of the Lessinian Alps, which line the Italian frontier. The Sarnthal Alps lie in the centre of Tyrol, at the eastern foot of the Oetzthal Alps. Tyrol contains and is bordered by numerous other groups of mountains. The Hohe Tauern (with the Gross Glockner peak, about 12,500 feet) forms the northeastern boundary, the Kitzbühl Alps lie on the Salzburg border, and the Ortler group enters from the southwest and forms the loftiest elevation in Tyrol—12,790 feet. The mountains of Tyrol are famous for their picturesque valleys. The climate is of great variety. In the north—the valley of the Inn—it is raw and cold, as is also the case in the Pusterthal. In the south, in the region of the Adige, the climate is hot in summer, and the lassitude of Italy is felt.

Tyrol is in general little adapted to tillage, the better portions being devoted mainly to meadows. About two-thirds of the surface is covered with forests. The agricultural sections are in the valleys in the northern and southern districts. Southern Tyrol is noted for its wine, and it grows much fruit. Zinc and sulphur are mined; also some coal, iron, and copper. The industries are not extensive. Cotton goods are produced in the Inn Valley and silk goods in the Adige district. Spinning and weaving as house industries are conspicuous. The wood-carving is famous. Carpets, iron wares, and marble are shipped, as well as cattle, lumber, and cheese. There is a university at the capital, Innsbruck. Tyrol has a Diet of 68 members—34 representing the rural communities, 13 the towns, and 10 the landed aristocracy, the principal ecclesiastical dignitaries having seats in the body. The Statthalter in Innsbruck is at the head of the administration for Tyrol and Vorarlberg, but Vorarlberg has its own Constitution and Diet. Tyrol sends 21 members to the Lower House of the Austrian Reichsrat. The population in 1900 was 850,062, mostly Catholics. About 55 per cent. of the inhabitants are Germans, nearly all of the remainder being Italians and Ladins.

HISTORY. In Roman times Tyrol formed part of Rhætia, which was conquered by the Romans, B.C. 15. At the time of the great migration of nations it was overrun by various German tribes, including the Ostrogoths. The southern portion later fell into the hands of the Lombards, and the northern became subject to the Bavarians, who were subdued by the Franks. Ultimately the country was divided into a number of petty lordships, some under the suzerainty of the dukes of Bavaria, some under that of the bishops of Trent, and others under that of the bishops of Brixen. The whole of German Tyrol finally came into possession of one family, the counts of the Adige or of Tyrol (the latter being the name of their castle, so-called from the Roman Teriolis, near the site of which it stood). The last Count, who died in 1335, left one daughter, Margaret Maultasch. She bequeathed her rights to her cousins, the dukes of Austria, who thus acquired possession of Tyrol in 1363. The Italian slope remained in possession of the bishops of Trent, who were dispossessed in 1803. By the Treaty of Pressburg in 1805 Tyrol was ceded to Bavaria, much to the discontent of the people, who were warmly attached to the House of Austria. They made a gallant resistance to the French in 1809, under Andreas Hofer (q.v.), but were defeated. By the Treaty of Schönbrunn the county was divided into three parts, North Tyrol going to Bavaria, South Tyrol to the Kingdom of Italy, and the eastern part being annexed to the Illyrian Provinces. Tyrol was restored to Austria by the Treaty of Paris in 1814. The acquisition of Italian Tyrol forms part of the programme of the Italian irredentists. See IRREDENTISM.

BIBLIOGRAPHY. Baillie-Grohman, *Tirol and the Tirolese* (London, 1876); Busk, *The Valleys of Tirol* (ib., 1874); Schneller, *Landeskunde von Tirol* (Innsbruck, 1872); Achleitner and Uhl, *Tirol und Vorarlberg* (Leipzig, 1902); Houshofer, *Tirol* (Bielefeld, 1903); Purtscheller and Hess, *Der Hochtourist in den Ostalpen* (Leipzig, 1899). For history, consult: Huber, *Geschichte der*

Vereinigung Tirols mit Oesterreich (Innsbruck, 1864); Egger, *Geschichte Tirols* (ib., 1872-80).

TYROLIENNE, tē'rō'lyĕn' (Fr., Tyrolese). A Tyrolese dance, or dance-song. It is best heard in the Zillerthal, in the Tryolese Alps. A characteristic feature is the Jodler. See JODELN.

TYRONE, tī-rōn' (Ir., *Tir-owen*, Owen's country). An inland county of Ulster, Ireland, bounded north by Londonderry, east by Armagh and Lough Neagh, south by Monaghan and Fermanagh, and west by the last-named county and Donegal (Map: Ireland, D 2). Area, 1260 square miles. The principal rivers are the Blackwater, the Foyle, and the Mourne. The northwestern mountains rise in Slieve Sawel to a height of 2236 feet. Between Dungannon and Stewartstown there is a small but productive coal-field. The soil of the plain is fertile; the hilly districts are sandy or gravelly, and devoted to pasturage. There are manufactures of linens and coarse woolens and earthware. Population, in 1841, 313,000; in 1851, 255,700; in 1891, 171,401; in 1901, 150,470. The capital is Omagh.

TYRONE. A borough in Blair County, Pa., 15 miles northeast of Altoona, on the Little Juniata River, and on the Pennsylvania Railroad (Map: Pennsylvania C 3). It has considerable commercial importance, being an outlet for the Clearfield coal fields, and is noted especially for the manufacture of various paper products. There are iron works, tube works, planing mills, a tannery, and box and shoe factories. Tyrone is also an important railroad junction and has large repair shops. The Birmingham Female Seminary is three miles distant. The government is vested in a burgess, elected every three years, and a unicameral council. Tyrone was settled about 1811, and was incorporated in 1857. Population, in 1890, 4705; in 1900, 58447.

TYRONE, HUGH O'NEILL, second Earl of (1540?-1616). An Irish soldier and revolutionist. He was the grandson of the first Earl, his father, who was illegitimate, being Baron of Dugannon. His elder brother was murdered in 1562, and Hugh became Baron of Dugannon, for precaution being sent to England. In 1568 he returned to Ireland, and for some years had great difficulty in maintaining his position against his encroaching kinsmen. In 1580 he commanded a troop of horse in Munster against the rebel Earl of Desmond, and in 1583 was appointed commander of the northern marches. In 1585 he was allowed to style himself the Earl of Tyrone, and, strengthening his power in 1587, visited England to petition for a restitution of the whole of the lands granted to his putative grandfather by Henry VIII. In this he was unsuccessful, and, resenting the visit of commissioners sent to arbitrate his differences with his rival, Turlough Luineach, he attacked the latter, but was defeated. He was placed under restraint and shortly afterwards pardoned, but he entered on a course of intrigue to separate Ireland from England, offered the crown of Ireland to Philip II. of Spain, and after a comparatively successful campaign, in which he defeated Sir John Norris, he killed his brother-in-law, Sir H. Bagnal, and effected a truce with the Earl of Essex. In 1601 he was worsted by Lord Mountjoy, to whom he surrendered about the beginning of 1603. He was soon after pardoned. In 1607, being suspected of again conspiring, he fled to Brussels, afterwards proceeding to Rome, where he lived in penury until his death, on a small pension allowed him by the Pope and the Spanish King.

TYROTOXICON (Neo-Lat., from Gk. *τυρός*, *tyros*, cheese + *τοξικόν*, *toxikon*, poison). An alkaloid isolated from poisonous cheese, by Victor C. Vaughan, of Michigan, in 1885, and named by him in ignorance of the fact that Kuhn, of Leipzig, had given this name in 1824 to "a poisonous principle formed in cheese by putrefaction." Vaughan obtained his crystallizable principle by making a clear, filtered aqueous extract of the suspected cheese, which was highly acid, then treating with ether and evaporating the ether. His finding was corroborated by Schaeffer, Stanton, Firth, Ladd, Wolff, Novy, and others. The principle has been found in ice-cream and cream puffs, as well as in milk. To obtain it from poisonous milk, the milk (normally acid) is filtered, neutralized with sodium carbonate, agitated with ether, and allowed to stand twenty-four hours, after which the ether is evaporated. The residue is acidified with nitric acid and then treated with an equal volume of a saturated solution of potassium hydrate, and heated. The tyrotoxicon crystallizes in beautiful six-sided plates along with prisms of potassium nitrate. The chemical character of tyrotoxicon is not well defined.

The symptoms of tyrotoxicon poisoning are vomiting, diarrhœa, pain over the stomach, coated tongue, feeble and irregular pulse, pale and cyanosed face. In some cases the body is covered with spots. In others there is marked dryness and constriction of the throat. In all there is marked nerve exhaustion. The treatment of tyrotoxicon poisoning consists in emptying and flushing the digestive tract, and supporting the heart.

TYR'RELL, ROBERT YELVERTON (1844—). An Irish classical philologist, born at Ballingarry, County Tipperary, Ireland, and educated at Trinity College, Dublin. He was appointed fellow of Trinity College in 1868, was made professor of Latin in 1871, and held the office of regius professor of Greek from 1880 to 1898. He was a frequent contributor to English reviews, and edited and translated many classical works. The most important of his works are an edition, with Purser, of the *Correspondence of Cicero* (1879-1900); *Bacchæ of Euripides* (2d ed. 1897); *Troades* (2d ed. 1897); *Miles Gloriosus of Plautus* (2d ed. 1886); *Latin Poetry* (1895).

TYRRHE'NIAN SEA (Lat. *Tyrrhenum mare*). That part of the Mediterranean Sea which is inclosed between the islands of Corsica and Sardinia on the west, Sicily on the south, and the Italian peninsula on the east (Map: Italy, F 7).

TYRTÆ'US (Lat., from Gk. Τυρταῖος, Τύρταιος, *Tyrtaois*) (fl. c. 630 B.C.). A Greek lyric poet, famous for his political elegies and marching songs. According to Attic tradition, he was a lame schoolmaster of Aphidnæ, in Attica, of low birth, whom the Athenians, ignorant of his lyric power and jealous of the Lacedæmonians, sent to Sparta when the Lacedæmonians, at the advice of Delphic Apollo, asked them for assistance against the Messenians. The tradition, however, is only the invention of a late time. Tyrtæus was no doubt a Spartan, or an Ionian who had moved to Sparta. By his poems he aroused the Spartans and led them to victory over their foes. The fragments of his work are published by Bergk, *Poetæ Lyrici Græci*, 4th ed., vol. ii. (Leipzig, 1882).

TYRWHITT, Richard St. John (1827-95). An English art-writer. He graduated at Christ Church, Oxford, in 1849, and was a tutor from 1852 to 1856. Ordained in the English Church, he was vicar of Saint Mary Magdalen at Oxford from 1858 to 1872. Tyrwhitt had an uncommon artistic insight and exhibited several water colors. But a lack of technical training led him to forego original painting for the interpretation of the work of others. Among his works are: *Concerning Clerical Powers and Duties* (1861); *Christian Art and Symbolism, with Hints on the Study of Landscape* (1872); *The Art Teaching of the Primitive Church* (1874); *Greek and Gothic: Progress and Decay in the Three Arts of Architecture, Sculpture, and Painting* (1881); *An Amateur Art Book: Lectures* (1886). He also published a novel and a volume of verse called *Free Field Lyrics* (1888).

TYRWHITT, Thomas (1730-86). An English scholar, born in London. He was educated at Eton and at Queen's College, Oxford, where he graduated in 1750. Five years later he was elected fellow of Merton, and called to the bar at the Middle Temple; but he never practiced the law. From 1756 to 1762 he was Deputy Secretary of War, and from 1762 to 1768 clerk of the House of Commons. Both of these positions he resigned, for they interfered with his studies. Tyrwhitt is now best known for his edition of Chaucer's *Canterbury Tales* (4 vols., 1775; 5th vol. 1778). He also punctured the Chatterton bubble (1778 and 1782). His classical scholarship is represented by a dissertation on Babrius (1776) and an edition of Aristotle's *Poetics* (posthumous, 1794).

TYTLER, tĭt'lẽr, Alexander Fraser (1747-1813). A Scotch historical writer, and a judge of the Court of Session in Scotland under the title of Lord Woodhouselee. He was born in Edinburgh, where he was educated. In 1770 he was called to the Scottish bar. In 1780 he became professor of history in the University of Edinburgh; in 1790, judge-advocate of Scotland; and in 1802 he was raised to the bench of the Court of Session. His writings include a biography of Henry Home, Lord Kames (1807); *The Decisions of the Court of Session;* and the work by which he was long known, *Elements of General History* (1801).

TYTLER, Patrick Fraser (1791-1849). A Scotch historical writer, born in Edinburgh, the fourth son of Alexander Fraser Tytler, Lord Woodhouselee. He was educated partly in Edinburgh, partly in England, and was called to the Scottish bar in 1813. Three years later he was appointed King's counsel, but devoted himself chiefly to the production of various literary and historical works, the most valuable of which is his *History of Scotland* (1828-43), beginning at the accession of Alexander III. and terminating at the union of the crowns, a book of more original research than any preceding work on the same subject. His writings also include *Life of James Crichton of Cluny, commonly called the Admirable Crichton* (1819); *Life and Writings of Sir Thomas Craig of Riccarton* (1823); *Life of John Wicliff* (1826); *Lives of Scottish Worthies* (1831-33); *Historical View of the Progress of Discovery on the More Northern Coasts of America* (1832); *Life of Sir Walter Raleigh* (1833); *Life of King Henry VIII.* (1837); and *England Under the Reigns of Edward VI. and Mary*, with the contemporary history of Europe (1839). In consideration of his merits as an historian, Sir Robert Peel's Government conferred on him a pension of £200 a year. Cousult Burgon, *Life of Patrick Fraser Tytler* (London, 1859).

TYUMEN, tyōō-mān'y'. A town in Siberia. See Tiumen.

TZANA, tsä'nȧ, **TANA,** or **DEMBEA.** A lake in Abyssinia, situated between 11° 35′ and 12° 16′ north latitude, at a height of nearly 6000 feet, and occupying an area of 1150 square miles (Map: Africa, H 3). It is surrounded by volcanic mountains, and receives over thirty affluents, and discharges its waters through the Blue Nile. It contains a number of inhabited islets.

TZENTAL, tsĕn'täl. An ancient cultured nation of Mayan stock, occupying a large part of the States of Tabasco and Northern Chiapas, in Mexico. Their traditional culture hero was Votan, who was said to have built the great ruins at Palenqué (q.v.), in Chiapas, and their general civilization resembled that of the Maya and other cognate tribes. They still constitute an important part of the population of their ancient territory.

TZETZES, tsĕt'sēz, Johannes (Lat., from Gk. 'Ιωάννης Τζετζης) (twelfth century A.D.). A Byzantine author and grammarian, who devoted himself to classical Greek literature. He was author of a large number of works, both prose and verse, which are excessively dull and show not a trace of literary genius, but have considerable value as sources of classical information not available elsewhere. His principal writings are his poems *Iliaca*, which included the *Ante-Homerica*, *Homerica*, and *Post-Homerica*, and dealt with the entire Trojan tradition, and are best edited by Bekker (Berlin, 1816). His *Chiliades*, his most comprehensive work, is a didactic poem in 12,674 verses, which is divided into sixty chapters, treating of mythological, literary, and historical miscellanies. This huge work was provided by its author with explanatory scholia; it was edited by Kiessling (Leipzig, 1826). Other works of his are: a collection of 107 letters, his Scholia to Hesiod, Aristophanes, Lycophron's *Alexandra*, Oppian's *Halieutica*, and many other works of minor importance. His elder brother, Isaak Tzetzes, was probably associated with him in preparing certain of his commentaries, and devoted himself particularly to the study of metric. There is extant a long poem on the Metres of Pindar, which is edited by Cramer in his *Anecdota Parisina*, vol. i. (1839).

TZINTZUNZÁN, chĭn'chōōn-chän. A town of the State of Michoacán, Mexico, 32 miles west of Morelia, on Lake Patzcuaro. It is celebrated for its church containing a painting supposed to be an Entombment, by Titian, which is worshiped by the people.

TZONECA. See CHONEK.

TZSCHIRNER, chēr′nĕr, HEINRICH GOTTLIEB (1778-1828). A German Protestant theologian. He was born at Mittweida, Saxony; studied theology at Leipzig; became professor of theology at Wittenberg in 1805; at Leipzig in 1809; and prebendary of Meissen in 1818. He published *Protestantismus und Katholicismus aus dem Standpunkt der Politik betrachtet* (1822; 4th ed. 1824); *Das Reaktionssystem* (1824); and *Der Fall des Heidentums* (ed. by Niedner, 1829).

U

U The twenty-first letter of the English alphabet. The Phœnician alphabet ended with *t* (q.v.) and *u* was the first of the letters developed in Greek and added to its alphabet to supply the deficiency of the Phœnician. Originally U was the uncial and cursive form, and V the capital form. The two were differentiated about the fifteenth century A.D., when V was limited to representing the consonant sound. Before the fifteenth century small *v* and *u* were used interchangeably. In English *u* represents a variety of sounds besides its original value, which is that of a rounded back vowel, the *u* in *rude*. It stands also for the sound *yoo*, as *educate*, *mule*, *value*. It is pronounced like *oo in rule*, *ruby*, *ruin;* ŏŏ in *full*, *pull*, *push;* *û* in *Turk*, *turnip*, *turpentine*, *urge;* *ŭ* (unrounded) in *tub*, *up*, *muff*. A *u* is always written after *q* (q.v.). In this case it has the consonantal value of *w*, which it has also often after other consonants, especially *g* and *s*, as in *quick*, *quartz*, *quote;* *language*, *anguish*, *guava;* *suave*, *dissuade*. It is silent in *guard*, *tongue*, *build*, etc.

The sources of *u* are as follows: Anglo-Saxon *ŭ*, as *sun* from *sunne;* *begun* from *begunnen;* *nut* from *hnutu;* Anglo-Saxon *ū*, as *us* from *ūs;* *but* from *būtan;* *up* from *ūp;* Anglo-Saxon *ō*, as *must* from *mōste*.

In chemistry U stands for *uranium*.

UAKARI, wȧ-kä′rē. See Ouakari.

UARAYCU, wȧ-rī′ko͞o. A peculiar tribe on the Lower Jurua and Jutay rivers, and the adjacent portion of the Amazon, Western Brazil. They whip their youths to test their manhood, and try the fortitude of their maidens by hanging them up in a net over a smoking fire, where they are kept without food until unable to endure any longer. Girls are betrothed in childhood and the young man must hunt game for his bride long before he is permitted to marry her. They burn their dead and bury the ashes in their huts.

UARDA, o͞o-är′dȧ. The second of the Egyptian historical novels by Georg Ebers (1877). The action takes place in Egypt during the reign of Rameses II., and it gives a masterly picture of Egyptian life of that period.

UAUPÉ, wȧ′o͞o-pā′. An extensive group of tribes, probably remotely of Arawakan stock (q.v.), residing on the Uaupés River, a head-stream of the Rio Negro, in Southeastern Colombia. They derive their name from a small water bird with a smooth and glistening forehead, in allusion to their habit of rubbing the face with certain leaves to render it smooth and shining. They cultivate corn, tobacco, manioc, cane, and bananas, are experts with the bow, lance, and blowgun, and are great fishermen. They live in large communal houses, sometimes nearly 100 feet square, with a roof nearly 40 feet high supported by columns hewn from the trunks of trees. They make hammocks, pottery, and baskets, and use canoes hollowed out from tree trunks. The men wear the G-string, feather head-dresses, and amulets of white quartz suspended from the neck. The women go entirely naked. Those of the same clan are not allowed to intermarry. Each communal household has its hereditary chief. In physique they are tall, stout, and well made, and are reputed to be among the most industrious tribes of the Amazon region.

UAUPÉS, wä′o͞o-pās′. A large tributary of the Rio Negro, considered by some geographers as the true head-stream of that river (Map: Brazil, D 3). It rises in the Eastern Cordillera of the Colombian Andes, descends from the highlands in a series of falls and rapids, and flows southeastward to its confluence with the main stream in Northwestern Brazil. It is over 700 miles long, and navigable in its lower course over the plains.

UBALDINI, o͞o′bȧl-dē′nē, Petruccio (1524?-1600?). An Italian illuminator and scholar of Tuscan birth. He went to England in 1545, and in the reign of Edward VI. fought in the Scottish waters. At this period of his life he wrote *Relatione delle cose del regno d' Inghilterra* (1551), wherein he records his experiences of English manners and institutions. In 1580 he visited Ireland and compiled an account of the unsuccessful Spanish-Italian invasion of Kerry. His *Vita di karlo Magno Imperatore* (1581) was the first Italian book printed in England.

UBANGI, ū-băn′gĭ. A river of Central Africa, the largest northern tributary of the Congo (Map: Congo Free State, C 2). It is known also as the Mobangi (near its mouth), the Dua (19° to 20° E.), the Koyu (21° to 22° E.), and the Makua and Welle (in its upper course). The river, probably rising in about 3° N. and 28° E., touches a point about 5° 10′ N. and 19° 40′ E., here turns south, soon forming the Zongo rapids, and finally joins the Congo in about 0° 30′ S. and 17° 50′ E. after a course of about 1500 miles.

From its mouth to its confluence with the Mbomu at Yakoma, about 22° 40′ E., the Ubangi forms the boundary between French Congo and the Congo Free State. That part of the river known as the Welle was first discovered by Schweinfurth in 1870; some ten years later Junker explored the Makua; in 1884 Hanssens discovered the mouth of the Mobangi; in 1885-86 Grenfell went up as far as the Zongo rapids, and within half a dozen years the several parts of the river already discovered were identified as the Ubangi. In great part the river flows through a populous country. Ubangi is also the name of a district in the northwestern part of the Congo Free State.

UBASTET. An Egyptian goddess, called also Pasht or Pakht and, from the Greek form of the name of the city where she was especially worshipped, Bubastis or Bast. She was the wife of Ptah (see Memphis), and was identified by the Greeks with Artemis (see Diana). Her son was Tum, the solar deity of the western horizon. Beside her main seat of worship at Bubastis (q.v.) she was honored at Thebes (q.v.) and together with Ptah, at Memphis. Ubastet is usually represented as a woman with a cat's head, but in the earlier monuments she more frequently has the head of a lion. Her annual festival, held at Bubastis, was characterized by revelry which implies by its phallic accompaniments a fertility-concept in the nature of the goddess. The cult of Ubastet does not appear to have been very ancient, but from the reign of Rameses III. (q.v.), in the thirteenth century B.C., it became one of the most important in Egypt. See Bubastis, and for illustration see *Pakht* in the plate of Egyptian Deities in the article Egypt.

UBEDA, ōō-bä'dȧ. A Spanish town of the Province of Jaén, in Andalusia, in the midst of the fertile Loma de Ubeda. It is 74 miles east of Cordova (Map: Spain, D 3). The country abounds in vineyards, olive plantations, and pasturages devoted especially to the rearing of horses. The town contains a castle with more than twenty towers, the sixteenth-century Church of San Salvador, and the Gothic San Pablo and San Nicolas of lesser note, together with the Palacio de las Cadenas, in which are the municipal offices and the edifice of the Colegio de Escolapius. The streets are broad and well paved and with the plazas well kept. The chief manufactures are pottery, leather, soap, and woolens. The population in 1900 was 19,395.

UBERTI, ōō-bĕr'tē, Fazio degli (c.1310-c.1370?). An Italian poet, born probably in Pisa. His love lyrics show the influence of Petrarch. His political verse is strongly Ghibelline in sentiment and bitter against the Papacy. His most noted work is the unfinished didactic poem entitled *Dittamondo* (i.e. *dicta mundi*, or things worthy of note in the world), which in its methods imitates the *Divina Commedia* of Dante. Like Dante, converted to righteousness in the middle of the path of life, Fazio feigns himself guided on a fantastic journey by the ancient geographer Solinus, from whose work he borrows largely. He traverses nearly all the known world save Asia, and in connection with all that he imagines himself as seeing he narrates fables, traditions, and legends which imitate, but poorly, episodes of Dante's poem. Consult the first edition of the *Dittamondo* (Vicenza, 1474) and that of Monti and Perticard (Milan, 1826); an edition of the *Liriche edite e inedite* (Florence, 1883) was prepared by Renier. A commentary on the *Dittamondo* by G. Cappello (1437) remains unedited.

UBIQUIST (from Lat. *ubique*, everywhere). A plant which grows in practically all habitats. The common dandelion, which grows naturally in light or shaded, moist or dry conditions, may be regarded as a typical example. The term cosmopolite refers to existence in all climates rather than all habitats.

UBIQUITY (from Lat. *ubique*, everywhere, from *ubi*, where). A term applied in theology to the doctrine that the Lord's body, in consequence of its personal union with the divine, by a 'communication of properties,' is everywhere present. This use of the word has its origin in the teachings of Luther, who, to defend the real presence of the entire Christ in, with, and under the elements of the Lord's Supper, taught consistently that Christ's body could be everywhere, although he called this presence 'illocal.'

UCAYALE or **UCAYALI,** ōō'kī-ä'lā. A large river of Peru (Map: Peru, C 5). It is one of the main headstreams of the Amazon, and, judged by length and volume, it should be considered as the true upper course of that river. It is formed by the junction of the Apurimac (q.v.), or Tambo, and the Quillabamba at the eastern base of the Andes on the boundary between the departments of Junin and Cuzco, and flows northward in a much winding course till it joins the Marañón in the northeastern corner of Peru to form the Amazon. The length of the Ucayale proper is about 1000 miles, and with the Apurimac the total length is nearly 1500 miles. Some of their sources are near Lake Titicaca, while that of the Mantaro, a tributary of the Apurimac, is in Lake Chinchaycocha or Junin (q.v.) within 100 miles of Lima, on the Pacific coast, and over 13,000 feet above the sea. So rapid is their flow, however, that at their confluence the Ucayale proper is less than 1000 feet above sea level. From this point its course through the densely forested and sparsely populated montaño is very sluggish, falling only 500 feet in nearly 1000 miles. Its banks are here very low, and it divides repeatedly into side channels, while large adjacent areas are periodically submerged. The Ucayale is navigable for the largest vessels, maintaining a depth of 40 to 70 feet for over 600 miles. Steamers can also ascend the Pachitea, the principal tributary below the confluence of the headstreams, over 200 miles to a point about 300 miles from Lima and 3600 miles from the mouth of the Amazon. The Ucayale thus affords an easy means of communication between the Atlantic Ocean and the heart of Peru.

UCCELLO, ōō-chĕl'lō, or **UCCELLI,** Paolo (c.1397-c.1475). A Florentine painter of the Renaissance, the first of the naturalists. He was properly Paolo di Dono by name, but was called Uccello on account of his fondness for birds. He was a pupil of Ghiberti and was also influenced by Donatello and by Domenico Veneziano. Under Manetti he acquired the facility in perspective which became the main feature of his work. His rare paintings are found chiefly in

Florence, where he frescoed scenes from Genesis in Santa Maria Novella (1446-48). There is also in the Uffizi a battle scene, one of four painted for the Bartolini. In Paris there are portraits by him of Brunelleschi, Donatello, Giotto, Manetti, and himself. In the Metropolitan Museum of New York City there is a portrait of a lady, attributed to him.

UCHARD, ų'shär', Mario (1824-93). A French playwright and novelist, born in Paris. After following for some time the business of a stockbroker, he married in 1853 Madeline Brohan (q.v.) of the Théâtre Français, where he produced the drama *La Fiammina* (1857), which was very successful. His other plays attracted much less attention, but his novels won much favor. They include: *Raymond* (1861); *Le mariage de Gertrude* (1862); *La comtesse Diane* (1864); *Une dernière passion* (1866); *Mon oncle Barbasson* (1876); *Inès Parker* (1880); *Antoinette ma cousine* (1891); and others.

UCHATIUS, ōōɢ-ä'tsē-ōōs, Franz, Baron (1811-81). An Austrian general of artillery and inventor, born at Theresienfeld. Entering the Second Regiment of artillery in 1829, he became commandant of the ordnance works in the arsenal at Vienna in 1871, was made a major-general in 1874, and lieutenant-fieldmarshal in 1879. He introduced an improved process of manufacturing steel in 1856, constructed several ballistic apparatus, especially one for measuring the pressure of gas in gun-barrels, invented the so-called steel-bronze (Uchatius metal), now exclusively used for the equipment of the Austro-Hungarian field-artillery, and in 1875 constructed the ring-grenades, adopted since then by nearly all artilleries. He died by his own hand, in Vienna.

U'CHEE, or **YUCHI.** An interesting tribe, constituting a distinct linguistic stock, formerly centring on the middle Savannah River, in Georgia and South Carolina, but afterwards incorporated with the Creek confederacy. Very little is known of them as a distinct people, but all the evidence tends to substantiate their own claim that they were the autochthones of eastern Georgia and the adjacent region, antedating its occupation by the Muskhogean tribes (see Muskhogean Stock) by many years. They call themselves children of the sun, which, according to one of their sacred myths, was their mother, and was worshiped with elaborate ceremonies. In 1739 Governor Oglethorpe concluded a treaty with the Uchee at what was then their principal town, situated on the Savannah River about 30 miles above Savannah. Before the end of the century they had all removed to the Creek country, where in 1799 they had four towns with about 250 warriors, or, perhaps, 800 souls. Their main town was on the western (Alabama) side of the Chattahoochee, a few miles below the present Columbus. They participated in the treaties, wars, and reverses of their Creek allies, and removed with them in 1835 to the Indian Territory, where they still constitute a distinct town, the largest in the Creek Nation. In physique they are smaller than the Creeks, but more wiry and athletic, as well as extremely pugnacious. Their language is remarkable for the number of arrested sounds, which give their conversation a jerky effect. The older ones adhere to their ancient religion and are greatly under the influence of their priests.

UCHTOMSKY, ųᴋ-tôm'skē, Esper Esperovitch, Prince (1861—). A Russian author and poet, born near Oranienbaum, of an old princely race descended from Rurik. Frequenting the University of Saint Petersburg, he gave his attention chiefly to philosophy and literature and in 1884 was appointed to a position in the Ministry of the Interior. He made three journeys to the East, the last in 1890-91, accompanying the present Czar, then heir apparent, which he described in *Oriental Trip of the Grand Duke Nicholas Alexandrovitch of Russia* (1893-97), a splendidly illustrated work, published also in English, French, and German. Besides many lyric poems, he contributed book-reviews and critical and historical essays to various periodicals, and in 1896 assumed the editorship of the *Sanktpeterburgskija Viedomosti*, in which he advocates particularly an energetic policy of Russia in Eastern Asia.

UDAIPUR, ōō'dī-pōōr', or **ODEYPORE,** called also Mewar, or Meywār. A native State of India, under British protection, in Rajputana (Map: India, B 4). Area, 12,861 square miles. Population, in 1891, 1,844,360; in 1901, 1,021,664. The capital, Udaipur, situated 120 miles southeast of Jodhpore at an altitude of 2064 feet; had 45,595 inhabitants in 1901. Here is an imposing royal palace of marble and granite. Just south of the city is the fortified hill Eklingarh. The roads leading to the city are guarded by a series of fortresses, but these have fallen into a state of decay.

UDALL, ū'd*a*l, Nicholas (1505-56). An English schoolmaster and playwright. He was born in Hampshire. In 1524 he was graduated from Corpus Christi College, Oxford, and elected a fellow. He took an early and active part in the Reformation, but he trimmed his sails in the reign of Mary. From 1534 to 1541 he was head master of Eton, and from 1554 to 1556 head master of Westminster School. The fame of his various translations, pamphlets, and Latin and English verse has been eclipsed by his *Ralph Roister Doister*, an English comedy on the Roman model. It seems to have been composed for the boys at Eton before 1551, though, so far as is known, it was not published until 1566. It is the earliest English comedy now extant. Consult the reprint by E. A. Arber (London, 1869); and A. W. Ward's *English Dramatic Literature* (vol. i., rev. ed., ib., 1899). See Gammer Gurton's Needle.

UDAL RIGHT. Under the old Scotch law, a species of freehold interest or title to land, independent of the ordinary feudal dues, and corresponding somewhat to an allodial title to real property in England. It was not acquired by a charter or deed, but by continuous possession for a long number of years, which fact could be established by the testimony of witnesses.

UDDEVALLA, ōōd'd*e*-väl'lȧ. A port of Sweden, situated at the head of the Byfjord, 48 miles north of Göteborg (Map: Sweden, D 7). It has a school of navigation, and manufactures cotton goods and furniture. There are also sugar refineries, wood-pulp mills, and granite quarries. Population, in 1901, 9442.

UDINE, o͞o'dē-nä. The capital of the Province of Udine, Italy, in a fertile, highly cultivated plain on the Roja Canal, 84 miles by rail northeast of Venice (Map: Italy, H 1). It consists of an inner and an outer town separated by fortifications. The streets are crooked and narrow, but it is an agreeable city. In the centre of the town rises a hill crowned by a castle, now used as a barracks, dating from 1517. The chief square lies at the southern base of the hill. The imposing municipal palace, in the style of the Doges' Palace of Venice, contains a large marble statue of Ajax, and some excellent mural paintings. The Romanesque cathedral possesses a finely sculptured portal. Udine has a handsome theatre, a splendid archiepiscopal palace with historic memories, a school of industrial arts, and a technical institute. There is a small public garden, and the artistic house of the painter Giovanni da Udine is shown. In the Palazzo Bartolini there are a municipal museum of antiquities, paintings by Giovanni da Udine, and a library of over 27,000 volumes. Udine has one of the most unique and beautiful countries in the world. The city manufactures silks, velvets, leather, metal-ware, paper, and sugar. The chief trade is in flax and hemp. Population (commune), in 1881, 32,020; in 1901, 37,942.

Udine, the ancient Utina, was an important city in the Middle Ages. In the thirteenth century it became the capital of Friuli. In 1420 it passed to Venice. Near Udine is the small but interesting town of Cividale del Friuli (q.v.), the ancient Forum Julii.

UDINE, GIOVANNI DA (c.1485-1564). An Italian painter, born at Udine. He was the pupil of Giorgione in Venice and of Raphael in Rome. The latter he assisted in decorating the *loggie* of the Vatican. The arabesques and borders of conventional design are almost entirely the work of Giovanni. His work is principally in Rome. It includes the garlands which surround the "History of Cupid and Psyche" in the Farnesina (designed by Raphael), decorations of painting and stucco in the Palazzo Madama, decorations in Clement VII.'s Torre di Borgia and in the Palazzo Massimi alle Colonne. Of the easel pictures atributed to him, the only authentic one is a "Madonna Enthroned" (1517) in Bergamo (Frizzoni collection).

UEBERWEG, ụ'bẽr-väG, FRIEDRICH (1826-71). A German philosopher, born at Leichlingen, Prussia. He was educated at Göttingen and Berlin, and in 1862 was made professor of philosophy at Königsberg, where he remained till his death. His most important works are his *System der Logik und Geschichte der logischen Lehren* (1857; 5th ed. 1882; Eng. trans. of the 3d ed. by Lindsay, London, 1871), and his *Grundriss der Geschichte der Philosophie* (1863-66; 8th ed., rev. by M. Heinze, 1894-98; Eng. trans. of the 4th ed. by Morris, New York, 1871). Consult F. A. Lange, *Friedrich Ueberweg* (Berlin, 1871); M. Brasch, *Die Welt- und Lebensanschauung Friedrich Ueberweg's nebst einer biographisch - historischen Einleitung* (Leipzig, 1889).

UECHTRITZ, ụK'trĭts, FRIEDRICH VON (1800-75). A German dramatic poet and novelist, born at Görlitz, Silesia. He studied jurisprudence at Leipzig and held various judicial positions at Treves and Düsseldorf. Of several tragedies, *Alexander and Darius* (1827), with a preface by Tieck, was produced in Dresden, Berlin, and Vienna. *Das Ehrenschwert* also met with a favorable reception. The dramatic poem *Die Babylonier in Jerusalem* (1836), while little adapted to the stage, is distinguished by brilliant diction. His best known novels are *Der Bruder der Brant* (1860), a religious-patriotic tale, and *Eleazar* (1867), a romance of the great Judean war. He also published *Blicke in das Düsseldorfer Kunst- und Künstlerleben* (1839-42). Consult *Erinnerungen an Friedrich von Uechtritz und seine Zeit in Briefen von ihm und an ihn* (Leipzig, 1884), with a preface by Sybel.

UECHTRITZ, KUNO VON (1856—). A German sculptor, born at Breslau. He studied at the Vienna Academy under Tilgner, to whose influence is to be attributed his fondness for the Baroque and Rococo style, manifest in his early portrait busts. Subsequently he turned to polychrome work, carrying it from softer tints to thoroughly naturalistic treatment, of which an "Italian Pifferaro with His Monkey," in the National Gallery, Berlin, is an example. After his removal to Berlin in 1886 he took up decorative and monumental sculpture, earning reputation with several fountain designs, enlivened by mythological ideal, and genre figures, and animals, and displaying a subtle sense of humor. For the Siegesallee he executed the group with the statue of Elector George William (1899), and for Breslau the Moltke Monument, with the Norse goddess of Victory offering the laurel to Moltke.

UFA, o͞o'fä. A government of Eastern Russia. Area, 47,130 square miles (Map: Russia, J 3). The eastern portion has a mountainous surface, being traversed by offshoots of the Ural Mountains, running in densely wooded ridges parallel to the main mass. The western part has a steppe-like appearance with an incline toward the Kama. This river forms the western boundary line of the government and its navigable tributary, the Byelaya, intersects it in a direction from southeast to northwest. The climate is severe, but very healthful. Ufa is a highly mineralized region containing deposits of iron, copper, coal, petroleum, sulphur, etc. The mining industries, however, are as yet little developed. Agriculture employs only a part of the population, as the inhabitants are largely nomadic and engaged in stock-breeding. About 35 per cent. of the area is under cultivation, chiefly under rye, oats, and wheat. The holdings are generally large, and the use of improved machinery is on the increase. A very important dairy product is kumiss. The manufacturing industries are connected to a large extent with mining, and the chief iron and steel works are situated at Zlatoust (q.v.). Other manufactures are spirits, leather, soap, and candles. The population in 1900 was estimated at 2,420,652, of whom the Russians constituted about 45 per cent., the remainder consisting of Bashkirs, Tatars, and Meshtcheryaks.

UFA. The capital of the Government of Ufa, in Eastern Russia, situated on the Byelaya, near its junction with the Ufa, 326 miles by rail east-northeast of Samara (Map: Russia, J 4). Population, in 1897, 49,961.

UFFIZI, PALAZZO DEGLI. A celebrated Florentine palace, containing one of the finest collections of sculpture and painting in the world. It was erected in 1560-76, after the designs of Giorgio Vasari for the Government offices of the Grand Duchy of Tuscany. The ground story is one of the most beautiful open halls of Italy; it is roofed with barrel vaulting supported by heavy Doric pillars which extend the height of the entire façade. The top story, now containing the gallery, was originally an open loggia. In the vestibule and court are many statues of celebrated Tuscans.

The nucleus of the gallery was a part of the celebrated collections made by the Medici in the fifteenth century. Additions were acquired or inherited by many of the Medicean dukes, and the collection was bequeathed to the State by the last representative of the line in 1737. It is especially rich in antique statuary, possessing the celebrated Niobid group, the "Boy Drawing Out a Thorn," the "Apollino," the "Medicæan Venus," "Satyr," "Wrestlers," the "Grinder," and "Dying Alexander." The collection of paintings possesses numerous works by artists of the early Florentine Renaissance, such as Fra Angelico, Filippo and Filippino Lippi, Domenico Ghirlandajo, and especially Sandro Botticelli. The High Renaissance is well represented by Michelangelo, Fra Bartolomeo, Andrea del Sarto, Raphael, Giorgione, Titian, and Correggio, the gallery being especially rich in masterpieces of Titian and Raphael. There is also a fine collection of Flemish and Dutch masters. The celebrated "Tribuna" of the Uffizi is a small room containing many of the masterpieces of painting and sculpture. An interesting feature of the gallery is a unique collection of portraits of great masters by themselves. A passageway connects the Uffizi with the Pitti Collection. (See PITTI PALACE.) The second story of the Uffizi contains the Biblioteca Nationale, containing 300,000 volumes and 14,000 manuscripts. Its nucleus was the Maglialecchiana Collection, to which, in 1862, was added the Royal Library of the Pitti Palace. The Uffizi also houses the Florentine State archives, one of the richest collections of documents in the world.

UGANDA (ōō-gän′dȧ) **PROTECTORATE.** A British protectorate in British East Africa, consisting of the native kingdom of Uganda and several adjacent States. It is bounded by the parallel of 5° north latitude (Egyptian Sudan) on the north, the Congo Free State on the west, and the German East African frontier (in part following the parallel of 1° south latitude) on the south (Map: Congo Free State, F 3). The eastern boundary is marked by a line drawn through the middle of Lake Rudolf, and by what is known as the Eastern Province. The protectorate covers 80,000 square miles (estimated).

Uganda is very mountainous, its mean altitude being given as over 3000 feet. It is a remarkably diversified country, with snow peaks, elevated plains, vast forests, and low swamps; and it also embraces the very arid depression around Lake Rudolf. The variey of climate it offers is likewise exceptionally great. The Lake Rudolf region has an average altitude of 2000 feet, is tropically hot, and is the most barren and hopeless section. The Mount Elgon region and that north of the Victoria Nyanza are much more favorable to development, owing to the ample rainfall and well-watered conditions. But the climate here is generally damp, hot, and productive of malarial fevers. This region, westward of the extinct volcano Mount Elgon—a gigantic mass 14,000 feet high, with a crater several miles wide—has an average elevation of some 4000 feet, and possesses dense forests, marshes, and many good agricultural districts. The course of the Nile from the Ripon Falls (its exit from the Victoria Nyanza) to Lado is within or contiguous to this region. The western part of the protectorate, distinguished by the Albert and Albert Edward lakes, the magnificent snowy Ruwenzori (thought to exceed 16,000 feet in elevation), and the deep-forested valley of the Semliki, forms a remarkable region rich in possibilities. Splendid plateaus and charming small lakes here abound. Cooling breezes make Ankori and Toro not only habitable, but inviting. In the Nile Valley to the north the heat is extreme, the rainfall abundant. The northern part of the protectorate is generally forbidding. The waters of the many lakes which characterize the protectorate are partly fresh and partly salt. Kioga-Kwania and Deveru may be mentioned in addition to the lakes already named.

Except in the Rudolf district, the flora, which is in general kindred to that of West Africa, is rich and abundant, but there is no oil palm. Papyrus covers the swampy Nile Valley. The lofty mountains explain the presence of the alpine vegetation in the higher parts, and of the witch-hazel and trees of kindred classes on the plateaus. Uganda has a peculiar long grass, from 10 to 15 feet high, which is used for building purposes by the natives. The fauna is allied to that of equatorial Central Africa and the Congo Basin, in conformity with the moist and forested character of the region. A list of the birds and quadrupeds would include most of those of Africa which are not strictly desert or seacoast forms. Lions and leopards are numerous, living upon antelopes and wild and tame cattle; and the rivers and lakes abound in crocodiles, feeding upon the fish, many of which are wholesome for food. There are no anthropoid apes, but many monkeys, of which the guerza (q.v.) is most notable. Large collections of insects and land shells have been made, but much remains to be learned of the smaller life of the region.

In the eastern sections of the protectorate granite and gneiss are prominent; in the central regions, quartz, sandstone, and basalt are added; around Lake Rudolf lava and tuff are superimposed on the foregoing formations. Iron ore abounds. Gold has been discovered in the north, and there are promising indications that many varieties of precious stones and metals will be found. The soil is of great fertility. Coffee of an excellent kind is indigenous, and much of it is being cultivated. Not a little has been done toward improving the country by building substantial houses, making good roads, etc. Rubber, ivory, and hides are the leading articles of trade. The commerce is chiefly in the hands of Germans, British Indians, and native dealers, and is slowly developing. The total value in 1901-02 was about £550,000, £50,000 being exports. Steamers ply between the northern boundary and Khartum. The so-called Uganda Railway lies wholly within the British East Africa Protectorate (q.v.).

The administration is left largely by Great Britain to the native chiefs. The British Government is represented by a commissioner and a deputy commissioner. The colonial forces, numbering 4,000 men, are commanded and largely officered by Englishmen. The headquarters of the English administration are at Entebbe. The government of the kingdom of Uganda, the chief state of the protectorate, is a feudal and hereditary monarchy. The native King's parliament is called 'Lukiko;' the capital is Mengo. The kings of Toro, Unyoro, and Ankole possess similar though less important honors and privileges. The protectorate is divided into five provinces, which are subdivided into districts or counties. There are British consular courts for the settlement of disputes between Europeans and natives. The local revenue of the protectorate in 1903 was estimated at about $200,000; the expenditure, at $670,000. Great Britain makes up the deficits. The population is estimated to be about 4,000,000. There are less than 500 Europeans.

The natives of the protectorate may be classified as Negritos or Pygmies, Bantus (q.v.), Nilotic Negroes, Hamites, and Masai (q.v.), though most of them are probably mixtures in varying degree of these different types. The Pygmies are not numerous, a few being found in that part of the Congo forest which is included within the limits of the protectorate. The Bantus, who in general are an agricultural people, make up nearly half the population. The Hamites are represented by a few tribes in the islands and on the north shore of Lake Rudolf and by the pastoral Wa-Huma or Bahima, probably of Galla ancestry (see Gallas), who more than 100 years ago conquered the Bantu agriculturists, and at present, more or less mixed with Bantu blood, form the aristocracy and ruling classes. They are purest in the western part of the protectorate, where there are also a few separate Bahima tribes. The Masai are met with in the Rudolf region, the Suk and Turkana tribes being good representatives. The Nilotic Negroes occupy the Nile Province and a large part of the Central Province, reaching the Victoria Nyanza in Kavirondo. Negro tribes also extend southward along the Albert Nyanza, especially on the west side, the Semliki River, and the Albert Edward Nyanza to the extreme southwest corner of the protectorate.

The Uganda Protectorate was formed initially of the once powerful native kingdom of Uganda, which has been in the British sphere of influence since 1890. The protectorate dates from 1894. The region was first visited by a European (Captain Speke) in 1862. Stanley passed through Uganda in 1875.

Bibliography. Speke, *Journal of the Discovery of the Source of the Nile* (Edinburgh, 1863); Taylor, *The Lake Regions of Central Africa* (New York, 1875); Reclus, *Géographie universelle*, vol. xiii. (Paris, 1888); Stanley, *In Darkest Africa* (New York, 1890); Richter, *Uganda* (Gütersloh, 1893); Kollmann, *The Victoria Nyanza* (London, 1900); Scott-Elliott, *A Naturalist in Mid Africa* (ib., 1896); Johnston, *The Uganda Protectorate* (ib., 1902); Ansorge, *Under the African Sun* (London, 1899); Ashe, *Two Kings of Uganda* (2d ed., ib., 1897); Colville, *The Land of the Nile Springs* (ib., 1895); Lugard, *The Story of Uganda* (ib., 1900); Purvis, *Handbook of British East Africa and Uganda* (ib., 1900); Wilson and Felkin, *Uganda and the Egyptian Sudan* (ib., 1882).

UGOGO, ū-gō′gō. A district of German East Africa, about 170 miles west of that part of the coast opposite Zanzibar. It is a bare, arid plateau, about 3500 feet in altitude, inhabited by the Gogo, or Wagogo, a warlike Bantu tribe (Map: Congo Free State, G 4).

UGOLINO DA SIENA, o͞o′gō-lē′nō dȧ syā′nȧ. A name appearing in the early annals of Sienese painting and once thought from its different designations to apply to four persons. It is probable, however, that the Ugolino da Siena who was influenced by Duccio and Cimabue, and who died at an advanced age in 1339, was identical with Ugolino di Neri and Ugolino di Pietro, mentioned in Sienese records of 1317 and 1324. The only work attributed to him with any degree of probability is part of an altar-piece which was painted for Santa Croce at Florence, and two panels of which are now in London. Another Ugolino da Siena, or Ugolino di Prete Ilario, also of the fourteenth century, painted in the Cathedral of Orvieto in 1364 and 1378.

UGRIANS. A term often used to designate a subdivision (closely related to the Finns) of the Ural-Altaic stock, which included the Ostiaks, Voguls, and Magyars. See Ural-Altaic.

UHDE, o͞o′de, Fritz von (1848—). A German historical and genre painter, born at Wolkenburg, Saxony. He began his artistic studies at the Dresden Academy in 1866, but, totally at variance with the spirit prevailing there, entered upon a military career and served in the army until 1877, when he took up painting again, at Munich, giving his attention especially to the old Dutch masters. Unsuccessful in his attempts to gain admittance to the studios of either Piloty or Diez, he was induced by Munkácsy in 1879 to remove to Paris, where he worked for a short time in that master's studio, but principally studied from nature and his old Netherland models. A result of these combined influences was the "Family Concert" (1881, Cologne Museum). The new coloristic principles which he in the meanwhile adopted are apparent in the "Arrival of the Organ-Grinder" (1883), and, turning now to religious subjects, he gave full vent to the most uncompromising sobriety in composition in his "Suffer the Little Children to Come unto Me!" (1884, Leipzig Museum). As this scene is depicted as taking place in a poor working man's room, so is also the following subject, "Come, Lord Jesus, and Be Our Guest" (1885, National Gallery, Berlin). He next produced "Christ with the Disciples at Emmaus" (1885, Städel Institute, Frankfort), "The Sermon on the Mount" (1887), the triptych of the "Nativity" (1889, Dresden Gallery), and "The Walk to Bethlehem" (1890, New Pinakothek, Munich), a bold modern conception of the subject. Progressing in his naturalistic conception, Uhde gave rise to a complete change in German art, counting among his followers most of the younger generation. His more recent productions include: "Noli me tangere" (1894, New Pinakothek, Munich), "The Wise Men from the East" (1896, Magdeburg Museum), "The Last Supper" (1897, Stuttgart Museum), "Ascension" (1898, New Pinakothek, Munich), and "Woman, Why Weepest Thou?" (1906, Vienna Museum). Consult the monographs by Lücke (Leipzig, 1887), Graul (Vienna, 1893), Vierbaum (Munich, 1893), Meissner (Berlin, 1900), and Ostini (Bielefeld, 1902).

UHLAND, o͞o'lănt, LUDWIG (1787-1862). A distinguished German poet, philologist, and literary historian. Born at Tübingen, April 26, 1787, he studied jurisprudence there, in 1802-08, at the same time cultivating mediæval literature, especially old German and French poetry, the study of which he subsequently pursued for eight months in Paris. On his return he began the practice of law at Stuttgart, worked in the Ministry of Justice, and when in 1815 Württemberg was to be granted a new constitution, his lyrics in praise of liberty were received with enthusiasm. As a member of the Legislature from 1819 to 1839 he sided with the opposition. In 1848 he was elected to the German National Assembly, but in 1850 retired from political life and settled at Tübingen, devoting himself henceforth exclusively to his literary pursuits. From 1829 to 1833 he had held the professorship of German literature at the University of Tübingen. As a lyric poet Uhland is remarkable for truth and simplicity of sentiment and his picturesque view of nature. His ballads and romances rank among the most precious ideal treasures of the German nation. During all his early life he labored to revive mediæval forms of poetry, especially the ballad, with an interest born of intimate knowledge and careful study. None has caught the spirit of the old folk-song so fully as he. Of his songs the most universally popular are "Der Wirtin Töchterlein" and "Der gute Kamerad;" of the ballads, "Das Schloss am Meer," "Das Glück von Edenhall," "Des Goldschmieds Töchterlein," "Roland Schildträger," "Der schwarze Ritter," and "Des Sängers Fluch" are in all anthologies. He was the first of the Swabian school of poets who sought to combine a classic purity of style with brevity and vigor, and to interpenetrate all with romantic sentiment. Although poetically effective, his glorifications of German faith, the dramas *Ernst, Herzog von Schwaben* (1817), and *Ludwig der Bayer* (1819) lack the power of dramatic action and had only moderate success. As a Germanic and Romance philologist, Uhland must be counted among the founders of that science. Besides the treatise *Ueber das altfranzösische Epos* (1812) and an essay *Zur Geschichte der Freischiessen* (1828), there are to be especially mentioned *Walther von der Vogelweide, ein altdeutscher Dichter* (1822); *Der Mythus von Thôr* (1836), the result of the most painstaking original investigation; and the masterly collection *Alte hoch-und niederdeutsche Volkslieder* (1844-45; 3d ed. 1892). His poetical works were repeatedly published as *Gedichte und Dramen*, while his scientific work is embodied in *Schriften zur Geschichte der Dichtung und Sage*, edited by Holland, Keller, and Pfeiffer (1865-72). For his biography, consult: Pfeiffer (Vienna, 1862), Notter (Stuttgart, 1863), Jahn (Bonn, 1863), Dederich (Gotha, 1886), Holland (Tübingen, 1886), and Fischer (Suttgart, 1887); also Mayer, *Ludwig Uhland, seine Freunde und Zeitgenossen* (ib., 1867), and *Ludwig Uhlands Leben. Aus dessen Nachlass und aus eigener Erinnerung zusammengestellt von seiner Wittwe* (ib., 1874).

UHLAND, WILHELM HEINRICH (1840—). A German engineer and writer on technology, born in Nordheim, Württemberg. In 1865 he founded the Technikum Mittweida, the first private institution for the instruction of machinists, and in 1868 organized the Technikum Frankenberg, near Chemnitz. He invented numerous improvements in the manufacture of starch, and contributed other inventions to various industries which have found extensive application throughout the world. He founded and became editor of the periodical *Der praktische Maschinen-Constructeur*, and wrote: *Handbuch für den praktischen Maschinen-Constructeur* (1883); *Skizzenbuch für den praktischen Maschinen-Constructeur* (16 vols., 1867-95); *Die Corliss und Ventildampfmaschinen* (1879); *Die Telephonanlagen* (1881); *Dampfmaschinen mit Schiebersteuerung* (1881); *Die Woolfschen und Compounddampfmaschinen* (1882); *Die Hebeapparate* (1882-83); *Das elektrische Licht und die elektrische Beleuchtung* (1884); *Die Brotbächerei, Biskuit und Teigwarenfabrikation* (1885).

UHLICH, o͞o'lĭk, LEBERECHT (1799-1872). One of the founders of the German 'Free Congregations' (q.v.). He was born at Köthen, Anhalt, studied at Halle, and served as pastor in various places till 1847, when he withdrew from the Evangelical Church, and thenceforth was preacher of the Free Congregation at Magdeburg. In 1841 he became the leader of the 'Protestant Friends,' or 'Friends of Light.' His liberal views frequently involved him in difficulties with the authorities. He published *Bekenntnisse* (4th ed. 1846); *Christentum und Kirche* (2d ed. 1846); *Die Throne im Himmel und auf Erden* (1845); *Handbüchlein der freien Religion* (7th ed. 1889). His autobiography appeared at Gera in 1872.

UHRICHSVILLE, ū'rĭks-vĭl. A city in Tuscarawas County, Ohio, 41 miles northwest of Wheeling, W. Va.; on Big Stillwater Creek, and on the Pittsburg, Cincinnati, Chicago and Saint Louis and the Baltimore and Ohio railroads (Map: Ohio, H 5). It derives considerable commercial importance from its situation in a farming and stock-raising section, and has several large sewer-pipe and fire-clay plants. Population, in 1890, 3842; in 1900, 4582.

UIGURS. A people of Eastern Turkestan, and of Turkic stock. They founded the powerful kingdom of Hiong-Nu, which reached its zenith was in a flourishing condition, and about this a northern and a southern empire. The latter was destroyed by the Tunguses in the third century, whereupon the southern Uigurs retreated to the west and founded the empire of the Huns (q.v.). In the eighth century the northern Uigurs founded a kingdom which was destroyed by the Kirghizes. In the fifth century A.D. their culture, developed on the slopes of the Tian Shan, was in a flourishing condition, and about this time they underwent considerable Buddhistic and Chinese influence, their religion having already been modified to some extent by Nestorian Christians, from whom they adopted the traces of Zoroastrianism also present among them. But they finally adopted the faith of Islam, and have been modified in blood and other characteristics by more recent Mongol-Chinese, Arab, and Turkic elements. The vicissitudes of time have deprived the Uigurs of their independent nationality and much of their peculiar culture. It is probably due to Uigur influence that the Mongols and Manchus adopted the Syrian system of writing, and not a few other advances in the culture of the numerous tribes of Central Asia and Siberia may, perhaps, be attributed to them. Consult: Klaproth, *Abhandlungen über die Sprache und Schrift der Uiguren* (Paris, 1820); Vámbéry, *Uigurische Sprachmonumente und das Kudatku Bilik* (Leipzig, 1870); Schott, *Zur Uigurenfrage* (Berlin, 1875); Radloff, *Aus Sibirien* (Leipzig, 1893); id., *Ethnologische Uebersicht der Türkenstämme Sibiriens und der Mongolei* (ib., 1883); id., *Die alttürkischen Inschriften der Mongolei* (Saint Petersburg, 1899).

UIN′TATHE′RIUM (Neo-Lat., from Eng. *Uintah*, mountain-range in Utah + Gk. *φηρίον*, *thērion*, diminutive of *φήρ*, *ther*, wild beast). An extinct and blunt-toed (amblypod) ungulate mammal, found fossil in the Eocene fresh-water deposits of the Western United States. The animal was about the size of a rhinoceros, with a large narrow head. The skull of the male is armed with two pairs of bony horn-like protuberances, of which the larger hinder pair is supported by crests of bone that slope upward toward them from points near the orbits. There are also two small knobs on the end of the nose. The upper incisor teeth are absent and the upper canines of the male are enlarged to form drooping recurved tusks. The horns and tusks are less prominently developed in the females. The eyes were small. The brain cavity is small, indicating a ratio between weight of brain and that of body of about 1 to 4000, which is exceptionally low for a mammal.

UIST, wĭst, NORTH and SOUTH. Two islands of the Outer Hebrides, situated south of Lewis-with-Harris and 15 to 30 miles west of Skye (Map: Scotland, A 2). They are separated by the smaller island of Benbecula. North Uist is 18 miles long and 3 to 10 miles wide; South Uist is 22 miles long and 7 miles wide. The western parts of both are fertile and productive and the inhabitants engage in agriculture and cattle-raising, as well as fishing. Population, in 1901, of North Uist, 3862; of South Uist, 5515.

UJI-BECSE, o͞o′y′ bĕ′chĕ. A town of Hungary. See BECSE.

UJFALVY, o͞o′y′-fäl-vē, CHARLES EUGÈNE (1842—). An Austrian philologist, anthropologist, and traveler, born in Vienna of an old Hungarian noble family. Educated in the military academy at Weiner-Neustadt, he served as lieutenant in the army until 1864, when he went to study at the University of Bonn. Going to France in 1867, he was appointed professor in the Oriental Academy in 1873, and by order of the French Government undertook three scientific expeditions into Central Asia, in 1876-82, the results of which were published in *Expédition scientifique française en Russie, en Sibérie et dans le Turkestan* (1878-80). Among several ethnological and linguistic essays, there are to be noted: *La langue magyare, son origine*, etc. (1871); *La migration des peuples*, etc. (1873); *Mélanges altaïques* (1874), and others. Since 1884 he has given himself to art-historical researches and published in that line *Les biscuits de porcelaine* (1893).

UJI, o͞o′jē. A well-known suburb of Kioto, Japan, the ancient capital of the Empire. Uji lies on the Uji River where it breaks through the gorge as it issues from Lake Biwa. The pretty village is surrounded by the most ancient and famous tea plantations in Japan. Population, less than 20,000.

UJI (Jap., maggot). The Japanese name for a parasite of the silkworm, a tachinid fly (*Leskia sericaria*). It is said by Sasaki that the eggs of the parasite are laid upon the mulberry leaves and are eaten by the worms, after which the larva hatches out and feeds in the interior of the worms in the same way as do the larvæ of tachina-flies. The life-history is thus very abnormal, since with other species the eggs are laid upon the body of the caterpillar or other host insect. This parasite sometimes does considerable damage in Japan, but fortunately has not been introduced into other silk-raising countries.

UJIJI, o͞o-jē′jē. A town of German East Africa, situated on the eastern shore of Lake Tanganyika (Map: Congo Free State, F 3). It is the terminus of the caravan route from Zanzibar and was formerly an important slave market. Here Stanley found Livingstone in 1871. Population, about 8000.

UJI-YAMADA, o͞o′jē-yä′mȧ-dȧ. A town in the Prefecture of Miye, Central Hondo, Japan, 73 miles by rail south of Nagoya (Map: Japan, E 6). It is filled with inns and hotels for the accommodation of the pilgrims to the near-by Isé shrines. Population, in 1898, 27,990.

UJJAIN, o͞o-jīn′ (Skt. *Ujjayinī*, City of Victory, Gk. *'Οζήνη*, *Ozēnē*), or OOJEIN. A town of Malwa, in the State of Gwalior, Central India, on the right bank of the Sipra, 35 miles north of Indore (Map: India, C 4). It has an active trade in opium, cloth, etc. It is encircled by a wall six miles in circumference, conspicuous on account of its round towers; has a spacious bazaar, a grand palace of the Maharaja Sindhia, several mosques and mausoleums, and an observatory dating from the fifteenth century. Ujjain is said to have been the viceregal seat of Asoka (q.v.) during his father's reign at Patna, but is better known as the capital of the Samvat kingdom founded B.C. 57 by Vikramaditya. (See VIKRAMA.) It was the capital of Sindhia until the seat of government was removed to Gwalior in 1810. Population, in 1891, 34,691; in 1901, 39,892.

UKASE (Russ. *ukazŭ*, edict, from *ykazatĭ*, to order, indicate, from *y*, in, by, near, connected with Gk. *ἐν*, *en*, Lat. *in*, in + *kazatĭ*, to show, connected with Gk. *τέκμαρ*, *tekmar*, boundary, goal, token, sign, Skt. *cakṣ*, to see), or UKAS. A term applied in Russia to all the orders or edicts, legislative or administrative, emanating from the Government. The ukases either proceed directly from the Emperor, or are published as decisions of the directing senate. In either case they have the force of laws till they are annulled by subsequent decisions. A collection of ukases in 48 volumes was made by order of the Czar Nicholas in 1827, and has been supplemented from time to time. These, after the elimination of such ukases as are unimportant or of temporary authority, constitute the present legal code (*svod*) of the Russian Empire.

UKIO-YÉ, ōō'kyō-yā' (Jap., pictures of the passing world). The name of the modern popular school of painting in Japan, founded by Hokusai (q.v.) and continued by his pupils and successors. The beginning of the movement may be traced as far back as the end of the sixteenth century, when droll sketches were made by Iwasa. Toward the close of the eighteenth century Okyo painted fowls, fishes, and monkeys, their naturalism giving an immense impulse to the popularization of art. The most common form of Ukio-yé is the *nishiki-yé*, 'brocade pictures,' and it is the art of the common people. Consult: Anderson, *Descriptive and Historical Catalogue of Chinese and Japanese Art* (London, 1886); Brinkley, *Japan; Its History, Arts, and Literature* (Boston, 1901-02).

U'KRAINE. A name formerly applied to a part of the old Kingdom of Poland, comprising portions of the present Russian governments of Podolia, Kiev, Tchernigov, Ekaterinoslav, and Kherson, and the whole of Poltava. By the Treaty of Andrussovo in 1667 the portion to the left of the Dnieper and Kiev passed to Russia, and later became known as Little Russia. The remainder was acquired by Russia at the second partition of Poland in 1793.

ULCER (from Lat. *ulcus*, Gk. ἕλκος, *helkos*, sore, ulcer, wound). An open sore; a superficial solution in the continuity of the soft parts. The tendency of an ulcer is toward continued dissolution of the tissues in which it exists, rather than toward healing, as in the case of an ordinary open granulating wound, the latter being less frequently (though properly) called an ulcer. Ulcers are usually classified according to their character and mode of origin into two classes: simple and specific or infective ulcers. Infective ulcers may result from such infective diseases as syphilis, tubercle, leprosy, and glanders. Among the simple ulcers may be mentioned a number of varieties, such as the *traumatic* or *inflammatory*, the *varicose* or *chronic*, the *erethritic* or *irritable*, the *perforating* or *trophic*, the *callous* or *indolent ulcer*, the *hemorrhagic*, the *phagedenic*, and the *fungous ulcer*.

The structures to which ulceration is usually limited are the skin and mucous membranes. Upon the surface of an ulcer a layer of inflammatory exudate is found, mingled with fragments of broken-down tissue or tissue in a state of coagulative necrosis. Beneath this tissue lies a layer of what is known as granulation tissue, which is composed of polynuclear leucocytes and epithelioid cells, with relatively little intercellular substance, but richly supplied with a network of capillary blood vessels, and forming the base of the ulcer. Below this there is usually found some of the fibrous tissue of the deeper layers of the skin. The edges of the ulcer consist of the surrounding skin, which has been more or less altered by inflammatory changes. The margins of an ulcer are occasionally undermined by the ulcerative process, or they may become firmly adhesive to the periosteum of bone or other subjacent structures. The varicose ulcer, the form most commonly seen by the surgeon, is situated usually on the front of the leg, above its lower third. Around it are generally seen the numerous dilated and congested veins whose condition is responsible for the ulcerative process. Passive hyperæmia and its resultant enfeebled nutrition are the fundamental causes of ulceration in this locality.

The treatment of ulceration in general may be regarded as constitutional and local. Constitutional treatment consists in fresh air, nourishing diet, proper hygienic surroundings, the administration of iron where anæmia exists, and the appropriate medication for any specific constitutional disease that may be present. Local treatment consists in rest and elevation of the part, antiseptic measures, and the application of special local forms of treatment adapted to the conditions present at the site of ulceration. Bandaging, strapping, and the application of various stimulating substances are the measures generally employed. Consult Morris, *How We Treat Wounds To-day* (New York and London, 2d ed., 1886).

ULEÅBORG, ōō'lå-ô-bôr-y'. The northernmost government of Finland, Russia (Map: Russia, C 1). Area, 64,000 square miles, or 44 per cent. of the area of Finland. The surface is densely wooded and interspersed with lakes and marshes. The climate is very severe. The chief industry is lumbering. There are also some metal works and tanneries. Population, in 1897, 273,290, almost exclusively Finns.

ULEÅBORG. The capital of the Government of Uleåborg, in Finland, Russia, on the Gulf of Bothnia, 498 miles by rail north of Helsingfors (Map: Russia, C 1). The town manufactures leather. Population, in 1898, 15,042.

ULEMA, ụl'å-mä (Ar. *'ulamā*,' plural of *ālim*, learned, from *'alima*, to know). The theologian lawyers of Islam. This religion has no ecclesiastical ministry, as any one of the Faithful may lead a congregation in prayer as Imam. But, inasmuch as theoretically every detail of life is to be guided by the letter of the Koran, along with all the approved traditions and orthodox interpretations, there is the necessity of a class of men learned in the canon law, who may act as the advisers of the Faithful in all these innumerable emergencies. These Ulemas, therefore, correspond most closely to the class of the Scribes or Rabbis in Judaism. The province of the Ulemas is now confined to a limited field in the Turkish Empire. By dictating the details of domestic life, they wield a vast authority over the people, and stand independent of, and often opposed to, the secular Government. They are recruited mostly from the lower classes. The candidates go up to the schools or universities, where the scholar remains three or four years, passing successively through the disciplines of grammar, dogma, and law. He may also pursue logic, rhetoric, etc. The great Mohammedan university is that of Cairo. The order is hierarchically graded. Above the lowest class stand the muftis, who have vast power in making abstract decisions on the law; above these the mollas (i.e. patrons), who constitute the governing body, having their chief centres at Constantinople and Cairo; and from this body at Cairo is appointed the Grand Mufti, or Sheikh-ul-Islam, the chief spiritual authority in Turkey.

ULEX. See Furze.

ULEXITE (named in honor of G. L. *Ulex*, a German chemist). A hydrated sodium and calcium borate that occurs in rounded masses, consisting of fine fibres. It has a silky lustre, and is white. It is found in Chile, Argentina, and on the West African coast; also in Esmeralda County, Nevada, and at several localities in Inyo, Kern, and San Bernardino counties, California. It is an important source of borax.

ULFELDT, o͞ol′fĕlt, Korfitz, Count (1606-64). A Danish adventurer. Through marriage with Leonora Christina, the natural daughter of King Christian IV., he rose to high office, being made Governor of Copenhagen and royal steward (1643). He retained his influence after the accession of Frederick III., the enmity of whose Queen, however, forced him in 1653 to flee to Sweden. In 1657 he fought against his native country, and by the Treaty of Roeskilde (1658) was restored to his estates. After many vicissitudes he died a fugitive near Basel, February 20, 1664. His wife was kept a prisoner at Copenhagen from 1663 to 1685, and wrote an account of her captivity in *Jammers Minde*, a notable specimen of Danish prose. She died in 1698. Consult Ziegler, *Denkwürdigkeiten der Gräfin Leonora Christina, vermählten Gräfin Ulfeldt* (Vienna, 1879).

UL′FILAS, Gothic **WULFILA** (little wolf) (c.311-c.381). Bishop of the Goths, and translator of the Bible into Gothic. He was born in Dacia. Tradition relates that his ancestors were Cappadocian Christians who had been taken captive by the Goths and had lived many years among them. Early in life he was a *lector* or reader of the Scriptures among his countrymen, and in 341 he was consecrated Bishop of the West Goths by Eusebius of Nicomedia (q.v.) at a Synod at Antioch. He was then and for the remainder of his life an Arian. For seven years he worked with much success as a missionary north of the Danube. In 348 the persecution of a heathen chief induced Ulfilas and his flock to emigrate, and, with the consent of the Emperor Constantine, they settled in Mœsia, in Byzantine territory south of the Danube. For more than thirty years Ulfilas continued his activity as the apostle to the Goths; he died at Constantinople, whither he had been summoned by the Emperor, probably in 381. Ulfilas had a good knowledge of Greek, Latin, and Gothic, and preached and wrote in all three languages. He is remembered chiefly for his translation of the Bible, which marks not only the beginning of Christianity among his people, but of Germanic literature as well. His plan is said to have included the entire Bible with the exception of the Books of Kings, which he thought contained too much about wars for the good of his fierce countrymen. The portions of his work which have been preserved are most of the four Gospels, the Second Epistle to the Corinthians, and other fragments, comprising the greater portion of the New Testament; of the Old Testament, portions of the Books of Nehemiah and Genesis only. The chief manuscript is the so-called *Codex Argenteus*, written with silver letters on purple parchment and now in the library of the University of Upsala. Editions of all the fragments have been published by Von der Gabelenz and Löbe (3 vols., Leipzig, 1843-46); Uppström, *Codex Argenteus*, in facsimile (Upsala, 1854-57); *Fragmenta Gothica Selecta* (ib., 1861); *Codices Gothici Ambrosiani* (Stockholm, 1868); Bernhardt (Halle, 1875); and Heyne (9th ed., Paderborn, 1896). For the life of Ulfilas consult Waitz (Hanover, 1840), Bessell (Göttingen, 1860), and Scott (Cambridge, 1885).

ULLMANN, ụl′män, Karl (1796-1865). A German Protestant theologian. He was born at Epfenbach, Bavaria, and studied theology at Heidelberg and Tübingen. He was appointed professor at Heidelberg in 1821. In connection with Umbreit he established in 1828 the *Theologische Studien und Kritiken*. He was professor at Halle, 1829-36, after which he returned to Heidelberg. He was president of the supreme ecclesiastical council of Baden, 1856-61. His most important works were *Gregor von Nazianz* (1825; 2d ed. 1867); *Die Reformatoren vor der Reformation* (1841; 2d ed. 1866); *Ueber die Sündlosigkeit Jesu* (7th ed. 1863); *Das Wesen des Christenthums* (5th ed. 1865), all of which were translated into English. Consult his *Life* by Beyschlag (Gotha, 1867).

ULLOA, ụl-yō′ȧ, Antonio de (1716-95). A Spanish statesman and scientist, born at Seville. He entered the Spanish navy, and in 1735 accompanied to South America the French scientific expedition sent out to measure a degree of the meridian at the equator. He became rear-admiral in 1760, came to Louisiana as Governor in 1764, and was made lieutenant-general of the naval forces in 1770. He was sent on a secret expedition against Florida, but his zeal as naturalist made him forget his sealed orders and brought him before a court martial (1780). He was acquitted, but lived in retirement. He wrote *Relación histórica del viaje á la América meridional* (1748).

ULLS′WATER. The largest of the English lakes, after Windermere, lying between the counties of Cumberland and Westmoreland, 10 miles east of Keswick (Map: England, D 2). Length, 8½ miles; breadth, ¼ to ¾ mile. Its scenery is rugged and grand, and one of its chief features is Helvellyn, which rises 3118 feet at the southwest extremity.

ULM, ụlm. A city of the Kingdom of Württemberg, Germany, and an important Imperial fortress, situated at the junction of the Iller and the Blau with the Danube, which here becomes navigable, 43 miles west of Augsburg (Map: Germany, C 4). Two bridges unite the city with New Ulm, a village on the Bavarian side of the Danube. The streets are narrow. The minster, which is a Protestant church, is the most important and beautiful example of late Gothic architecture in Germany, and is next to the Cathedral of Cologne the largest church in that country. It is 407 feet in length, 159 feet in breadth, and the spire (finished 1890), 530 feet high, is the highest in the world. The building was begun in 1377, and finished with the exception of the spire in 1494. The leading industries are flax, cotton, and woolen weaving; bleaching; the manufacture of paper, leather, and mixed fabrics; beer-brewing, ship-building, book-printing, etc. Ulm is famed for ornamental pipe bowls, its pastry, called Ulmer bread, and its trimmed lumber. Population, in 1895, 39,300; in 1900, 42,860. Ulm was a free Imperial city as early as the twelfth century, and had become very prosperous by the close of the Middle Ages. In 1530 the city accepted the Reformation, and the majority of the people have since been Lutherans. In 1802 Ulm was attached to Bavaria, and became part of Württemberg in 1810. Here on October 17, 1805, the Austrian general Mack surrendered to the French with about 23,000 men. Consult: Pressel, *Ulmisches Urkundenbuch* (Stuttgart, 1873); Loeffler, *Geschichte der Festung Ulm* (Ulm, 1883); Schultes, *Chronik von Ulm* (ib., 1886).

ULMIN. See Humus.

UL'PIAN (Domitius Ulpianus). A distinguished Roman jurist, a citizen of Tyre, who lived in the latter part of the second and the first part of the third century. Under Septimius Severus (A.D. 193-211) he became assessor in the auditorium of Papinian (q.v.), i.e. he was an associate justice when Papinian was prætorian prefect or Chief Justice of the Empire. Under Caracalla, who put Papinian to death, Ulpian retained his position; but Elagabalus stripped him of his dignities and exiled him from Rome. On the accession (A.D. 222) of the youthful Alexander Severus, to whose mother he was related, Ulpian was recalled, appointed guardian of the Emperor and prætorian prefect, and became the virtual Regent of the Empire. He was slain in B.C. 228 in a rising of the Prætorian Guard. Ulpian was one of the most prolific of the Roman legal writers. Besides voluminous commentaries on the civil law and on the prætorian edict, he published collections of cases ('opinions,' 'responses,' etc.), books of 'rules' and 'institutions,' treatises on the powers and duties of different magistrates, and many monographs. On account of the lucidity of his style, Justinian's compilers drew more largely upon his writings than upon those of any other jurist. Excerpts from his works constitute one-third of the *Digest*. Outside of Justinian's *Digest*, only one of Ulpian's books has been even partially preserved, viz. his monograph on rules (*Liber Singularis Regularum*), which appears to have been a hand-book for practitioners. It is frequently printed with the *Institutes* of Gaius, as in Muirhead's edition (Edinburgh, 1880), and in that of Abdy and Walker (3d ed., Cambridge, Eng., 1885). See Civil Law; Jurisconsult.

ULRICH, o͞ol'rĭk (1487-1550), Duke of Württemberg. He was the son of Count Henry IV., and at the age of eleven succeeded to the dukedom, assuming personal power in 1503. He added to the territory of Württemberg, but so impoverished the peasantry that in 1514 they rose in revolt. This he quelled only after many important concessions. By the murder of Hans von Hutten, brother of Ulrich von Hutten, he aroused the enmity of the dukes of Bavaria and the nobility. He was placed under the ban of the Empire, and was driven from the country by the Swabian League in 1519, and his possessions were sold by the League to Charles V., who transferred them afterwards to his brother Ferdinand. Ulrich went over to the Protestants, and with the aid of Philip of Hesse won back his dukedom, at the head of an army of 20,000 men (1534), but only as a fief of Austria. He then carried on the work of the Reformation, joined the Schmalkaldic League, and fought against Charles V. in 1546. He bought a precarious peace from the Emperor at great cost, and died in 1550 just as he was again threatened with deposition. Consult Kugler, *Ulrich, Herzog zu Württemberg* (Stuttgart, 1865).

ULRICH, ŭl'rĭk, Charles Frederick (1858 —). An American painter, born in New York City and educated at the Cooper Institute and the National Academy of that city. Afterwards he studied in Munich. In 1883 he was awarded the Thomas B. Clarke prize for his picture "In the Land of Promise," and was elected an associate of the National Academy. His pictures include "The Carpenter," "A Dutch Typesetter," "The Glass-Blowers," and "The Wood Engraver."

ULRICH VON HUTTEN, o͞ol'rĭk fôn hụt'*ten*. See Hutten, Ulrich von.

ULRICH VON LICHTENSTEIN, lĭk'*ten*-stīn (c.1200-76). A German minnesinger, born in Styria, of an ancient noble race, and who was Landeshauptmann of Styria in 1245, headed the refractory Styrian nobility, and went through a terrible imprisonment in his own castle of Frauenburg. His chief work, *Frauendienst*, is invaluable for the history of civilization. In it he describes adventurous tournaments which he, a married man, undertook in the service of a high-born mistress. It is a sort of rhymed memoir work, covering the period from 1211 to 1255, interspersed with his own graceful lyrics.

ULRICH VON TÜRHEIM, tụr'hīm. A Swabian noble and epic poet of the thirteenth century. Of the details of his life nothing is known. He continued, using other sources, Gottfried von Strassburg's *Tristan und Isolde*, and Wolfram von Eschenbach's *Willehalm*. The former is conjecturally dated 1240, the latter, entitled *Der starke Rennewart*, 1250. Consult: Bechstein, *Tristan und Isolde* (Leipzig, 1875); and Lohmeyer, *Die Handschriften des Willehalm Ulrich von Türheim* (Halle, 1882).

ULRICI, o͞ol-rē'tsē, Hermann (1806-84). A German philosopher, born at Pförten, Brandenburg. He studied at Halle and Berlin, and after a brief career as a lawyer devoted himself exclusively to literature and philosophy. In 1834 he was appointed professor of philosophy at Halle, where he resided till his death. Among his works are to be mentioned: *Geschichte der hellenischen Dichtkunst* (1835); *Ueber Shakespeares dramatische Kunst* (1839; Eng. transl., 1864); *Ueber Princip und Methode der Hegelschen Philosophie* (1841); *Das Grundprincip der Philosophie* (1845-46); *System der Logik* (1852); *Gott und die Natur* (1862); *Gott und der Mensch* (1866-72). He was an opponent of the Hegelian philosophy, and endeavored to establish an empirical idealism.

UL'STER. The northernmost province of Ireland, comprising the nine counties of Antrim, Armagh, Cavan, Donegal, Down, Fermanagh, Londonderry, Monaghan, and Tyrone (qq.v.). Total area, 8613 square miles. Population, in 1861, 2,389,263; in 1891, 1,619,814; in 1901, 1,581,350. The Presbyterians and Episcopalians constitute more than half of the inhabitants.

ULSTER KING-AT-ARMS. The chief heraldic officer of Ireland. See King-at-Arms.

ULTRAMARINE (from Lat. *ultra*, beyond + *marinus*, marine, from *mare*, sea). A blue pigment originally obtained from the mineral lazulite, or lapis lazuli (q.v.). The finest specimens of lazulite come from various localities in Persia, Siberia, and Chile, and when ground form the pigment; but, as only a very small proportion of that mineral is available, the pigment is very expensive. In 1828 Guimet, of Toulouse, was successful in producing it on a commercial scale, and almost simultaneously a synthetical method for its preparation was announced by Gmelin, of Tübingen. For the manufacture of artificial ultramarine, sodium sulphate, china clay, and carbon are ground together and heated in crucibles at a red heat for from six to nine hours. The resulting raw ultramarine, which is of a somewhat dull green color, is then crushed, mixed with powdered sulphur, and placed upon a roasting furnace, where it is heated with excess of air until the sulphur has been entirely burned off, when the mass assumes a bright blue color. A so-called direct method, which is said to yield better results, consists in using a mixture of sulphur 110 parts, china clay 100 parts, soda ash 90 parts, charcoal 20 parts, with some infusorial earth. These materials, after being carefully ground, well mixed, and pressed, are calcined in a muffle-furnace and yield, after heating from 12 to 18 hours, a blue ultramarine, which is then washed, ground, and dried. The pigment finds extensive use in the arts as a coloring material, owing to its brilliancy as a body color and high coloring power, especially in calico printing, in the manufacture of blue printing ink, for the printing of wall paper, in the making of blue writing paper, as a paint, and in the manufacture of blue mottled soap. It is also used as a whitening agent, correcting the yellow tinge in writing and printing papers, in cotton and linen goods, sugar, etc. *Cobalt ultramarine*, or 'Thénard's blue,' is a pigment prepared by mixing freshly precipitated alumina with cobalt arsenate or phosphate, drying the mixture, and then slowly heating it to redness. *Yellow ultramarine* is a pigment consisting of barium chromate.

ULTRAMONTANISTS (from Lat. *ultra*, beyond + *montanus*, mountainous, relating to a mountain, from *mons*, mountain; so called in allusion to the geographical position of Italy relative to the countries north of the Alps, and hence applied to the Italian party in the Roman Catholic Church). The name applied to those who recognize the Papal claim of supremacy over all national churches and sovereigns. Since 1870 it has been used also as a designation of all who accept the decrees of the Vatican Council, and in a broader sense it has been applied to the most conservative element in the Roman Catholic Church. In a purely political sense it has come to be used to designate the extreme Catholic party in almost every nation of Northern Europe. The Ultramontanists as a Church party first appeared in the Papacy of Gregory VII. (q.v.), who advanced the theory that the Pope had the power to depose and absolve temporal rulers. The enforcement of this theory would have had the effect of entirely superseding the freedom of action of the various churches, and its assertion aroused the opposition of powerful parties in the churches of Germany and France. After the Council of Constance (1414-18) (q.v.) the struggle between the Ultramontanists and the champions of the liberties of the various churches became the principal point of dispute within the ecclesiastical body. The opposition in the Gallican Church was particularly active, and has so continued to the present day. After the reconstruction of Europe, following the Napoleonic wars, the actual influence of the Ultramontanists was considerably decreased, although their principles were still tenaciously maintained and reasserted at every opportunity. In 1869-70, in connection with the meeting of the Vatican Council and the discussion of the doctrine of Papal infallibility, the political aspects of Ultramontanism assumed new importance. In Germany, Austria, and France the Catholic and Belgian parties in Parliament are designated by the name of Ultramontanes.

ULTRA VIRES, ŭl′trȧ vī′rēz (Lat., beyond one's powers). A legal term employed to indicate the acts of, or contracts entered into by, corporate bodies beyond the scope of the powers given to them expressly or by implication by their charters or the general law under which they were created.

ULTRA-VIRES CONTRACTS. *Ultra-vires* contracts of corporations should be distinguished from those which are illegal either by statute or some rule of the common law. Strictly an *ultra-vires* contract of a corporation is without legal validity to bind the corporation because the act is without or beyond the legal powers of the corporation, and therefore has no legal existence. Illegal contracts, on the other hand, are without such validity because of the positive prohibition of such contracts by the statute or common law on grounds of public policy. This distinction is important because of the difference in the consequences which flow respectively from *ultra-vires* contracts and illegal contracts of corporations. (For a fuller discussion of this subject, see QUASI CONTRACTS.) It is held by the English courts, by the Federal courts of the United States, and by the courts of some of the States that neither party to an *ultra-vires* contract can acquire any true contract rights under it. In each of these courts, except the English courts, it is also held that in case either party has given his performance under such a contract, he may recover the property or thing so given in an appropriate action, or the value of the performance so given, on theory of quasi contract. The distinction between rights on the contract and in quasi contract in case of *ultra-vires* contracts is often of the greatest importance.

The second view with reference to *ultra-vires* contracts, and the one which is held in most of the States, is that so long as such contracts remain executory neither party to the contract acquires any rights under it, it being a complete answer to an action brought by either party either for damages or specific performance that the contract is invalid because *ultra vires*. If, however, either party has performed the contract on his part, the other is held to be estopped to deny its validity, and the plaintiff may recover as though the contract were originally valid. The application of the doctrine of estoppel to such cases is anomalous and in many cases practically does away with the doctrine of *ultra vires*. In the case of negotiable paper issued *ultra vires* by a corporation, it is everywhere held that *ultra vires* is a personal and not a real defense (see NEGOTIABLE INSTRUMENTS), and cannot be set up against a *bona fide* purchaser for value, although it may be a valid defense against the original taker or holder of the paper. In determining what contracts are *ultra vires*, the courts have applied liberal rules of interpretation, holding not only that contracts expressly authorized were within the powers of the corporation, but that it has all the power to contract which can fairly be implied from the language of its charter and from the character of the business which it is authorized to conduct.

TORTS AND CRIME. Strictly all torts committed by the agents of a corporation while acting for the corporation are *ultra vires*, since a corporation has no express or implied authority to commit tortious acts. Following this course of reasoning, the early tendency of the courts was to hold that corporations could not be held legally responsible for torts. Governed, however, by considerations of policy, the courts hold that corporations are liable for all torts of their agents and employees committed by them within the scope of their authority. When malice is an essential element in the tort, the malice of the agent is imputed to the corporate principal. Upon similar principles corporations have generally been held responsible for minor criminal offenses, and in many States there are now special statutes governing the criminal responsibility of corporations. See LAW, CRIMINAL.

Courts of equity will take jurisdiction to restrain *ultra-vires* acts at the suit of a stockholder upon his showing that the directors or trustees of the corporation refuse to act. There is also statutory authority in some States for proceedings brought in behalf of the State by the Attorney-General to restrain *ultra-vires* acts when they are working a public injury, and at common law the State may proceed on the relation of a private individual to compel forfeiture of the charter of a corporation by *quo warranto* (q.v.) on the ground that the corporation is committing *ultra-vires* acts under such circumstances as to amount to a departure from the business or purposes for which it was organized. Consult the authorities referred to under CORPORATION; CRIMINAL LAW; EQUITY; QUASI CONTRACT.

ULUA, ōō-lōō′ȧ, **WOOLWA**, or SUMO. A group of tribes including the Sumo proper, the Cookra, the Poya, and others, constituting a distinct linguistic stock, occupying the headwaters of the streams which empty along the east coast of Nicaragua. They call themselves *Sumo*, the other names having probably been bestowed by their enemies, the Mosquito (q.v.). In physique they are below middle stature, of light brown complexion and handsome features, with chests and arms strongly developed. They live in huts consisting of palm-leaf roofs raised upon posts and sufficient to accommodate four families. The women wear only a short skirt of bark fibre, and both sexes are much given to painting. They also flatten the head. They plant fields of corn, cacao, sugar-cane, and chile, and the women are potters, while the men are especially expert boatmen and lumberers. Polygamy is common, and girls are frequently betrothed almost in infancy. Boys are subjected to various ordeals on arriving at manhood. Their principal ceremonial is a festival lasting several days and nights, during which they drink large quantities of *mishla*, a liquor prepared from the manioc root. Their dead are buried under sheds, and they have the curious custom of unwinding a long thread from the former owner's house to the grave, sometimes even for miles through the forest or across rivers.

ULUGH-BEG, ōō′lụg-bĕg′ (1394-1449). A Persian prince and astronomer, the grandson of Timur (q.v.). He succeeded, in 1447, to the Imperial throne of Samarkand on his father's death. He was a successful warrior, but happening to conceive suspicions of the loyalty of his eldest son, that prince rebelled, defeated and captured his father, and soon after caused him to be put to death.

Ulugh-Beg was the founder of the observatory at Samarkand, as a patron of astronomers and himself a diligent observer. His most important contribution to astronomical science is his star-catalogue, the first original one since that made by Ptolemy. The astronomical works of Ulugh-Beg were written in Arabic, afterwards translated into Persian, and thence the chronological portion of them into Latin by Greaves (London, 1650), and the geographical part (1652). An independent version in Latin and Persian was published by Hyde (Oxford, 1665). The latest edition of the star-catalogue was edited by Baily in 1843, and published in volume xiii. of the *Memoirs of the Royal Astronomical Society* (London, 1843).

UL′VERSTON. A seaport in Lancashire, England, 22 miles northwest of Lancaster (Map: England, C 2). Its parish church dates from 1111. It stands in an extensive agricultural and mining district, and has manufactures of cotton goods, iron, boilers, linen, paper, ropes, boots, and woolen yarn. Population, in 1901, 10,064.

ULYS′SES (Lat. *Ulysses*, *Ulixes*, *Olixes*, Athen., Bœot., Corinth. Gk. Ὀλυσσεύς, *Olysseus*, Ὀλυττεύς, *Olytteus*, general Gk. Ὀδυσσεύς, *Odysseus*, probably of Illyrian origin, influenced by popular connection with ὀδύσσεσθαι, *odyssesthai*, to be hated). A legendary Greek hero. According to the oldest legend, the Homeric, he was the son of Laertes, Prince of Ithaca, and of Anticleia, daughter of Autolycus. According to a later account, his father was the crafty Sisyphus; whence he is sometimes called, by way of reproach, Sisyphides. He married Penelope (q.v.), by whom he became the father of Telemachus. When the expedition against Troy was resolved on, Agamemnon and Menelaus prevailed on Ulysses, though with difficulty, to take part in it. Later traditions represent him as feigning madness—an artifice which failed through the skill of Palamedes. Once enlisted, Ulysses devoted himself to the success of the expedition; with Nestor's aid he secured the help of Achilles, and with Menelaus he undertook a fruitless embassy to Troy to demand the return of Helen and her treasures. When the Greek fleet assembled at Aulis, Ulysses brought twelve ships. In the narrative of the *Iliad* Ulysses plays an important part. In prudence and ingenuity of resource he is the foremost of the Hellenic chiefs, while in courage he is inferior to none. His later trait of trickery is seen in the episode of Dolon, but in the Homeric poems he is generally represented as a model of the older, as Achilles is of the younger, hero. After the fall of Troy, the Homeric narrative of his long wandering on his return to Ithaca is contained in the *Odyssey*. Setting sail for home, his ships were driven by a storm on the coast of Thrace, where he plundered the land of the Cicones, but lost a number of his crew. Having reembarked, a north wind blew them to the country of the Lotophagi (the 'Lotus-eaters'), on the coasts of Libya, where some of the companions of Ulysses ate of the wondrous fruit, and wished to rest forever. But their leader compelled them to leave the land, and, sailing north again, they touched at the 'island of goats,' where Ulysses left all his ships but one. Thence he proceeded to the 'land of the Cyclopes,' where occurred the adventure in the cave of Polyphemus (q.v.). With his reunited fleet he now visited the island of Æolus, ruler of the winds, who gave him a favoring breeze, and the unfavorable winds tied in a skin. This his companions, in search of treasure, opened, and at once they were swept back to the island, from which they were now sternly excluded. They then reached the land of the Læstrygonians, a race of cannibals, who destroyed all the ships but one. Escaping with his solitary ship, he next landed on the island of Ææa, inhabited by the sorceress Circe (q.v.). After a year's sojourn he was sent by Circe to the Kingdom of Hades, to inquire about his return from the blind seer Teiresias. Teiresias disclosed to Ulysses the fact of the implacable enmity of Poseidon, whose son, Polyphemus, he had blinded, but encouraged him at the same time with the assurance that he would yet reach Ithaca in safety, if he would not meddle with the herds of Helios (the sun-god) in Thrinacia.

He passed in safety the perilous island of the Sirens (q.v.), but in sailing between Scylla and Charybdis the monster that inhabited the first of these rocks devoured six of Ulysses's companions. He next came to Thrinacia, where his crew insisted on landing, and while storm-bound killed, in spite of their oath, some of the cattle of Helios while Ulysses was asleep. When they had sailed away, a fierce storm arose, and Zeus sent forth a flash of lightning that destroyed the ship. Every one on board was drowned except Ulysses himself, who, clinging to the mast, was finally washed ashore on the island of Ogygia, the abode of the nymph Calypso, with whom he lived for eight years. The nymph offered him immortality if he would remain, but his love for Penelope and longing for his home were too deep, and at the entreaty of his special guardian, Athena, Zeus sent Hermes to command his release. Sailing eastward in a skiff of his own building, he was seen by the implacable Poseidon; who roused against him a terrible storm, which wrecked his ship and from which he barely escaped with his life by the aid of Leucothea to the land of the Phæacians. Naked and worn by fatigue, he fell asleep, but was awakened by the sport of Nausicaa, daughter of the King, Alcinous, and her maidens. She received him kindly, and brought him to the city. Entering the palace under Athena's protection, he was entertained by the King, who promised him safe convoy to his home. On the magic Phæacian ship he fell asleep, and was landed, with the rich presents of the Phæacians, while still unconscious.

Disguised as a beggar, he repaired to the hut of the swineherd Eumæus, where he met and revealed himself to Telemachus. The next day he was brought by Eumæus to the palace, where he was recognized by his old dog, Argus. Here he was harshly treated by the suitors of his wife, who were living riotously on his estate. After an interview with Penelope, to whom he foretold her husband's return, he was recognized by his old nurse, Eurycleia, whom he bound to silence. When the suitors all failed to string the great bow, he took it, easily strung it, and shot the arrow through a row of twelve axes, thus accomplishing the test Penelope had proposed for the suitors. Then, aided by Telemachus, Eumæus, and the neatherd Philœtius, he slew all the insolent suitors. The last book of the *Odyssey* records his recognition by his father, Laertes, and a final reconciliation with the friends of the suitors, brought about by Athena's aid. The Homeric poems have a tradition of further wanderings to appease Poseidon, by introducing his worship among a people who knew not the sea, and finally a happy old age and painless death. Allusions show that to Ulysses was also given a prominent place in other episodes of the Trojan War, such as the battle over the body of Achilles, the invention of the device of the wooden horse, and the final sack of Troy. The other epics enlarged these episodes and added others, in which Ulysses frequently played but a mean-spirited part. This degradation of his character continued in many of the plays of the Attic tragedy, and was further developed in later writers, especially the comedians. His death in these narratives was usually attributed to his son by Circe, Telegonus, who had been sent by his mother in search of his father. Landing in Ithaca, he was met in arms by Ulysses, and slew him with a spear tipped with the sting of a ray, thus fulfilling the prophecy that death should come to him from the sea.

UMĀ, o͞o′mȧ. In Hindu mythology, one of the principal names of the consort of the god Siva (q.v.), also called Durga, Devi, Kali, Parvati, Bhavani, and, less frequently, Katyayani, Ambika, and Haimavati. The myths relating to this goddess, who is worshiped in various parts of India, but especially in Bengal, are recounted in the great epic poems and Puranas (q.v.), and in poetical works, but the text-book of her worshipers is the *Dēvīmahātmya*, or the majesty of Devi, and a portion of the *Mārkaṇḍōya Purāṇa*. In the *Rāmāyaṇa* (q.v.) she is the daughter of the nymph Mena and of Mount Himalaya, whence her names Parvati, Haimavati, Adrija, Girija, and similar ones, meaning 'the mountainous' or 'the mountain-born.' According to the Puranas, in a former life she was Sati, the daughter of Daksha (q.v.), but it was only as Uma that she bore to Siva Ganesa (q.v.), the god of wisdom, and Kartikeya (q.v.), the god of war. According to the *Harivanśa* (q.v.), in another life she was born as the daughter of Yasoda, and exchanged for Vishnu (q.v.), when, in his incarnation as Krishna, he was born as a son of Devaki. On that occasion she was killed by Kansa, and became a divine virgin, to whom the gods addressed their praises, whence she was called Kanya, or Kumari, the virgin. The principal myths concerning her were her destruction of the demons Madhu, Kaitabha, and Mahisha, or Mahishasura, her defeat of the army of Chanda and Munda, two demon servants of Sumbha and Niśumbha, and her destruction of the demons Raktavija, Sumbha, and Niśumbha. In commemoration of her victory over Mahishasura, a festival called the Durgapuja, or Durgotsava, is annually celebrated in Bengal. Three weeks later another festival, the Kalipuja, is held in honor of her destruction of Chanda and Muṇda. In her aspect of Uma, Parvati, and Devi, this deity is essentially benignant. As Kali or Durga, however, she is malignant. She dwells with Siva on Mount Kailasa, a peak of the Himalayas. Consult: Moor, *Hindu Pantheon* (London, 1810); Muir, *Original Sanskrit Texts*, vol. iv. (2d ed., ib., 1873); Wilkins, *Hindu Mythology* (ib., 1900). See *Pārvati* in the Plate of HINDU DEITIES.

UMAN, ōō-män′. A Russian town in the Government of Kiev, on the Umanka, 170 miles south of Kiev (Map: Russia, D 5). It has two palaces belonging to the Counts Potocki. Population, in 1897, 28,628, of whom about three-fourths were Jews.

U′MATIL′LA. A tribe of Shahaptian stock (q.v.) formerly occupying the country about the junction of the Umatilla and the Columbia in northeastern Oregon, and now gathered with the Cayuse and Wallawalla upon a reservation in the same neighborhood. Like all the tribes of the same region, they subsisted originally on fish, game, roots, and berries, and did not practice agriculture. They were visited by Lewis and Clark in 1804, and about forty years afterwards by Jesuit missionaries, by whom some were converted and civilized. By a treaty of 1855 they agreed to come upon their present reservation. In 1903 they numbered only about 180.

UMBA′GOG LAKE. One of the Rangeley Lakes (q.v.).

UMBALLA, ụm-bäl′lȧ. The capital of a district in the Punjab, India. See AMBALA.

UMBEL. A form of inflorescence (q.v.).

UMBELLIFERÆ (Neo-Lat. nom. pl., from Lat. *umbella*, umbrella, umbel, diminutive of *umbra*, shadow, shade + *ferre*, to bear). The PARSLEY FAMILY. A large and important natural order of dicotyledonous herbs and a few shrubs containing about 200 genera and 1500 species generally characterized by the inflorescence, an umbel which is often compound. The species abound chiefly in the temperate regions of the Northern Hemisphere. They generally have divided or compound, rarely simple, leaves, and usually abound in a resinous secretion, and volatile oils, on account of which many are reputed poisonous. Acridity is their general characteristic. Some are pleasantly aromatic, others have a powerful and disagreeable smell. In the roots of some, especially when enlarged by cultivation, starch and sugar are stored, so that they become useful for food. The systematic arrangement of the Umbelliferæ has been found difficult by botanists. Sprengel, De Candolle, Koch, and others have devoted much attention to this order. The North American species have been described by Coulter and Rose. Engler divides the genera into three suborders: Heterosciadieæ, Haplozygieæ, and Diplozygieæ, with nine tribes. The genera of economic importance include, Daucus, Pastinaca, Apium, Crithmum, Fœniculum, Carum, Ferula, Coriandrum, Pimpinella, Petroselinum, Archangelica, etc. Of succulent-rooted Umbelliferæ the carrot and parsnip are the best known examples. Skirret, earthnut (*Conopodium*), and arracacha are also of some value. The roots of Annesorhiza capensis and Carum capense are used as esculents at the Cape of Good Hope. The roots of Chærophyllum tuberosum, or sham, are used in the Himalayas. The herbage of Prangos pabularia is used in the temperate parts of the East Indies for feeding cattle, and made into hay for winter fodder. The blanched stems of celery, enlarged by cultivation, are a favorite salad, and those of alexanders (*Smyrnium olusatrum*) were formerly used in the same way. The candied stalks of eryngo were once much esteemed, and those of angelica are still used. The leaves of parsley, chervil, fennel, etc., and the seeds of anise, caraway, coriander, etc., are used for flavoring. Lovage (*Levisticum officinale*) is sometimes cultivated as a salad plant.

UMBER (from Fr. *ombre*, from Lat. *umbra*, shadow, shade). A mineral pigment resembling ochre, but differing from true ochre in containing some oxide of manganese. It is soft, earthy, and of a dark brown color. It occurs at many localities in Europe, notably in the island of Cyprus, and is also mined in Illinois, Pennsylvania, Georgia, and New York. Raw umber yields a brown paint, while burnt umber has a redder tinge. Both are stable and can be mixed with water or oil. See MINERAL PAINTS; OCHRE.

UMBILICAL CORD (from Lat. *umbilicus*, navel; connected with Gk. *ὀμφαλος*, *omphalos*, OIr. *imblin*, OHG. *nabalo*, Ger. *Nabel*, AS, *nafela*, Eng. *navel*), or NAVEL STRING. The bond of communication between the fœtus (which it enters at the umbilicus, or navel) and the placenta, which is attached to the inner surface of the maternal womb. It consists of the umbilical vein lying in the centre, and the two umbilical arteries winding from left to right round the vein. Contrary to the usual course, the vein conveys arterial blood to the fœtus, and the arteries return venous blood to the placenta. These vessels are imbedded in a yellow gelatinous matter, known from its first describer (in 1659) as the jelly of Wharton. Nerve filaments have been traced into the cord; but the presence of lymphatics is doubtful. The whole is invested by a membrane (the amnion), and its ordinary length is about 20 inches. As soon as a child is born, and its respiration fairly established, the umbilical cord is tied, and divided near the navel, which spontaneously closes, the fragment of cord dying away. See FŒTUS and PLACENTA.

UMBILICAL HERNIA. The term applied to the protrusion of intestine at the navel or umbilicus. It is of most frequent occurrence shortly after birth; but it is not uncommon in women who have been frequently pregnant. If the hernia is reducible, and the patient an infant, the ordinary course of treatment is, after returning the parts to their proper position, to place the convex surface of an ivory hemisphere on the navel, and to retain it there either with strips of adhesive plaster or with a bandage. Special trusses are made for the treatment of this affection in adults. In cases of irreducible hernia a large hollow pad should be worn. If it becomes strangulated, an operation may become necessary. Early operation is now often resorted to for the radical cure of umbilical hernia. See Hernia.

UMBILICUS. The anatomical term for the navel.

UMBRELLA-BIRD. A black South American bird (*Cephalopterus penduliger*), the size of a crow, whose head is ornamented with a crest forming a covering somewhat like a parasol, composed of straight elevated feathers with white and stiff shafts terminated by black beards which project forward. The sides of the neck are naked, but long, black, glossy, metallic feathers, forming a loose pelerine hanging below the breast, spring from the throat and sides of the neck. The tail is long and slightly rounded. There are two other closely allied species. They live in deep woods, make rough stick nests, and utter cries, especially at twilight, described as 'lowings.' See Cotinga and Plate of Cotingas, etc.

UMBRELLA PLANT. See Cyperus.

UMBRELLA TREE. See Magnolia; China Tree.

UMBRETTE. A peculiar heron-like bird (*Scopus umbretta*) representing alone an African family (Scopidæ) closely related to the shoe-bill (Balæniceps). It is a native of the wooded regions of Madagascar and most of Africa. It has a body about the size of a common fowl's, long naked legs, with very large, slightly webbed toes, and a large head with a long, strong, keeled stork-like beak, surmounted by a great crest, suggesting in profile the name 'hammerhead' given to the bird by many English observers. The plumage is purplish brown, with black tail bars; and its smoky tints make it almost invisible in the dusk when it most often goes abroad. At night, according to Evans, it roosts in trees. Its food consists of fish, reptiles, frogs, worms, mollusks, and insects captured in shallow water; and while feeding the birds have a curious habit of skipping round each other with extended wings. The note is a harsh quack or weak metallic sound. The nest is an enormous structure of sticks, lined with roots, grass, rushes, or clay, having a hole at the side, and ordinarily a flat top; it is placed in a tree, on a rocky ledge, or exceptionally on the ground. Three to five white eggs form the complement.

UM'BRIA. In ancient geography, a country of Central Italy, corresponding loosely with the modern territorial division of the same name, which constitutes the Province of Perugia. At an early date the name Umbria was applied indefinitely to a large territory in Central and Northern Italy. The Umbrians were among the oldest and most powerful nations of Italy, and probably held all the land in Central Italy between the Adriatic and the Tyrrhenian Sea. This territory was gradually decreased by the encroachment of the Etruscans on the west, of the various Celtic tribes on the north, and of the Picentes on the south, until the Umbrians were shut off from the sea in the valleys east of the Apennines.

Umbria at the period of the Roman conquest of Italy was bounded on the north by the *Ager Gallicus*, on the east by Picenum, on the south by the country of the Sabines, and on the west by Etruria. The historical prominence of the Umbrians ends with the beginning of the third century B.C.; they were defeated by Rome in B.C. 308, and, with the other confederated peoples, were crushed at the battle of Sentinum, B.C. 295. After B.C. 220 the Via Flaminia ran through the country. Umbria, together with the *Ager Gallicus*, which had been restored to the territory after the conquest of the Senones by the Romans, constituted the sixth region of Italy in Augustus's division. Knowledge of the Umbrian civilization and language has been gained chiefly from inscriptions, as the accounts left by ancient writers are of uncertain value. The most important of these epigraphical remains are the seven bronze tablets found at Gubbio (the ancient *Iguvium*, the mediæval *Eugubium*) in 1444. See Eugubine Tables; also, for the language, Italic Languages, paragraph *Umbrian*.

The district known in modern times as Umbria was a part of the Papal States until 1860. The Province of Perugia has an area of 3748 square miles. The population in 1901 was 675,352. The surface is mountainous, but the valleys are fertile. Capital, Perugia (q.v.).

UMBRIAN SCHOOL OF PAINTING. The name applied to the Central Italian painters of the Renaissance, living chiefly within the modern Province of Umbria. The Umbrian school is characterized by its intense but dreamy religious sentiment. This is achieved by the ecstatic expression of the faces and by the effect of great distance or spaciousness. The Umbrians had admirable illustrative qualities and good color, but they were deficient in form and dramatic action. Though usually classed as Umbrians, the principal painters of the northern part of this territory differed from the others in their high proficiency in form and motion. Such artists were Piero degli Franceschi (d.1492), and his pupils, Melozzo da Forli and Luca Signorelli. Gentile da Fabriano (d.1428) may be considered the first great Umbrian painter. Fra Angelico and his pupil Benozzo Gozzoli exercised a strong influence. The founder of the Umbrian school in its narrower sense was Niccolò da Foligno, and the first important Perugian master was Bonfigli; then in the later fifteenth century came Fiorenzo di Lorenzo, Pinturicchio, and Perugino, its best known master next to his pupil Raphael. All the best qualities of the school culminated in Raphael, who added the best that Florence and the antique could give. A characteristically Umbrian contemporary of Raphael was "Lo Spagna" at Spoleto. Consult Berenson, *Central Italian Painters of the Renaissance* (New York, 1897), and the works cited under Florentine School of Painting.

UMBRINE. A fish. See Meagre.

UMLAUFT, o͞om'louft, Friedrich (1844—). An Austrian geographer and author, born and educated in Vienna, where he became professor at the State Gymnasium of Mariahilf and at the municipal Teachers' College in 1870. He wrote: *Die oesterreichischungarische Monarchie* (3d ed. 1896); *Die Alpen, Handbuch der gesamten Alpenkunde* (1887; English trans., 1889). After 1882 he was editor of the *Deutsche Rundschau für Geographie und Statistik*.

UMLAUT, o͞om′lout (Ger., sound-change). In comparative philology, the change undergone by a vowel or diphthong through the influence of a following vowel. It is, therefore, essentially a process of regressive vowel-assimilation. It occurs frequently throughout the Indo-Germanic linguistic group, although it is a characteristic only of the Germanic languages. As examples of umlaut, occasionally called mutation by English writers, may be cited Avesta *vohu*, 'good,' *mošu*, 'soon,' but Sanskrit *vasu, makṣu;* Armenian *keam*, 'I live,' but Sanskrit *jīvāmi;* Bœotian Greek *τρεπέδδας*, 'table,' but Attic *τράπεζα*; Attick Greek *ἥμυσυς*, 'half,' beside *ἥμισυς*; Latin *nihil*, 'nothing,' from *ne hilum*, 'not a thing;' Vulgar Latin *vixillum*, 'banner,' *butumen*, 'pitch,' but Latin *vexillum, bitumen;* Old Irish *cloth*, 'famous,' but Greek *κλυτός*; Old Church Slavic *bĭdr ĭn ŭ*, 'watchful,' beside *bŭdrĭnŭ, bŭdrŭ;* Lithuanian *budrù*. In Germanic umlaut is caused either by *i* or *u*. The *i*-umlaut changes a preceding *e* to ĭ, and *a* to *e*, as Gothic, Old High German *ist*, 'is,' but Greek *ἐστί*; Old High German *gesti*, plural of *gast*, 'host.' In Middle High German the *i*-umlaut changes *o, u, ā, ō, ū,* and *uo* to ö, ü, *ae, oe, iu,* and *üe* respectively, as *löcher*, plural of *loch*, 'hole,' *süne*, plural of *sun*, 'son,' *gaeben*, subjunctive of *gāben*, 'gave,' *hoeren*, present of *hōrte*, 'heard,' *briute*, plural of *brūt*, 'bride,' *güete*, 'goodness,' from *guot*, 'good.' The chief *i*-umlauts in Anglo-Saxon are of *æ, ā, o, ō, u,* and *ū* to *e, æ, e,* or usually *y, ē,* and *y* respectively, as Anglo-Saxon *weccan*, 'to wake,' Gothic *wakjan; hælan*, 'to heal,' from *hāl*, 'health,' *exen*, plural of *oxa*, 'ox,' and *gylden*, 'golden,' from *gold*, 'gold,' *dēman*, 'to judge,' from *dōm*, 'judgment;' *wyllen*, 'woolen,' from *wulle*, 'wool;' *cyþan*, 'to proclaim,' from *cyþ*, 'famous.' In Icelandic also the *i*-umlaut plays an important part.

The *u*-umlaut is less far-reaching than the palatalization caused by *i*. It does not occur in Gothic (owing probably, in part, to the deficiencies of the Gothic system of writing) or in Old, Middle, or New High German. It is found, however, in Anglo-Saxon, and, highly developed, in Icelandic. In Anglo-Saxon *a* before *u* or *o* becomes *ea*, *e* becomes *eo*, and *i* becomes *io*, although these umlauts are by no means regular in their action. Examples are *ealu*, 'ale,' but genitive *alo* , *ealo* , Northumbrian *al es; weorod*, 'folk,' beside *wer od; mioluc*, 'milk,' but Gothic *miluks*. The principal Icelandic *u*-umlauts are of *a* to *o*, *ā* to *ō*, *e* to *ö*, *ē* to *ö*, *i* to *y*, *ī* to *y*, *ei* to *ōy* or *ey*, *ia* to *io*, *ua* to *uo* or *o*, *uā* to *ō*, *ui* to *y*, *uī* to *y*, and *ue* to *ö*. There are other minor umlauts. Anglo-Saxon has a palatal umlaut which changes the *eo* and *io* arising from the 'breaking' of Germanic *e* and *i* before a guttural *h* plus a consonant to *ie* and later to *i, y,* and before palatals *ea* and *ēa* later became *e, ē*. Examples are *rieht, ryht*, 'right,' beside *reoht*, Old High German *reht; Wiht*, 'Wight,' beside *Wioht; sex*, 'knife,' beside earlier *seax; ēge*, 'eye,' beside earlier *ēage*. In Icelandic there are traces of an ʀ-umlaut, as in *ær*, 'they' (feminine), but Old Swedish *aʀ*, Gothic *os*. In German umlaut survives as an important element in the inflection. It is found especially in nouns, as *Brüder*, plural of *Bruder*, 'brother' (but Old High German *bruoder* for both numbers), *Söhne*, plural of *Sohn*, 'son' (Old High German *suni, sun*), *Hände*, plural of *Hand*, 'hand' (Old High German *henti, hant*), *Lämmen*, plural of *Lamm*, 'lamb' (Old High German *lembir, lamb*). It also characterizes the comparative and superlative degrees of adjectives, as *jung*, 'young,' *jünger, jüngst* (Old High German *jung, jungiro, jungisto*), and is seen in the imperfect subjunctive of certain verbs, as *hätte* from *haben*, 'to have' (Old High German *habēti*). In English there are only sporadic traces, as in *men, mice, feet*, as plurals of *man, mouse, foot* (Anglo-Saxon *men, mæn, mys, fēt*, plurals of *man, mūs, fōt*), and in causative verbs, as *set* from *sit* (Anglo-Saxon *settan* from *sittan*, Gothic *satjan* from *sitan*, pret. *sat*).

UMRIT′SAR. A city of the Punjab, India. See Amritsar.

UNA. The principal female personage in the first book of Spenser's *Faerie Queene*. She stands in the allegory for the quality of Truth, and is beautiful, pure, and trustful. She is the companion of the Red Cross Knight (q.v.) on his mission from the Court of Gloriana, but is soon separated from him by Archimago and undergoes many painful adventures until rescued by Prince Arthur and restored by him to her knight.

U′NAKA MOUNTAINS (called also, in whole or in part, the Smoky or Great Smoky Mountains). A southwestern division of the Appalachian Mountains. They branch off from the Blue Ridge in southern Virginia, and extend southwestward on or along the boundary between Tennessee and North Carolina, penetrating a short distance into northern Georgia (Map: North Carolina, A 4). On the west they are separated from the Cumberland Plateau by the great eastern valley of the Tennessee, and on the east they are connected with the Blue Ridge by an intricate system of cross ranges forming the rugged and much dissected remnants of a lofty plateau culminating in the Black Mountains. Nearly all the eastern headstreams of the Tennessee rise on this inclosed plateau and break through the Unaka Range. Otherwise the latter forms a sharply defined ridge, whose crest is the boundary line between Tennessee and North Carolina. In the north, however, there are three main ridges inclosing fine valleys. The average elevation of the main ridge is from 3000 to 5000 feet, the middle portion, which is generally known as the Great Smoky Mountains, being the highest. Here a number of peaks exceed an altitude of 6000 feet, extending their bare rocky summits above the timber-line. The highest is Clingman Dome with an altitude of 6619 feet. The range is composed chiefly of Lower Silurian sandstones and shales, with some Archæan metamorphic rocks. The slopes are covered with pine forests, and the range abounds in grand and rugged scenery.

UNALASKA, o͞o′nä-läs′kȧ, or **UNALASHKA.** The second largest and most important of the Aleutian Islands. It is situated in latitude 53° 30′ N., longitude 167° W., 135 miles southwest of the extremity of the Alaska Peninsula (Map: Alaska, B 5). It is about 75 miles long and from 10 to 25 miles wide; its coasts are indented with fiords, and it consists mainly of barren and treeless mountains, among which rises the volcano of Makushin to a height of 5961 feet. The island is thinly populated by Aleuts and a few Russians and Americans, chiefly engaged in fishing and sealing. The largest inhabited place is Unalaska Village or Iliuliuk, with a population, in 1900, of 428. It is the chief port of call for all vessels navigating Bering Sea, and since the gold discoveries its trade has increased considerably.

UNAU. The two-toed sloth (q.v.).

UN'CAS (?-c.1683). A famous sachem of the Mohegan Indians in Connecticut. At first a Pequot chief, he revolted about 1635 and collected a number of Indians, who took the name of Mohegans, which had once belonged to the Pequots, against whom he fought as an ally of the English in the Pequot War of 1637. (See PEQUOTS.) He was rewarded by the whites with a grant of Pequot lands. In 1643 he defeated the Narragansett chief Miantonomoh (q.v.), and somewhat later, with the sanction of the commissioners representing the United Colonies of New England, had him put to death. In 1648 the Mohawks and Pocomtocks began an unsuccessful war against him. In 1657 he was besieged by the Narraganset sachem Pessacus, but, according to tradition, was relieved by Ensign Thomas Leffingwell, to whom he is said to have granted the site of Norwich, Conn. The date of his death is unknown, though he is known to have been alive in 1682. A monument to his memory was erected at Norwich, Conn., in 1842. Consult: Stone, *Uncas and Miantonomoh, a Historical Discourse* (New York, 1842); Drake, *The Book of the Indians of North America* (Boston, 1834).

UNCIAL LETTERS. A term applied in Greek and Latin paleography to a modification of capital letters, which are made rounded instead of square, as being written on papyrus or vellum. See section *Letters and Their Forms,* under PALEOGRAPHY.

UNCLEANNESS. As used in the Old Testament, a term having several shades of meaning. In its primary sense it signifies a bodily condition which during its continuance excluded from the 'holy community.' Such a condition might be produced by a variety of causes, as childbirth (Lev. xii.), contact with a dead body (Num. xix. 11-12), or leprosy (Lev. xiii.-xiv.). Various purificatory rites are prescribed in the Pentateuchal codes to free from this condition. In a wider sense the term 'unclean' is applied to animals prohibited as food (Lev. xi.; Deut. xiv. 3-21), and the fruit of trees was unclean (i.e. could not be eaten) for the first three years (Lev. xix. 23). Certain functions of the body were very generally regarded in early times as rendering a person unfit to perform the rites of religion, or, in other words, to approach the deity. These functions are all connected in some way with the phenomena of reproduction.

The stipulations in regard to certain animals regarded as unclean belong in a different category. In all parts of the world certain animals are regarded as sacred either because a clan regards itself as descended from a particular animal or because for other reasons the animal in question is regarded as affording protection to the clan. Accordingly the animal formerly regarded as sacred comes to be avoided as unclean. And connection with the widespread symbolism of giving to deities the shapes of animals leads to the conception that certain animals are to be avoided because of their demoniac nature. In the Pentateuchal regulations all these factors may be traced—the sanctity attached to certain animals, their position as totems, as well as the later conception which regarded them as the abode of evil spirits.

In primitive religions disease is ascribed to the presence of a demon or evil spirit in the body, brought there by the power of a sorcerer or witch. A cure is thought to be effected by certain rites in which sympathetic magic plays a prominent part. In the Pentateuchal codes, however, an advance in religious ideas is manifested by designating a diseased person as one 'smitten' by God. The disease chiefly dealt with is a form of leprosy, which is still common in the East. From disease to death is but a short step, and the primitive views held in regard to death lead to precautions to be exercised by those who are obliged to come into contact with a dead body. On the one hand, death itself indicates the triumph of the evil spirit, while on the other, the uncertainty as to the whereabouts of the soul or spirit of the dead person incites fear and likewise leads to precautions against the unexpected return of the spirit which has perhaps only temporarily disappeared. By a natural extension of the term the dead person is regarded as unclean.

The rabbinical schools in Babylonia and Palestine elaborated the subject still further, and in the Talmud the laws and degrees of the various kinds of uncleanness are set forth in great detail accompanied with minute discussions of casuistical problems raised in connection with the subject. The extension of the term unclean to the fruits of trees for the first three years is quite secondary, and dates from the late period when it had acquired the general sense of forbidden, without reference to any genuine uncleanness connected with the transgression involved. The prohibition appears to have been a purely economic regulation to insure productiveness. Consult the commentaries on the passages cited and the Hebrew archæologies of Nowack and Benzinger; also Stade, *Geschichte des Volkes Israel,* vol. i. (Berlin, 1887).

UNCLE SAM. See NATIONAL NICKNAMES.

UNCLE TOM'S CABIN. See STOWE, HARRIET BEECHER.

UNCOMMERCIAL TRAVELLER, THE. A series of papers written by Charles Dickens for *All the Year Round,* from January 28, to October 13, 1860, in book form in 1860. In the edition of 1868 eleven new sketches were added to the first collection, and that of 1869 was increased by seven more. The papers consist of stories and impressions, humorous and pathetic, gained, doubtless, during the author's early journalistic experiences in London.

UNCONFORMITY. A term applied in geology to a break or interruption in the sequence of rock formations. In areas of stratified rocks one series may be found sometimes to rest upon the upturned or eroded edges of another series, thus showing that the deposition of the inferior beds was followed by an upheaval, during which they were disturbed from their horizontal position or were eroded, and then by a depression beneath the water, where the upper series was deposited. An unconformity, therefore, marks a hiatus in the geological record—a lapse of time unrecorded by sedimentation—and it is only by examining the sequence of deposits in other regions that the missing series can be supplied. Similarly, unconformities may exist in regions of igneous or metamorphic rocks. They are valuable to the geologist in fixing the limits of natural rock groups.

UNCTION (Lat. *unctio*, an anointing, from *unguere*, to anoint; connected with Skt. *añj*, to anoint, smear). The practice of anointing the body, or certain portions of the body, with oil, especially with the oil of olives. It was resorted to by the ancients from motives of health, of athletic development, or of luxury; but the practice now is chiefly a religious one. It was a rite in frequent use among the Egyptians, as well as the Greeks and Romans. Among the Hebrews priests and kings were anointed upon being set apart for their several offices, as were also sacred vessels. The oil employed in these religious unctions was prepared of the most precious perfumes and balsams. In Christian use, anointing from a very early time possessed the same sacred significance. (See EXTREME UNCTION.) Besides the anointing of the sick, however, there are many other sacred unctions traceable in ancient Christian practice; namely, in baptism, confirmation, ordination, consecration of churches, and the coronation of kings.

UNDERGROUND RAILROAD. The name popularly applied before the Civil War to the system adopted by many persons in the North for aiding fugitive slaves to escape from their masters and elude the pursuit of those sent to reclaim them. By furnishing food and shelter as well as advice to fugitives, they enabled thousands to escape to Canada beyond the reach of the Fugitive Slave Law. The most favored routes lay through Ohio and Pennsylvania. The houses along these routes where aid was given came to be known as 'stations;' those who directly assisted the escaping fugitives were known as 'conductors;' and those who made contributions of money, clothing, etc., were known as 'stockholders' in the enterprise. It was estimated that the number of negroes in Canada who made trips to the South to assist their friends in escaping from slavery amounted to 500 annually before the outbreak of the war. Large rewards were offered by Southern legislatures and individuals for the delivery of such persons south of Mason and Dixon's line. Among the most active white persons in the 'underground railway' service were Levi Coffin, Josiah Grinnell, Gerrit Smith, Theodore Parker, Thomas Garrett, Rev. Charles Torrey, and Samuel J. May. Coffin was commonly styled the president of the concern, and he claimed to have been actively engaged in the business for thirty-three years and to have received into his house an average of 100 fugitives annually. Professor Siebert in his exhaustive work on the subject gives the names of 3211 'agents, station keepers, and conductors.' He credits Daniel Gibbons, of Lancaster, Pa., with having aided 1000 fugitives to reach Canada; Dr. N. M. Thomas, of Michigan, with having aided 1000 or 1500; Rev. Charles Farrer with having aided 400; Philo Carpenter, of Chicago, with having aided 200; while H. B. Leper, of Princeton, Ill., aided 31 runaways to reach Canada in six weeks. Thomas Garrett (q.v.) claims to have aided 2700 to make their escape. Harriet Tubman, a negress, who escaped from Maryland, is reported to have made nineteen journeys to the South and to have brought away altogether 300 slaves. She subsequently served with success during the Civil War as a scout. Many of those concerned in this service were fined heavily for violating the Fugitive Slave Law, Garrett alone paying a fine of $8000, but the occasional punishments that were inflicted did not break up the practice, and it continued to be one of the chief grievances of the South against the North. Consult Siebert, *The Underground Railroad* (New York, 1899).

UNDERGROUND RAILWAY. See RAILWAYS; TUNNEL; SUBWAY.

UN'DERHILL, JOHN (?-1672). An American colonist, born probably in Warwickshire, England. In his youth he saw military service in the Low Countries and Spain, and in 1630 he accompanied the elder John Winthrop to Boston as commander of the militia. Four years after his arrival he was elected to the Colonial Assembly, and in 1637 he aided Capt. John Mason (q.v.) to exterminate the Pequot Indians. Of this expedition he wrote an account entitled *Newes from America*, which was published in London the following year. In spite of the services he had thus rendered, he incurred the wrath of the colonists by espousing the Antinomianism of Wheelwright and by his immorality. Forced to flee from Massachusetts, he took refuge at Dover in New Hampshire, and was there elected Governor. Later he removed to Connecticut and became a member of the Assembly. In 1643 he entered the military service of the New Netherlands, but ten years later he was expelled from that colony and went to Rhode Island, where he obtained a commission to make war on his late employers. In 1664 the New Netherlands were conquered by the English, and Underhill returned and settled at Oyster Bay, where, three years later, he obtained a grant of 150 acres of land from the Mantinenoc Indians. On this property, which he named Killingworth, he passed his later years.

UNDER-LEASE. The creation of a new term by a lessee of lands, by alienation of a portion of or an interest in his own term, with a reversion in himself. Where a lease is silent on the question, a lessee may make a valid under-lease, so long as the conditions in the original lease are observed. See LEASE.

UNDERSTANDING. A term which has been employed in various philosophical systems, from Plato to Hegel, as in some sort antithetical to reason. In general, the point of distinction has been that reason is the higher, understanding the lower faculty of cognition; that reason apprehends intuitively and in wholes, understanding discursively, on the ground of premises and hypotheses which it does not itself test; that reason moves above the realm of sense, while understanding is indebted for its material to the empirical data of sensation. In the modern psychological system 'reason' and 'understanding' have either dropped out of use or at least have come to play a very subordinate part. Consult: Wundt, *Physiologische Psychologie* (4th ed., Leipzig, 1893); James, *Principles of Psychology* (New York, 1890); Sully, *The Human Mind* (London, 1892).

UNDERWING MOTH. Any noctuid moth of the subfamily Catocalinæ, and especially one of the type genus Catocala, of which more than a hundred species inhabit the United States. Many have beautifully colored hind wings, which, however, are entirely concealed by the others when they are at rest. They are night-fliers, and generally pass the day upon trunks or branches of trees which they closely resemble in coloring. The larvæ are inconspicuous, and are usually protectively colored, and curious lateral structures have been developed for the purpose of disguising the resting-line between the larva and the surface upon which it stands. Some of them have developed bright warning colors in spots which may be exhibited at the will of the larva.

UN'DERWOOD, LUCIEN MARCUS (1853—). An American botanist, born in New Woodstock, N. Y., and educated at Syracuse University. He taught in Illinois Wesleyan University (1880-83), in Syracuse University (1883-91), in De Pauw University (1891-95), and in the Alabama Polytechnic Institute (1895-96), whence he was called to a chair of botany in Columbia University. He published *Our Native Ferns and How to Study Them* (1881; revised in 1882 as *Our Native Ferns and Their Allies*, 5th ed. 1900); *Descriptive Catalogue of North American Hepaticæ* (1884); *An Illustrative Century of Fungi* (1889); *Hepaticæ Americanæ* (1887-93); *Moulds, Mildews, and Mushrooms* (1899); and several bulletins of the Alabama Agricultural Experimental Station.

UNDERWRITER. In ordinary usage, a person who is authorized to negotiate insurance contracts. In modern financial practice a peculiar form of insurance has arisen to which the term underwriting is applied. It has been resorted to for many years in marketing new securities for established corporations, but has reached its highest development in the financing of the large industrial corporations recently formed. When a large corporation is organized to absorb a number of existing companies it is usually necessary to raise a large sum of money to serve as a working capital or to be employed in the purchase of stock in the original companies which holders are unwilling to exchange for new securities. To raise this cash the services of an underwriter are usually secured. The underwriting contract is one by which the company is assured of a definite amount of capital within a stated time. The underwriter binds himself to take at some stated future time a stipulated part of the securities of the new company at a price named in the contract, unless such a part is sold before that time at as high a price. He usually further agrees to advance at once the capital needed to launch the company. The underwriter leaves a wide margin between the price at which he agrees to take the stock and the price at which he hopes to sell it. A part of his reward comes from this source. He sometimes exacts in addition a bonus of stock for himself, or a commission on all stock sold, and occasionally stipulates that none of the stock given to others shall be put on the market until he has disposed of the entire amount that he has underwritten.

The securities of a corporation of any magnitude are seldom underwritten by a single person or firm. The original underwriter usually allows other bankers or favored customers to share in the underwriting. The group is known as an underwriting syndicate. The original underwriter usually acts as syndicate manager. Each member of the syndicate subscribes for a part of the stock. The cash that has to be raised to carry out the agreement with the company is secured by the syndicate manager partly through an assessment pro rata upon the members of the syndicate, partly by borrowing on the security of the underwriting. At the expiration of the time limit the syndicate manager distributes the profit of the transaction pro rata among the members, if the specified amount of stock has been sold. If some of it still remains unsold, whatever profit has been realized is distributed, and each member of the syndicate is called upon to take his proportionate share of the unsold stock at the stipulated price.

UNDINES (ML. *undina*, from Lat. *unda*, wave). The name given in the fanciful system of the Paracelsists to the elementary spirits of the water. Paracelsus describes the Undines in his *Treatise on Elemental Spirits*. They are of the female sex. Of all the different orders of elementary spirits, they intermarry most readily with human beings, and the Undine who gives birth to a child under such a union receives with her babe a human soul. But the man who takes an Undine to wife must be careful not to go on the water with her, or at least not to anger her while there, for in that case she will return to her original element. Should this happen, the Undine is not disposed to consider her marriage dissolved; she will rather seek to destroy her husband, should he venture on a second marriage. Fouqué has made this Paracelsist fancy the basis of an exquisite tale, entitled *Undine*, published in 1814, and frequently translated into English.

UNDUE INFLUENCE. In law, such an influence or control exercised over the mind of a testator that his will is practically overpowered, and that he is constrained by it to make some disposition of his property by will contrary to his own best judgment and wishes. Mere persuasion, appeals to the charity, benevolence, affections, gratitude, or pride, of a testator will not constitute undue influence, unless carried to such an extent that the mind of the testator is virtually overpowered. For example, one of several children may suggest to one of their parents that the latter should bequeath to him a larger share of his property than to the others, and urge as a reason that he labors under some disability rendering him less able to support himself than the others, or that the others have been abundantly provided for by bequests or devises from other relatives, etc. Where a will is contested on the ground of undue influence, the courts will scrutinize very carefully the relationship which existed between the testator and the beneficiary, and if it was of a confidential or fiduciary character, as that of attorney and client, physician and patient, religious confessor and confessant, such a fact is regarded as a suspicious circumstance, which, taken in conjunction with proof of active efforts on the part of the beneficiary to induce the testator to make his will in favor of the former, may give rise to a presumption of undue influence. Ordinarily, however, where undue influence is charged, the burden of proof rests upon the party making it. Any person, who would have been a legal heir if the testator had died intestate, may contest his will on the ground of undue influence, and if he is successful the court will refuse to probate the will. See WILL; and consult the authorities there referred to.

UNDULATORY THEORY OF LIGHT. See LIGHT.

UNDY. In heraldry, a term denoting wavy. See HERALDRY, section on *Partition Lines.*

UNEARNED INCREMENT. See SINGLE TAX.

UNEMPLOYMENT. A term applied in recent years to that condition of industrial life in which there is a considerable number of workmen out of work. In its widest application it describes the condition of several classes. In a report by the Labor Department of the English Board of Trade, in 1893, the term is used of four distinct classes: (1) Those who, engagements being for short periods, have terminated their last engagement on the conclusion of a job, and have not yet entered on another; (2) those who belong to trades in which the volume of work fluctuates, and who, though they may obtain a full share during each year of the work afforded by their industry, are not at the given time able to get work at their trade; (3) those who are economically suffering because there is not enough work in those trades to furnish a fair amount to all who try to earn a livelihood at them; (4) those who cannot get work because they are below the standard of efficiency usual in their trades, or because their personal defects are such that no one will employ them. Another classification divides the unemployed more briefly into three classes: (1) Members of season trades; (2) members of decaying trades; (3) the 'fringe' or least competent members of every trade. These are broad definitions, including two separate groups, those who for one reason or another, as feebleness, illness, old age, criminal characteristics, or mental deficiency, are incapable, and, secondly, those who are able and willing to work but cannot find it. The first class has always existed, and its presence occasions different phases of the problems of poverty and pauperism. The existence of the second class constitutes more strictly the problem of unemployment. Irregularity of employment even for competent workmen is not a modern phenomenon. It has been characteristic of every stage of economic development; but, on account of the growth of industrial democracy and the development of humanitarian interest, the evil assumes new importance. On this point Professor Marshall writes: "When a large factory goes on half time, rumor bruits the news over the whole neighborhood, and perhaps the newspapers spread it all over the country. But few people know when an independent workman, or even a small employer, gets only a few days' work in a month; and in consequence whatever suspensions of industry there are in modern times are apt to seem more important than they are relatively to those of earlier times. In earlier times some laborers were hired by the year, but they were not free, and were kept to their work by personal chastisement. There is no good cause for thinking that mediæval artisans had constant employment. And the most persistently inconstant employment now to be found in Europe is in those non-agricultural industries of the West which are most nearly mediæval in their methods and in those industries of Eastern and Southern Europe in which mediæval traditions are strongest. Though the rapidity of invention, the fickleness of fashion, and, above all, the instability of credit, do certainly introduce disturbing elements into modern industry, yet other influences are working strongly in the opposite direction." (Vol. i., p. 775). Professor Cunningham in his exhaustive study of the *History of Commerce and Industry* in England, presents abundant evidence on this point, and concludes that the artisan of one hundred years ago was less regular in his work and less steady in character than the skilled artisan of to-day. (Vol. ii., p. 474.)

The immediate causes of unemployment are many. Chief among them are: (1) Fluctuations due to change of season, as in the building trades, in dock labor in London, or in the tea, wool, and timber industries; (2) introduction of new machinery and transformation of processes; (3) migration of labor from rural districts to the city, or from one country to another; (4) displacement of adult males by women or children; (5) shifting of the seat of an industry from one place to another; (6) change in fashion; (7) industrial depression or the operation of some extraordinary occurrence, as war. Some of these causes have been in operation with increasing force since the revolutionary inventions of the eighteenth century, and the introduction of new methods of transportation in the first half of the nineteenth century. The influence of the causes mentioned has been accentuated during the past century by the periodic appearance of crises which profoundly affect the entire organization of trade and industry. Under the strain of international competition markets become more and more sensitive to remote disturbing influences; production may unexpectedly cease and entire classes of workmen for weeks together be thrown out of work. In addition to these causes, which are clearly recognizable, various theories, involving a discussion of the fundamental principles of political economy, have been advanced to explain the phenomena of unemployment. Only a reference can be made to these. First, the theory of overproduction: under the present system of production, with its enormous capacity for manufacture, more goods are created than are required to satisfy the market needs; consequently there must be cessation at regular intervals until the excess supply has been taken up. Second, the theory of under-consumption: the rich hoard and invest too much in fixed capital, while the poor have not the power of wholesome consumption. Third, the theory of inflated credit: the extensive organization of business, the promotion of new enterprises, the growth of banking institutions for the sale of credit have all stimulated the growth of the credit system; the settlement of contracts is thus made contingent upon future success; this development goes beyond the limits of safety, and periodically necessitates contraction; this in turn depresses industry, and men are thrown out of work. Fourth, the Socialist theory, which attributes unemployment to the institution of private property and the practice of individual competition: these necessarily cause a never-ending fluctuation of supply and demand, and prevent a harmony of industrial interests.

Statisticians have not as yet devised any satisfactory method of determining the amount of unemployment. To be complete such figures should show the number of unemployed on a given day; and, secondly, the duration of unemployment for each workman during the year. As a rule, the popular estimates of unemployment are greatly exaggerated, owing to the inclusion of the shiftless and chronic poor, and to the inaccurate methods of enumeration. The most important statistical sources relating to unemployment in ordinary years are the following: (1) Returns from trade unions, as, for example, those published monthly by the Labor Department of Great Britain in the *Labor Gazette,* and in the *Annual Abstract of Labor Statistics,* beginning with 1887; by the Labor Department of France since 1894, and of Belgium since 1895; in the United States by the Labor Bureau of New York in its quarterly bulletin (Albany), beginning with 1897, and more recently by the American Federation of Labor in its monthly publication, the *American Federationist* (Washington). Those records are limited as a rule to well-organized trades, and consequently do not throw light on the amount of unemployment in industry as a whole. Again, in ordinary times the best organized trades are inclined to underestimate the numbers of unemployed for fear that employers will seize the opportunity to lower wages. The English trade union returns clearly show the seasonal character of the building trades, and that in the engineering and metal trades unemployment is cyclical. (2) Returns from manufacturers, as published annually since 1886 by the Labor Bureau of Massachusetts and later by the Labor Bureaus of New Jersey, Connecticut, and Wisconsin. These statistics indicate the number under employment in manufacturing establishments in each month of the year, but do not show the number of those desiring employment. In Massachusetts, returns from 4397 establishments in 1893 showed that in April of that year 319,818 persons were at work, and in September 248,404, or only 78 per cent. of the number employed in April. (3) Census returns, as in the Massachusetts censuses of 1885 and 1895, the Rhode Island census of 1895, and the Pennsylvania census of 1895. The United States census of 1890 on this point proved a failure. The census of Massachusetts in 1885 showed that 70 per cent. of the working population were continuously employed, and that 30 per cent. were unemployed a month or more. The year 1885, however, was one of industrial depression. The Rhode Island census of 1895 showed that on the average 5.8 per cent. of all workers were unemployed at a given time, the maximum amount being 7.3 per cent., in February. In Germany two censuses were taken in 1895, on June 14th and December 2d. The first returned 292,678 unemployed out of a total of 15,497,000, and the other 762,668. (4) Special investigations, as by the Massachusetts Bureau of Labor in 1878, by the Massachusetts Board to Investigate the Subject of the Unemployed, in 1894, by Parliamentary Commissions in Great Britain, and by the French Labor Bureau in 1896. In this category may also be included the police censuses undertaken by municipalities, as that of Boston in December, 1893, and of Brooklyn in February, 1894. These special inquiries have generally been made in periods of industrial distress, and frequently in winter months, when there is always a large number of unemployed owing to seasonal causes. In addition to these direct inquiries fragmentary data may be found in the reports of public poor departments and charitable societies, especially when a record is made of the causes of destitution. Care must be taken to distinguish between new applications and the total number, in order to avoid duplication. Of some service also are the records of employment bureaus and registry offices. Statistics of such offices, however, are not statistics of the unemployed alone; they are rather statistics of the labor market, that is, of the offer and demand for labor, for a certain percentage of those who register have positions and file applications simply in the desire to change.

The remedies which have been proposed for the relief of unemployed are of two kinds, those which are especially applicable in times of emergency and those which are permanent in their operation. In the administration of emergency relief perplexing difficulties are met, for it is easy to transmute unemployment into voluntary idleness. Discrimination must be shown, first, in the selection of the persons to whom relief work is to be given; second, in the choice of work to be undertaken; and, third, in the organization of the agencies by whom the relief work is to be administered. It is difficult to separate the worthy from the unworthy, and to prevent the influx of the unemployed from outside districts. The abuses occasioned by lax methods of procedure are well illustrated by the 'soup kitchens' and bread carts in American cities in 1873, and by the indiscriminate distribution of the Mansion House Fund in London in 1886. Efforts were consequently made to develop a wiser policy in the relief work of each country in 1894. It is now generally agreed that emergency funds as far as possible should be restricted to those who in ordinary times are habitually at work, to those personally known, and to those who are willing to accept less wages than customary, or to work fewer hours per day or fewer days per week, so as to prevent refusal to work elsewhere under ordinary conditions. In brief, there must be investigation and some sort of test; and the shiftless and chronic poor are to be left to the ordinary methods of relief. The choice of kind of work constitutes the most difficult phase of the relief problem. Skilled and unskilled laborers alike must be provided for. The principles adopted by the Local Government Board of England in 1893 in the selection of work were as follows: (1) Work which does not involve the stigma of pauperism; (2) work which all can perform, whatever may have been their previous vocations; (3) work which does not compete with that of other laborers at present in employment; and (4) work which is not likely to interfere with the resumption of regular employment in their own trade by those who seek it. In accordance with the foregoing principles, municipalities were advised to undertake spade industry on sewage farms, the laying out of open spaces, recreation grounds, and new cemeteries, the cleansing of streets not usually undertaken by local authorities, the laying out and paving of new streets, and the extension of sewerage work and works of water supply. These forms of work, however, do not meet the needs of all—the experience of cities and towns in the United States in 1894 showed that many mill hands and artisans were physically unable to endure out-of-door work in the winter or during inclement weather—and, of course, women are not provided for. As yet no satisfactory scheme which will meet the capacities of all has been suggested; the most that has been done is provision for the less skilled laborers who on the whole are less provident and less able to meet unexpected strains.

The agencies to relieve distress among the unemployed are of five classes: First, special citizens' relief committees, organized primarily to aid the unemployed; second, municipal departments having charge of public works upon which it is possible to give employment; third, labor organizations giving aid either by the usual out-of-work benefits or by extraordinary methods; fourth, private charities, including all permanent relief-giving organizations not connected with State or municipal governments; fifth, the permanently established relief agencies administered for the State and for municipalities, such as poor departments. No one of these agencies is complete in itself. The organization of a special relief committee is too apt to be delayed until suffering has been acute, and its methods are likely to be ill-considered if not injurious to society. The undertaking of new public works by municipalities is liable, in the present stage of political development, to be uneconomical, and possibly demoralizing to the civil service. Its virtue is that it may have less of the demoralizing taint of charity. Trade unions cannot make work, and generally oppose any reduction in the standard rates of wages in fear that they cannot recover the concession except by prolonged struggle. Nor do they possess adequate funds to meet extraordinary demand. Private charities are hampered by the cautious, and to able-bodied workmen often irritating, methods of investigation which must govern the ordinary administration of charity; and there is a natural objection on the part of laborers to receive official aid when it is accompanied by what is termed the stigma of pauperism. Illustration of the work of all these agencies may be found in great detail in the *Report of the Massachusetts Board to Investigate the Subject of the Unemployed,* made in 1895, and in the *Report on the Agencies and Methods for Dealing with the Unemployed,* made by the Labor Department of the Board of Trade of Great Britain, in 1893.

The more permanent agencies which have been recommended for the relief of unemployment are as follows: (1) Publication at frequent intervals by responsible authorities, either trade or governmental, of the condition of the labor market, for the purpose of assisting workmen who seek employment, and of preventing an excessive migration from the country into the city. (2) The establishment of employment bureaus and registry offices in order to bring employers and laborers together more promptly. Neither of these agencies can greatly increase the amount of work to be performed; they do, however, reduce loss of time and futile effort. (3) Establishment of boards of conciliation and arbitration in order to prevent strikes and lockouts, which throw men out of work. (4) Adoption of a shorter day of work, so as to give opportunity of employment to a greater number of workmen. This recommendation, however, does not take into account the results of past experience: either the productive power of those working is proportionately increased by the reduction in hours, or the cost of production is increased, thus diminishing the purchasing power and standard of comfort of those dependent upon that particular product. (5) Restriction of immigration. In some industries, as the garment-making trade in the cities of the Atlantic seaboard, and the mining industry in Pennsylvania and Illinois, there has undoubtedly been a congestion of labor owing to an excessive influx of workmen from foreign countries; the restriction of immigration, however, involves so many consequences entirely apart from that of regularity of employment that its discussion must be omitted. (6) Establishment of labor farms or colonies for the purpose of training workmen for agricultural life. The most notable of these experiments are the Labor Colonies of Germany; that of Hadleigh, in England, established by the Salvation Army, the Jewish colonies in Alliance and Woodbine, New Jersey; and certain land settlements in New Zealand. Nearly every country, moreover, has experimented along this line, but the results are not as a whole encouraging. It is undoubtedly one of the methods to be utilized, but it appears to be unfitted to serve as a complete remedy. Agricultural labor is not highly paid, and during the past half century has been subjected to enormous strains caused by the opening up of new markets of supply. Nor can it be expected that a miscellaneous collection of workmen taken from the city will succeed in entirely new pursuits upon the land. Again, urban workmen who have been unused to farm life are likely to be attracted by numerous associations to the charm of city residence. Success can be hoped for only when the colonists are inspired by an earnest spirit, can settle upon land of especially favorable quality, and are supplied with a considerable amount of initial capital. (7) Insurance against unemployment. This has been tried in a few towns in Switzerland, as Bern, Saint Gall, and Basel. In Bern the insurance is voluntary; in Saint Gall compulsory. In each the enterprise is undertaken by the municipality. The scheme adopted in Bern in 1893 provides for the payment of monthly dues of 40 centimes, to which the town adds a small subsidy of 5000 francs. The value of the out-of-work benefit is one franc for unmarried, and one and a half franc for married men, per day. Relief is granted only during the winter months. The Swiss projects have been in operation for too short a period to justify any conclusion as to their applicability elsewhere on a large scale. It may, however, be seriously doubted whether any employment is a sufficiently regular phenomenon to admit of actuarial calculations as is the case with death, sickness, and even accidents. (8) The extension of State industrial enterprise. This in particular is the remedy offered by the Socialists. (See SOCIALISM.) (9) Industrial education. Opposed to the Socialist is the individualist who lays stress upon individual training by which the workman will be enabled to turn quickly from one employment to another in case of displacement. It is held that industrial evolution has proceeded at so marvelous a rate that it is impossible to avoid disturbance. Distress can best be met by a thorough preparation of the individual and the adoption of such measures as will tend to strengthen individual effort and to widen individual opportunity.

UNGA′VA. An unorganized Territory of the Dominion of Canada occupying the peninsula of Labrador with the exception of the southern portion, which belongs to Quebec, and the Atlantic coast region, which constitutes the Newfoundland Territory of Labrador (Map: Canada, Q 5). The boundary of the latter Territory is undetermined, but that of Quebec is formed by the East Main and Hamilton rivers. The area of Ungava is estimated at 456,000 square miles. Ungava occupies of the interior plateau of Labrador a tableland having an average elevation of 1000 to 2000 feet, and composed almost wholly of Archæan gneisses and granites, with some ancient Paleozoic, mainly Silurian, sedimentary rocks. In the northwest the land sinks to an altitude of 500 feet, and the shores of Ungava Bay, as well as portions of the Hudson Bay coast, are low. At Cape Jones, at the entrance to James Bay, and at several other places the plateau approaches the coast. The surface of the plateau is an undulating plain scoured by glacial action, so that the rounded granite surfaces are exposed, surrounded by marshy depressions. Post-glacial river systems have not yet developed definitely, and the whole interior is a maze of surface streams and shallow lakes, the latter being so numerous that fully one-third of the total area is covered with water. The streams, however, finally collect in a number of main rivers, which have cut deep valleys in the edge of the plateau, through which they descend to the coast by falls and rapids.

In the southern part of Ungava are large forests of spruce and birch extending northward in the valleys as far as the fifty-seventh parallel, north of which the country is treeless, though there is an area of scrub where gooseberries, currants, huckleberries, and cranberries are abundant. The vegetation in the northern half consists of sphagnum bogs with sedges and Arctic flowering plants, followed in the extreme north by tundras, in which lichens, especially reindeer moss, are predominant. Large animals are not numerous, though deer inhabit the southern forests, and reindeer the northern tundras, while foxes, otters, and beavers are also found. Large flocks of wild geese and other water fowl frequent the lake region, which is also a prolific breeding place for mosquitoes. The climate of the interior is rigorous. The lakes and streams are frozen from October to June, and the temperature sometimes falls to —60° F. The mean temperature of the short summer is 55°. Large areas of iron ore are known to exist, and there are indications of gold, copper, and nickel. The population in 1901 was 5113, almost wholly of roving bands of Indians, who live by hunting. They are partly civilized, and many of them are Christians. Ungava was constituted a Territory in 1897, and is administered by the Dominion Government. The interior was practically unknown until its exploration in 1892-94.

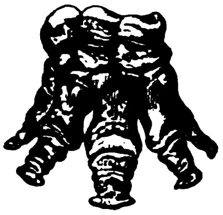
UNGER, o͞ong′ĕr, FRANZ (1800-70). A German geologist and botanist, born in Styria. He became in 1836 professor of botany at Gratz, and in 1850 was called to Vienna. His principal works are: *Anatomie und Physiologie der Pflanzen* (1855); *Botanische Streifzüge auf dem Gebiete der Kulturgeschichte* (1857 et seq.); *Sylloge Plantarum Fossilium* (1860); *Die fossile Flora von Kumi in Eubœa* (1867); and *Geologie der europäischen Waldbäume* (1869).

UNGER, JOSEPH (1828—). An Austrian jurist and statesman. He was born in Vienna; studied law in that city, and after holding a professorship at Prague became a professor of jurisprudence in the University of Vienna in 1857. He was greatly interested in the constitutional questions of Austria, and in collaboration with Fischhof, published *Zur Lösung der ungarischen Frage* (1861). He became a member of the Lower Austrian Diet in 1867, and later of the Reichsrat, where he was active on behalf of the liberal programme. In 1869 he was called to the House of Peers. From 1871 to 1879 he was a Minister without a portfolio, and in 1881 became the president of the Imperial Court. His chief work, an attempt to systematize the Austrian private law, was published under the title of *System des österreichischen allgemeinen Privatrechts* (1856-59). Among his other works are: *Das österreichische Erbrecht* (1864); *Der Entwurf eines bürgerlichen Gesetzbuches für das Königreich Sachsen, mit besonderer Rücksicht auf das österreichische allgemeine bürgerliche Gesetzbuch besprochen* (1853); *Die rechtliche Natur der Inhaberpapiere* (1857); *Die Verlassenschaftsabhandlung in Oesterreich* (1865). With Glaser and others, he published *Sammlung von civilrechtlichen Entscheidungen des k. k. obersten Gerichtshofes in Wien* (1859-92).

UNGER, WILLIAM (1837—). A German etcher, born in Hanover. He was a pupil of Josef von Keller in Düsseldorf and of Thäter in Munich. In 1872 he went to Vienna, where he became professor in the school of industrial arts in 1881, and at the Academy of Fine Arts in 1895. He became the foremost champion of reproductive etching in Germany—indeed, in Europe—reproducing the great masterpieces of the galleries at Brunswick, Cassel, Haarlem, Amsterdam, and especially at Vienna, where his principal work was published under the title *Die k. k. Gemäldegallerie in Wien*, 175 plates with text by Lützow. Consult Graul, *William Unger und sein Radierwerk* (Vienna, 1891).

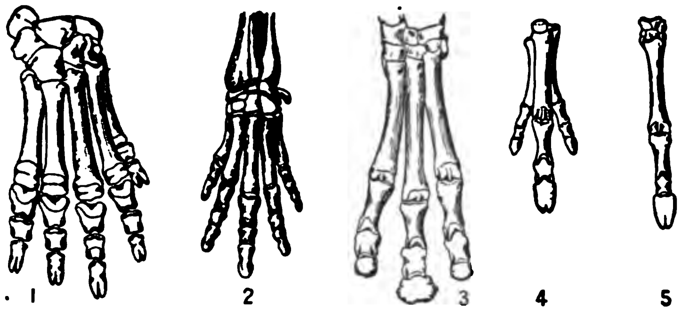
UNGUENT (Lat. *unguentum*, from *unguere*, to anoint; connected with Skt. *añj*, to anoint, smear), or OINTMENT. A medicament for external application, consisting of a fatty base holding in it an active agent. The base consists of prepared lard, prepared suet, or olive oil or almond oil, mixed with white wax, or of vaseline, or of lanoline. There are 26 unguents official in the United States Pharmacopœia. The best known of these are *unguentum aquæ rosæ*, or 'cold cream;' *unguentum zinci oxidi*, so widely used for simple ulcers; *unguentum belladonnæ*, often used to allay pain; *unguentum diachylon*, with the virtues of lead plaster; and *unguentum acidi carbolici*, used largely in domestic practice to prevent infection of simple ulcers. See OINTMENT.

UNGULATA (Lat. nom. pl., having claws or hoofs, from *ungula*, claw, hoof, diminutive of *unguis*, Gk. ὄνυξ, *onyx*, nail, veined gem, onyx, thickening in the cornea of the eye, OIr. *inga*, nail). An order of mammals, including the elephants, hyracoids, hoofed animals, and related forms of the past; the ungulates. The earliest known forms from the basal Eocene have many resemblances to the Creodonta or primitive Carnivora in the small brain, the dentition, the comparatively short legs and long heavy tail, and the pentadactyl foot. However, it may be that the resemblance to the creodonts is only a parallelism, in that both these groups have retained primitive characters inherited probably from the still earlier Insectivora Primitiva, from which it seems likely both these groups have sprung.



LEFT FORE FOOT OF CORYPHODON (AMBLYPOD TYPE).

The tendency of the group is very early shown in the development of a true herbivorous type of tooth, and a type of limb adapted to running. The oldest forms have the foot plantigrade or nearly so, but the change through the semi-plantigrade and digitigrade to the unguligrade foot, with only the terminal phalanx resting on the ground, is rapid. Also in the earliest forms all the five digits were about equally functional, but began very early a specialization in two directions—the mesaxonic type with the axis of the foot in the third or middle digit, as in the perissodactyl or odd-toed forms, and the paraxonic type with the axis between the third and fourth digits as in the artiodactyl or even-toed forms. The connecting links between the great groups of ungulates have not yet been well established. The Condylarthra, represented by the Lower Eocene Phenacodus, seem to be the most primitive, and it is the general opinion that the other groups have descended from some very early condylarth. The ungulates undoubtedly began to radiate in the Cretaceous, for, though none have yet been recorded for that formation, there are two well-marked groups, the Condylarthra and the Amblypoda, in existence at the very base of the Eocene; the Amblypoda specialized into the clumsy and bizarre uintatheres (see UINTATHERIUM) and both groups became extinct before the end of the Eocene period. The radiation of ungulates continues through the Eocene, and during this period all the great groups become well differentiated. Of the Perissodactyla the Palæotheriidæ, Equidæ, Tapiridæ, Lophiodontidæ, and Hyracodontidæ appear in the Lower Eocene, the Titanotheridæ and Amynodontidæ in the Middle Eocene, and the Rhinocerotidæ in the Upper Eocene. The great expansion of this group is in the Upper Eocene and Oligocene. The Proboscidea and Hyracoidea probably arose, at the latest, in the Upper Eocene. Besides these forms, which were common to most of North America and Eurasia, there arose in South America an ungulate fauna found nowhere else, consisting of the three groups Litopterna, Typotheria, and Toxodontia. These seem to be entirely unrelated to other ungulates except possibly to the Condylarthra. They flourished in the Miocene and Pliocene and became extinct in the Pleistocene.



EVOLUTION OF THE FOOT IN UNGULATES.

1, Homalodontotherium (lower Tertiary); 2, Hyracops (Eocene); 3, Theosodon (lower Tertiary); 4, Proterotherium (lower Tertiary); 5, Thoatherium (lower Tertiary).

The ungulates are from the standpoint of human economy the most important, and have been the chief support of mankind since he attained supremacy, furnishing him with most of the food, clothing, and working assistance which he derives from animals. The four existing suborders are the Hyracoidea, Proboscidea, Artiodactyla, and Perissodactyla. See HYRAX; ELEPHANT; PROBOSCIDEA; RUMINANT; BOVIDÆ; HORSE; RHINOCEROS; and the names of allied groups and species. Consult: Beddard, *Mammalia* (London, 1902); Woodward, *Vertebrate Palæontology* (New York, 1898); and the recent literature therein cited.

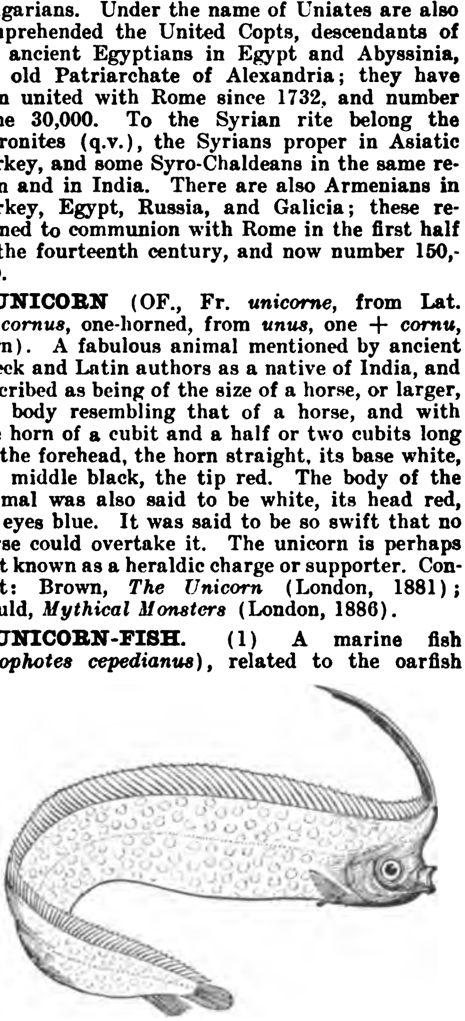
UNGULED. In heraldry (q.v.), a term applied to the tincture of the hoofs of an animal. Thus a stag represented with hoofs of a certain color is unguled of that color.

UNGVÁR, ụng′vär. A town of Hungary, capital of the County of Ung, 172 miles northeast of Budapest, on the river Ung, and on the Nyiregyháza-Ungvár Railway (Map: Hungary, H 2). The former castle is now a seminary. The manufacture of pottery and vine culture engage the people. The population, in 1900, was 14,723, mostly Magyars.

UNIATES (Russ. *uniyatŭ*, member of the United Greek Church, from Lat. *unus*, one). A generic term used to designate several bodies of Eastern Christians, who, while in communion with Rome, are allowed to retain a number of their traditional local peculiarities in discipline and worship. As a rule they have their own liturgies in the Eastern tongues, not in Latin; they use leavened bread in the Eucharist (with the exception of the Maronites and the Armenians); their priests are allowed to marry once; and they have a body of canon law of their own, partly consisting of ancient conciliar decrees and partly of Papal decisions made for their special case. Their government is cared for by a special committee of the Propaganda *super negotiis Orientalium* organized by Pius IX. in 1862. The United Greeks may be divided according to the languages employed in their worship. Those with a Greek liturgy are found principally in Greece, European Turkey, Italy, and Russia, besides some 10,000 adherents in the United States. The Melchites (q.v.) employ the Arabic. There are also Rumanians with a vernacular liturgy; the Slavic is employed by the Ruthenians and Bulgarians. Under the name of Uniates are also comprehended the United Copts, descendants of the ancient Egyptians in Egypt and Abyssinia, the old Patriarchate of Alexandria; they have been united with Rome since 1732, and number some 30,000. To the Syrian rite belong the Maronites (q.v.), the Syrians proper in Asiatic Turkey, and some Syro-Chaldeans in the same region and in India. There are also Armenians in Turkey, Egypt, Russia, and Galicia; these returned to communion with Rome in the first half of the fourteenth century, and now number 150,000.

UNICORN (OF., Fr. *unicorne*, from Lat. *unicornus*, one-horned, from *unus*, one + *cornu*, horn). A fabulous animal mentioned by ancient Greek and Latin authors as a native of India, and described as being of the size of a horse, or larger, the body resembling that of a horse, and with one horn of a cubit and a half or two cubits long on the forehead, the horn straight, its base white, the middle black, the tip red. The body of the animal was also said to be white, its head red, its eyes blue. It was said to be so swift that no horse could overtake it. The unicorn is perhaps best known as a heraldic charge or supporter. Consult: Brown, *The Unicorn* (London, 1881); Gould, *Mythical Monsters* (London, 1886).

UNICORN-FISH. (1) A marine fish (*Lophotes cepedianus*), related to the oarfish and ribbon-fishes (qq.v.). It has been taken both in the Eastern Atlantic and off the coast of Japan, in rather deep water. It is about five feet long and silvery in color, with lighter spots and rosy fins. All the fins are minute except the dorsal, which extends the whole length of the back, and is preceded by the elevation of the crown of the head into a high crest, surmounted by an exceedingly long and recurved spine, from which the fish receives its name. Its habits are unknown. (2) One of the filefishes (*Alutera scripta*) common in the West Indies, and known there as 'lija trompa.' It is two or three feet long, olivaceous in color, streaked and spotted with blue and black, and has the snout produced, and a long and slender spine rising from the top of the head. Consult Günther, *Study of Fishes* (Edinburgh, 1880).



UNICORN-FISH.

UNICORN PLANT. See MARTYNIA.

UNIFORMITARIANISM. In geology the theory which seeks to account for the past history of the earth in the light of the present. It assumes that the great changes which the earth has undergone are the results of slow-working but persistent processes rather than of catastrophic agencies. The theory was first clearly stated by James Hutton and found its ablest advocate in Sir Charles Lyell; it has had an important influence in the development of geological science.

UNIFORMITY, ACT OF. See ACT OF UNIFORMITY.

UNIFORMS, MILITARY AND NAVAL. A distinguishing dress or costume (q.v.) appropriate to a certain group or organization, as an army, society, etc. It is necessary to go back to the Crusades to obtain authentic record as to the employment of costume devices. Armor (q.v.), partly because of its expense, but more especially because it was a badge of caste, was the property and privilege of the nobleman. Just as the impossibility of distinguishing one armored knight from another had compelled the adoption of shields, and what are now known as heraldic devices, mottoes, etc. (see HERALDRY), so the difficulty of distinguishing the men-at-arms and followers of a king or nobleman, especially in battle, brought about the introduction of a distinct badge or pattern of dress. In the Second Crusade (twelfth century), for example, the French wore red crosses on the sleeve and the English white. Feathers were first worn in the fifteenth century by the French; cloaks and tabard of arms by military men over their armor. Later, Henry VIII., with characteristic love of pomp, at the siege of Terouenne, had as a guard six hundred archers wearing white gaberdines and caps, and in 1526 he arrayed the yeomen of his household in red, the first appearance, it is said, of red as the English national color. In the same reign all the soldiers of the King were ordered to wear a blue uniform trimmed with white and a Saint George's cross upon the sleeve. In 1544 an order required "every soldier to have a coat of blue guarded with red cloth and a pair of hose, the right hose to be all red, the left to be blue with one stripe of three fingers broad of red upon the outside of his leg." The cloaks of the cavalry were red. In 1584 sod green or russet was chosen for the Irish service, and in 1585 the English soldiers wore red coats during their service in the Low Countries. During the Civil War uniforms varied according to the colors of the leader under whom the soldier served. Red was the color chosen by King

Charles and Prince Rupert for their bodyguards, but it was not definitely adopted as the English color until Queen Anne's reign. In 1693 the infantry wore gray and the drummers scarlet. By the close of the seventeenth century nearly the whole of the land forces of Great Britain were uniformed in scarlet or blue, varying in the facings only. Helmets appeared in 1812 and the red stripe on the trousers in 1834.

The idea of facings (q.v.) in military and naval uniforms grew out of the custom of pinning back the long coat tails for convenience in action, thus showing the lining of a different color. Epaulets (q.v.) of gold bullion were evolved from the metal shoulder pieces used in armor, and appeared in 1795.

In 1603 James I. ordered all shipmasters to dress in scarlet cloth, but a regular naval uniform was not used until 1746. A group of naval officers who were accustomed to meet at Wells Coffee House, in London, decided to place the question for a dress uniform for the naval service before the King and Admiralty, through the Duke of Bedford. The colors suggested were red and blue, the national colors, but the King preferred blue with white facings, which was adopted. Patterns of these earliest uniforms are to be seen at the United Service Institution, London. Under William IV. the naval colors were blue with red facings, and under Queen Victoria and King Edward as originally, blue and white.

Uniforms were first worn in France by the entire army in the reign of Louis XIII. Under Louis XIV. regiments were distinguished by the colors of their colonel. In 1670 Louvois by proclamation made the wearing of uniform compulsory in the army, and gave definite instructions as to its details. The infantry were ordered to wear white coats faced with red, white waistcoats, and white breeches. The officers' uniforms were distinguished by difference in material and trimmings of gold lace. A small cap was worn with this uniform. The cavalry had similar uniforms, but with leather breeches, plumed hats, and high boots.

De Choiseul modified these uniforms in color, making the infantry wear white, the cavalry blue, and the dragoons green. Under Louis XVI. the regiments were divided into six classes, distinguished by the color of the facings. With the French Revolution uniforms were simplified, and consisted of long blue coats, breeches, and high gaiters. Powder and queues were prohibited, but this order was not strictly enforced. Napoleon attempted, on account of the difficulty and expense of procuring indigo dye, to restore the original white uniforms, but, a substitute for this dye having been found, the blue coat was retained, though shortened. A sleeved waistcoat, trousers, and a shako helmet were added to the uniform. In 1815 the white uniform was again taken up, but gave way to the blue in 1820. In 1843 the tunic became almost a waistcoat, and a long gray cloak for protection against cold and wet was brought into use. The trousers were loose and confined by gaiters at the knee; belts were worn round the waist instead of over the shoulder.

The dress of the United States Army prescribed in orders has been marked in practice by irregular and unauthorized modifications. This has arisen partly from the American tendency to sacrifice ornament to utility, and to the want of a suitable dress for field service, in which the troops have been almost constantly engaged since the formation of the Government. During the Revolution it became necessary at times to call upon the inhabitants to contribute cast-off clothing to cover the nakedness of the patriot army; yet efforts were made to establish some degree of military uniformity. Thus in 1777 the Commissioners at the Court of France were "directed to use their utmost endeavors to send, without delay, 80,000 blankets, 40,000 complete suits of clothing for soldiers, of green, blue, and brown colors, with suitable facings and cloth of the same colors, with trimmings sufficient for 40,000 suits more, and 100,000 pairs of stockings fit for soldiers."

In 1780 it was announced that "the different military ranks should be distinguished from each other"—"major-general to wear a blue coat with buff facings, two epaulets with two stars upon each" and "a black and white feather in the hat; brigadier-general, the same as major-general, with one star; captains one epaulet on the right shoulder and lieutenants one on the left shoulder; staff officers to be distinguished by hat feathers of various colors." In 1782 it was ordered "that the uniform of the American cavalry and infantry shall in future be blue ground with red facings and white linings and buttons." The close of the Revolution found the troops, generally, in a condition as to uniform not unlike Falstaff's recruits.

In 1794 the green coat of the cavalry was changed from white to black facings, a leather helmet with black horse-hair plume, and leather breeches. In 1802 Jefferson ordered the French leather cap with a strip of bear-skin on the top; officers of artillery wore gold and of infantry silver epaulets; the coat was a cutaway showing the waistcoat; the infantry wore double and the cavalry and artillery single cross belts; the gorget worn during the Revolution was replaced by a single oval brass plate on the belt. Prior to 1801 the hair was worn tied in queues, but in that year General Wilkinson ordered the hair cut short; the length of whiskers was limited to the bottom of the ear and beards were not allowed until 1853. In 1808 general officers were required to wear single-breasted coats, with very high collars embroidered in gold. In 1810 all coats were single-breasted without facings, and there was worn that remarkable head-dress, the civilian 'silk hat' with a pompon prescribed, which had but a short life. In 1812 the changes were the abolition of the sash, boots for all mounted officers; in 1814 the cocked hat was succeeded by the black leather bell-crowned shako of the French Army; on social occasions, knee-breeches and shoes were permitted with yellow knee-buckles.

In 1821 chapeaux bras were ordered for all but company officers, who continued to wear the bell-crowned cap; captains wore a chevron above the elbow on each arm; subalterns, one below the elbow. In 1825 a blue cloth shako or high forage cap was prescribed, each arm of service being distinguished by the color of the pompon; light artillery, yellow with red top; light infantry, white with red top. In 1835 colored facings were revived; general officers had double-breasted coats with lapels, with buff facings. In

1857 the large black felt hat, turned up at one side, with an ostrich feather curled around the crown, appeared; this was the dress hat until the close of the Civil War. Divested of the feather, it became the campaign hat of the period and the ancestor of the drab felt service hat of 1898-1903.

At the beginning of the twentieth century the question of uniform has become almost as important in its relation to military success as is the rifle or ammunition. The difficulty of crossing the fire zone of the modern rifle demands that the troops thus engaged be uniformed as inconspicuously as possible; but, in the universal effort to attain this result, the nations are practically adopting the same type of uniform, and the same color of material. The great disadvantage of this was frequently seen in the Boer-British War of 1899-1903, when the British troops were sometimes unable to distinguish groups of the enemy from similar bodies of their own forces, owing to the fact that both sides employed Khaki uniforms.

Uniforms of this material came into use about 1880 in the British-Indian Army. At first the Khaki dye was not fast color, and regiments on parade presented a somewhat mottled appearance. In 1884 two Englishmen named Lemann and Gatti secured a fast dye and thus obviated the difficulty. This dye is used equally well for cotton or woolen materials, an important factor in view of service in different climates. In 1885 Lord Roberts investigated the matter and ordered accoutrements, gun wheels, and carriages to be painted in the Khaki color. With the helmets or turbans, haversack covers, and water bottles as well as the uniforms, in this dull shade, the soldier is practically invisible in the field. It was decided to do away with the distinguishing marks of officers in the field on account of the great losses among them in the South African War, but the difficulty of inaugurating any changes in the uniforms of the British Army stands in the way of any radical reform. For instance, in the Boer War the Highland regiments consented to wear Khaki helmets and jackets, but refused to give up their kilts. Similarly, every regiment in the British Army possesses its own traditions and privileges. These privileges are regarded as inalienable rights, and as they conduce very strongly to esprit de cörps, they have a value which in a degree offsets the strictly utilitarian views of the War Office.

The service uniforms of the armies of the military powers are now selected primarily for their usefulness under actual war conditions but the main characteristics of the ordinary uniforms are indicated in the following summary:

AUSTRIA. *Infantry*, a frock of dark blue cloth, the collar bearing patches with the regimental colors. *Rifle regiments*, light gray. The *Bosnian infantry* wear a frock coat of light color. *Cavalry: Dragoons, Uhlans*, wear a single-breasted tunic of light blue cloth. *Hussars*, light and dark blue. The various regiments are distinguished by their head-dress or the color of their facings. The dolman is of the same color as the tunic, is lined with fur, and has a black astrachan collar. *Engineers*, light blue.

ENGLAND. *Infantry*, generally scarlet. *Rifle regiments*, dark green. The Royal regiments and guards are distinguished by their dark blue facings. *Cavalry*, scarlet or blue. *Artillery*, blue with scarlet facings. *Engineers*, scarlet with blue facings.

FRANCE. The radical change which took place in 1903 was largely due to General Andrée. Instead of the red full trousers and double-breasted coat, a tunic of dark Prussian blue cloth with a single row of buttons is worn. The trousers are of dark bluish gray. The head-dress consists of a large, broad-brimmed felt hat, looped up at the side with a red, white, and blue cockade, somewhat similar to those worn during the Directory. The only decorative portion of the uniform is the red epaulets. *Cavalry, cuirassiers*, and *dragoons* wear a dark blue tunic, with the number of the regiment marked on the collar. *Artillery*, dark blue tunic and scarlet facings. *Engineers*, dark blue tunic, scarlet facings, and dark blue trousers.

GERMANY. *Infantry*, single-breasted dark blue tunic with scarlet facings, the Guards regiments being distinguished by the lace on their cuffs. *Rifle regiments* wear dark green tunics with scarlet facings and a leather shako. *Cavalry, cuirassiers*, and *dragoons*, metal or leather helmet, white or light blue tunics. The *hussars*, tunics of various colors, dark blue breeches, fur busbies, Hessian boots, and gray cloaks. *Lanciers*, lancier caps, dark blue tunic (Bavarians, dark green), dark blue breeches, long boots, gray cloaks, and white belt. *Artillery*, dark blue tunics, black facings. *Saxon regiments* wear dark green tunics with scarlet facings. *Engineers*, dark blue tunic, with black facings, white buttons, and scarlet shoulder straps. Early in 1904 the field dress of the German Army was changed in color and material like that now worn by the United States Army. See below.

ITALY. *Infantry*, dark blue tunic, gray trousers. *Cavalry*, dark blue tunic and light gray trousers. *Artillery*, same tunic as cavalry, but with yellow edging and dark blue trousers.

RUSSIA. *Infantry*, green tunic fastened by hooks instead of buttons, loose-fitting for men. No facings are worn, but a line of red piping goes around the top of the collar. Trousers, green with red facings for officers; men, green, without facings. Knee boots are worn, into which the trousers are tucked. Grenadiers wear the same uniform as the infantry except that the shoulder straps are always yellow and the regimental number on the cap is followed by the initial letter of the word grenadier. The infantry of the Guard wear a tight-fitting tunic, with facings of white, red, or orange, according to their divisions. *Cavalry, grenadiers*, and *dragoons* wear green tunics with two rows of buttons, facings of red on collar and sleeves. The trousers are of gray cloth, with red stripes for the Guard only. The uniform of the Cossack troops generally consists of a coat hooked obliquely across the chest, with facings of red, blue, or yellow, according to the regiment. The trousers are of blue cloth, with wide red stripes; boots to the knee, and black sheepskin cap, with a red top. The Cossacks of the Caucasus wear the Caucasian dress of a dark gray coat under which is partly exposed a white waistcoat, full gray trousers tucked into the boots, and high round caps of sheepskin. Artillery uniforms are modeled after the infantry and cavalry.

JAPAN. The Japanese artillery, infantry, and cavalry wear the same style of uniform, except that the facings for cavalry are green, artillery yellow, and those of the infantry red. The winter uniform is dark blue, and the summer uniform white. The campaign uniforms adopted in 1903 are of Khaki, and are modeled after the British and German types.

UNITED STATES. An important and radical alteration in the uniform of the United States Army was made in 1902. It comprised the adoption of 'full dress,' 'dress,' and 'service' uniforms (with summer and winter additions); the helmet was abolished and a cap, shaped somewhat like the British officers' forage-cap, was substituted; minute adherence to details and strict observance of times and places or 'occasions' when each kind of dress was appropriate were enjoined. In the new dress, the results of the experience of all nations as to utility and ornament were combined.

For all uniforms excepting overcoat and 'service dress' the traditional color—dark blue—was retained with facings or piping of red, yellow, and white for the artillery, cavalry, and infantry respectively. For the staff corps and departments colors for facings, etc., were prescribed as follows: Scarlet piped with white for the engineers; orange piped with white for the signal corps; black piped with scarlet for the ordnance department; maroon for the medical corps; and buff for the quartermaster's department. The overcoat was an 'ulster' of a yellowish-brown color. The chapeau was discarded for all purposes save 'full-dress—dismounted' for generals and officers of the general staff. In 1903 a new material of an 'olive drab' shade was adopted for the 'service dress;' all insignia and metal trimmings and buttons were of bronze; and boots and leggings of russet leather were prescribed.

The full-dress coat for officers is double-breasted, with a double row of buttons, and for general officers has a velvet collar. With it are worn epaulets (by general officers) or shoulder knots, while the appropriate insignia for the corps, department, or arm of the service and the rank of the officer are indicated by devices and braid on the collar and cuffs. The dress coat for all officers except general officers is a single-breasted sack coat of dark blue cloth trimmed with black braid, but without brass buttons. Shoulder straps and appropriate corps devices on the collar are worn with this coat. The white coat is similar to the dress coat save that the insignia of rank is placed on the shoulder loop and the shoulder straps are omitted. The general officers' dress coat is a double-breasted sack coat with brass buttons. The service coat of olive drab is a sack coat with outside patch pockets and has the insignia of rank on the shoulder strap and the corps devices on the collar. These with the buttons are of dull bronze. Private soldiers have the same general classes of uniforms. The full dress uniforms are adorned with a breast cord and tassel of the corps, color of the department, or arm of the service, as are the piping of the collar, shoulder loops, and cuff. The trousers of the full-dress uniform are of sky blue with a stripe of the color appropriate to the corps or arm. The cap which replaces the helmet for full dress has a stripe of cloth of the proper color, while it has the appropriate insignia of metal in front. The dress cap has the band removed, while in service the well-known felt campaign hat is worn. The various insignia worn in the United States Army are described in some detail under MILITARY INSIGNIA; CHEVRONS; EPAULETS; etc. The uniform for the cadets of the United States Military Academy (q.v.) is of gray, the service coat being a sack coat trimmed with black braid without buttons, while the dress coat is a swallow-tailed coat with brass bell buttons. The marks of ranks of the cadet officers are chevrons with the points upward.

NAVAL UNIFORMS.

Modern naval uniforms are marked by the same general characteristics throughout the navies of the world, and resemble each other quite closely. This, doubtless, is due to the fact that naval officers and men are universally exposed to the same conditions and that the ceremonies and usages at sea obtain in much the same form under different flags. The uniforms of the United States Navy, described in some detail below, may be considered fairly typical, and the deviations are usually in such details as epaulets, gold lace, insignia, etc., for which each service has its own definite and minute regulations.

The uniform for the British Navy closely resembles that of the United States Navy. For officers there are eight different suits to be worn on specific occasions, classed as follows: Full dress, ball dress, frock coat with epaulets, frock coat, undress, mess dress, mess undress, white undress. The undress uniform differs from that worn in the United States Navy in that it has a double-breasted coat with brass buttons instead of the blouse trimmed with braid. On all the uniforms the distinctive marks of rank are stripes on the sleeves and appropriate devices on the shoulder strap or epaulet. The significant degrees on the latter are as follows: Admiral of the fleet, crown, and crossed cannon surrounded by a wreath; admiral, crown, crossed sword and baton and three stars; vice-admiral, the same, with two stars; rear-admiral, the same, with one star; a commodore or senior captain has a crown and anchor and two stars, while a junior captain has the same with one star; a commander has a crown and anchor, a senior lieutenant a star and anchor, and a junior lieutenant an anchor.

The Russian Navy in its dress resembles the British, but is less elaborate and has some marked peculiarities. Officers (in winter) wear a dark blue frock coat, a reefer jacket, or a monkey jacket; in summer, white. The cap is high, flat-topped, and of the color of the dress worn. Cocked hats are required for full dress. In winter both officers and men wear a brown woolen cape, also goloshes over the boots. The Russian officer out of quarters is always in uniform. The enlisted man in winter wears a short gray overcoat, belted at the waist. On shore duty he wears a military tunic and leggings.

The uniform of officers of the United States Navy consists of three classes—dress, undress, and service dress. The dress uniforms are, special full dress, full dress, dress, evening dress A, evening dress B, mess dress. The undress uniforms are undress A and undress B. Service dress is either blue or white. The special full-dress uniform consists of a double-breasted blue broadcloth coat with standing collar and eighteen gilt buttons, nine in each row; blue trousers with a stripe of gold lace down the outside seam;

epaulets, cocked hat, sword, and full-dress belt. The undress A uniform consists of a double-breasted blue frock coat similar in cut to the civilian's coat, but having eighteen gilt buttons, nine each side, and with shoulder fixtures for epaulets, cocked hat, sword, and full-dress belt. with undress A) ; a blue waistcoat with seven gilt buttons, cap, sword, plain leather belt, and plain blue trousers. The service suit consists of a blue or white blouse with standing collar and trimmed with black braid; blue or white waistcoat with seven gilt buttons; plain blue or white trousers. The evening dress suit is similar in cut to the civilian evening dress suit, but the buttons are gilt and the coat is fitted with shoulder fixtures for epaulets; the waistcoat may be blue or white as ordered. The mess dress consists of the white mess jacket, cut like the evening dress coat without the tails, white waistcoat, and blue or white trousers.

The various styles of uniform are made up from these. The special full dress is used on occasions of special ceremony. The full dress is used on less important occasions. It consists of the frock coat with epaulets, cocked hat, full-dress belt, and special full-dress trousers. The dress uniform, used for particular official calls, consists of frock coat, epaulets, cocked hat, plain belt, blue trousers. Undress A is used for service on courts-martial, reporting for duty, etc. Undress B differs from undress A only in omitting the sword and belt. It is used for ordinary official and semi-official calls, etc. Service dress is worn at all times when some other special uniform is not provided. The mess dress is worn at dinner when ordered.

On all except white uniforms the rank of an officer is indicated by gold lace on the sleeve and devices on the collar, epaulet, shoulder strap, or shoulder mark. Ensigns and officers of that rank wear one stripe of half-inch gold lace; lieutenants of the junior grade, a stripe of half-inch lace and a stripe of one-quarter inch lace above it; lieutenants, two stripes of half-inch lace; lieutenant-commanders, two stripes of half-inch lace and a stripe of one-quarter inch lace between them; commanders, three stripes of half-inch lace; captains, four stripes of half-inch lace; rear-admirals, one stripe of two-inch lace and one of half-inch lace above it; admiral, two stripes of two-inch lace and one stripe of half-inch lace between them. All officers of the line or executive branch wear a gold star on the sleeve above the lace. On the overcoat and white service coat the lace is worn on the shoulder marks. The ornaments indicating rank, which are worn on the collar, epaulet, and shoulder strap, consist of the corps device and rank emblem. The former consists of a silver foul anchor for line officers, sprig of silver oak leaves for pay corps, gold oak leaf and silver acorn for medical corps, one silver oak leaf and acorn for professors of mathematics, silver cross for chaplains, two gold live-oak leaves and acorn for naval constructors, and the letters C. E. in silver for civil engineers. The rank emblem for an admiral is four silver stars with a gold foul anchor under the outer ones; for a rear-admiral, two silver stars and a silver foul anchor or other corps device between them; for a captain, a silver eagle; for a commander, a silver oak leaf; for a lieutenant-commander, a gold oak leaf; for a lieutenant, two silver bars; for a lieutenant of the junior grade, one bar. Ensigns and officers of that rank wear only the corps device.

White uniforms are worn in hot weather. The overcoat is of the ulster type with very broad collar and black rubber buttons. Rank is indicated by the shoulder mark. Warrant officers wear no stripes on the sleeve, and no shoulder ornaments. The collar ornaments are crossed anchors for boatswains, a bursting shell for gunners, and a gold chevron for carpenters. When commissioned after ten years' service, chief warrant officers wear a half-inch gold stripe and silver collar ornaments.

The uniform of enlisted men consists of dress, undress, and working dress; each of these may be white or blue. Chief petty officers wear double-breasted blue or white coats with gilt buttons. Other enlisted men wear a blue shirt or white dress jumper for dress, with blue cloth trousers. Undress is merely less neat or new uniform, if blue; but white undress has a white collar instead of a blue one; working dress is old blue or white uniform and is worn without a neckerchief. Rating badges for petty officers are worn upon the sleeve. Chief petty officers wear caps with visors and an ornament consisting of a gold foul anchor; other enlisted men wear round caps with a flat top projecting beyond the band all around the head.

UNIGENITUS. A Papal bull issued in 1713 condemning the principles of Jansenism (q.v.).

UNIMAK, o͞o′nė-mäk′. The largest and easternmost of the Aleutian Islands (Map: Alaska, C 5). It is separated from the southwestern extremity of the Alaska Peninsula by a narrow, very shallow, and unnavigable channel. It is 70 miles long; average breadth, 20 miles. It is barren and mountainous, and contains two volcanoes, one of which, Shishaldin, has an altitude of 8683 feet and is still active. There is a very scant population of Aleuts.

UNIO. The type-genus of the family Unionidæ, which contains the greater part of the fresh-water mussels (q.v.).

UNION. See TRADE UNIONS.

U′NION. A town in Hudson County, N. J., adjoining Weehawken and West Hoboken; on the Erie, the West Shore, and the New York, Susquehanna and Western railroads (Map: New Jersey, D 2). It is of considerable importance as an industrial centre, being interested largely in the manufacture of silk goods. There are also breweries and a shirt factory. Population, in 1890, 10,643; in 1900, 15,187.

UNION. The county-seat of Union County, S. C., 65 miles northwest of Columbia; on the Southern Railway (Map: South Carolina, C 2). It is the commercial centre of a farming and cotton-growing region, which also has large lumber and fruit interests. There are cotton mills, a cottonseed-oil mill, knitting mills, etc. The waterworks and the electric light plant are owned by the municipality. Population, in 1890, 1609; in 1900, 5400.

UNIÓN, o͞o′nė-ōn′, LA. A town of Murcia, Spain, near the Mediterranean coast, five miles east of Cartagena (Map: Spain, E 4). The country is a mineral region, producing iron, manganese, sulphur, and carbonate of lead. The town was founded in the second half of the nineteenth century. Its municipal population in 1900 was 28,479.

UNIÓN, La. A province of Northern Luzon, Philippine Islands (Map: Philippines, E 3). Area, 867 square miles. The province is mountainous and forested, but much land is well cultivated, producing tobacco, rice, cotton, corn, sugar, and cacao, while stock-raising is also important. A telegraph line, as well as the main highroad and projected railroad from Manila to Laoag, runs through the province. Population estimated in 1901 at 110,464, chiefly Ilocanos and Pangasinánes. Capital, San Fernando (q.v.).

UNIÓN, La. A port of the Republic of Salvador and capital of the Department of La Unión, situated at the southeastern extremity of the country, on an inlet of the Gulf of Fonseca, and at the foot of the volcano of Pinos (Map: Central America, D 4). Population, 3000.

U'NION CITY. The county-seat of Obion County, Tenn., 100 miles north by east of Memphis; on the Nashville, Chattanooga and Saint Louis, and the Mobile and Ohio railroads (Map: Tennessee, B 4). It is important as a shipping point for farm produce, chiefly wheat, corn, and hay; and manufactures flour, brooms, mattresses, decoy ducks, and foundry and lumber products. The water-works and the electric light plant are owned by the municipality. Population, in 1890, 3441; in 1900, 3407.

UNION COLLEGE. An institution of higher education at Schenectady, N. Y., incorporated in 1795. It was the second college incorporated in the State, and received its name from the coöperation of several denominations in its organization. In 1830 a scientific course was established parallel with the classical course. The first engineering course in an American college was established here in 1845. The progressive policy of Union at this period was due chiefly to the genius of Dr. Eliphalet Nott, president from 1804 to 1866. The college fraternity system originated at Union (1825). In 1873 the Law School and Dudley Observatory in Albany were associated with Union College under the corporate title of Union University, and the Albany Course of Pharmacy was added in 1881. The degrees conferred in course are B.A., Ph.B., B.S., B.E., M.A., and M.S. The students in the college in 1903 numbered 220 and the faculty 24. The library contained 37,325 volumes, the endowment was $534,000, and the income $62,840.

UNION JACK. The combination of the national flags of England, Scotland, and Ireland into a union flag, dating from April 12, 1605, when James I. ordered that the red cross of Saint George on a white field of England should be combined with the white saltire, or Saint Andrew's cross, of Scotland and flown by all British ships. Charles I. restricted the Union flag to royal ships, and on July 28, 1707, a 'red jack (flag) with a union jack' at the upper corner next to the staff was duly prescribed as a merchant ensign. In 1801 the red diagonal cross of Saint Patrick was added for Ireland, being placed with the Saint Andrew's cross, the red and white alternately above. The union jack was originally carried in the maintop, and the separate flags of Scotland and England at the foretop, but it came to be a fundamental part of the national ensign, which in the navy differed in color for the different divisions of the fleet. In 1864 it was determined to use the white ensign for the royal navy, the blue ensign for naval reserve, royal yacht clubs, and various official ships, and the red ensign and the union jack with a white border for the merchant marine, the latter flag being used as a signal for a pilot or as a jack at the bowsprit. The union jack proper is flown at the bowsprit on a jackstaff by British naval vessels, and also occasionally as a personal flag, as at the main-topgallant masthead for an admiral, or at the mizzen-topgallant masthead for the sovereign when abroad, or with the addition of emblems by various other officials. The union jack is also carried as one of the two regimental colors by British regiments. (See Colors.) In the United States the term 'union jack' is applied to a blue flag used by the navy, with white stars similar to the field of the national ensign and flown at a jackstaff at the bow when in port. (See Jack; also Flag, and Colored Plates of Flags.) For an interesting and detailed history of the 'union jack,' see Green, *Archæological Journal* (London, December, 1891); also Hulme, *The Flags of the World* (London, 1897).

UNION LABEL. A trademark or advertisement owned and registered by a trade union and attached to articles of sale, signifying that they have been made in establishments employing union labor only, and under conditions stipulated by the union. The label seems to have been first used by the California cigarmakers about 1874. It appeals with particular force to the more conservative trade-unionists, who praise it as a peaceable and inexpensive way of increasing the power of the unions; they frequently describe it as 'the legal boycott.' Its use is spreading rapidly. The American Federation of Labor in 1903 recognized and indorsed at least 43 labels of different trades and three 'display cards;' while a very large number of unions employ the common label of the American Federation. In most States (32 in 1900) statutes impose penalties for counterfeiting the label knowingly using a counterfeit. In several trades, e.g. cigarmakers, printing, and the hatters' trade, the label has become a factor of first importance.

UNION LEAGUE CLUB OF THE CITY OF NEW YORK, The. One of the leading social and political organizations of the United States. It was incorporated by the New York State Legislature, February 16, 1865. The qualifications for membership are United States citizenship and absolute and unquestioned loyalty to the Government of the United States. The club has been a stronghold of Republicanism and its influence has been repeatedly exerted for the Republican Party in national and local elections. The number of annual resident members is limited to 1800, and 100 members constitute a quorum at all meetings. The club has quarters at Fifth Avenue and Thirty-ninth Street in New York City, containing a well-furnished library and art gallery. Total membership January 1, 1903, 1866. Similar institutions of the same name and purposes have sprung up in other cities, notably in Philadelphia and Chicago.

UNION THEOLOGICAL SEMINARY IN THE CITY OF NEW YORK, THE. A Presbyterian institution founded in 1836, independent of all ecclesiastical control, and open to students of every evangelical denomination. It offers a regular course of three years leading to a diploma, a three and a four years' course leading to the degree of bachelor of divinity, graduate and specal courses, and extension courses for lay students. The regular course requires a minimum of 1200 hours of classroom work, 780 in specified subjects, and 480 hours of electives; the three years' degree course demands college graduation, all the work of the regular course, 180 additional hours of classroom work and the attainment of a higher standing than that required for the diploma, attendance upon a 'seminar' for at least one year, a thesis representing original research, and such special and searching examinations as the faculty may prescribe. The four years' degree course requires the regular three years' diploma course taken at this seminary or elsewhere, with advanced standing, and an additional year in residence including 360 hours of classroom work and the other additional items already specified. The seminary offers a number of merit scholarships with incomes of $100-$250, prize scholarships of $300, a limited number of graduate scholarships, and two fellowships of $600 appropriated to the use of incumbents prosecuting special studies for two years either in the United States or Europe. The seminary buildings at 700 Park Avenue contain a chapel, lecture rooms, library, museum, social room, gymnasium, professors' offices, and students' rooms. The library in 1903 contained 80,000 volumes and 33,000 pamphlets. Connected with the seminary are 16 resident professors and instructors and 120 students.

UNIONTOWN. The county-seat of Fayette County, Pa., 44 miles south by east of Pittsburg; on the Pennsylvania and the Baltimore and Ohio railroads (Map: Pennsylvania, B 4). The borough is the commercial centre of a section containing extensive deposits of coal and iron. Its industrial establishments include lumber mills, steel works, a foundry, brick yards, and manufactories of glass, flour, leather, etc. Uniontown was settled about 1767 and was laid out as a town in 1783. It was incorporated as a borough in 1796. Population, in 1890, 6359; in 1900, 7344.

UNION UNIVERSITY. See UNION COLLEGE.

UNION VETERAN LEGION. See VETERAN LEGION, UNION.

UNION VETERAN UNION. See VETERAN UNION, UNION.

UNIO PROLIUM (Lat., union of offspring). In the law of Germany, a form of mutual adoption of children frequently effected when a widower having children marries a widow with children. The parties secure to the children of each by their former spouses the same rights as to succession to property, etc., as any children who may be born to them thereafter.

UNISON (from ML. *unisonus*, having one sound, from Lat. *unus*, one + *sonus*, sound). In music, a tone of the same pitch as another. In this sense the term unison is identical with the interval of the prime. The term has, however, been extended so as to include all parts performing the same melody, even if some instruments play the tones one or two octaves lower than others.

UNIT (formerly also *unite, unitie, unity*, from Lat. *unitas*, oneness, from *unus*, one). A certain fixed quantity employed for measuring other quantities and for stating their magnitude. Ordinarily a unit is the smallest complete measure of value, extension, duration, mass, etc., and when employed in measurement involves repetition and subdivision. An arbitrary unit is one which may be employed in the form of a concrete standard and which is generally available for reproduction. An example of such a unit is the distance between two marks in gold plugs on a bronze bar in the possession of the British Board of Trade, or the British Standard Yard. Similarly the meter of the Archives at Paris (see METRIC SYSTEM) is an arbitrary unit. Fundamental units are those selected arbitrarily on account of the ease with which standards can be constructed or reproduced and from which other units can be derived. In the C. G. S. system (q.v.) the fundamental units are those of length, mass, and time, from which units have been derived for area, volume, velocity, force, work, etc., magnetic units, electro-magnetic units, etc. In certain instances the derived units in the C. G. S. system may be in such shape that they are not available for general use and either a multiple or a fraction must be employed. Such units are known as practical units. Examples of practical units in common use are the ohm, the volt, and the ampere. See C. G. S. SYSTEM; METRIC SYSTEM; ELECTRICAL UNITS; MECHANICAL UNITS; WEIGHTS AND MEASURES; MONEY, etc.

UNITARIANISM. In general, the religious system of all who affirm the unity of God; specifically, the belief of certain free Christian churches and individuals whose religious faith is expressed in the doctrines of "the fatherhood of God, the brotherhood of man, the leadership of Jesus, salvation by character, and the progress of mankind onward and upward forever." The declaration of the National Conference of Unitarian and other Christian churches (American) is: "These churches accept the religion of Jesus, holding, in accordance with his teaching, that practical religion is summed up in love to God and love to man." The most generally accepted covenant of the Unitarian churches reads, "In the love of truth and the spirit of Jesus Christ, we unite for the worship of God and the service of man."

Unitarians do not appeal to the Bible as a final and infallible authority, but they consider that in the prophetic teaching against idolatry, formalism, and all unrighteousness, there is set forth what are now recognized as essential Unitarian principles. They assert that the teaching of Jesus was simply that of one God, the heavenly Father, and they profess to teach what was central and essential in his message. They lay emphasis on the Beatitudes, the Golden Rule, the Two Commandments. They find the way of salvation described in the Gospels, where "purity is set forth as the condition, growth the method, love the motive, character the fruit, and service the expression of eternal life, of the Kingdom of God." Original Christianity, they maintain, was not the acceptance of any formal creed, but the adoption of a spirit like that of Jesus, whom they regard not as a God to be worshiped, but as a divinely prepared teacher to be loved and followed. They point to the fact that the view of Jesus as God, equal to the Supreme Being, was ardently resisted, especially by the Arians, who in the fourth century constituted nearly half of Christendom. (See ARIUS; ATHANASIUS.) The Arian view of Jesus as a separate and subordinate being was widely held by the forerunners of modern Unitarians, but it was not a successful solution of the problem respecting the nature and rank of Jesus. Arianism was declared heresy in the fourth century, and was steadily crushed out by the growing power of the orthodox Church.

Among the earliest movements of the Reformation epoch were some in which we find the seeds of modern Unitarianism. The study of the Bible brought new appreciation of the original teachings of Jesus. The reformers, indeed, carried over into Protestantism many of the characteristics and thoughts of the dogmatic Christianity which they rejected, yet they opened the way to larger interpretations. A definite affirmation of the doctrines now called 'Unitarian' was made at Vicenza in Italy in 1546, when a number of leading scholars of Northern Italy came together to discuss and promulgate their anti-Trinitarian views. They were dispersed or destroyed, and the exiles found refuge in Switzerland, Poland, and Transylvania. In Poland the doctrines taught by these fugitives fell into fruitful soil. The leaders in this movement were two Italians, uncle and nephew—Lælius and Faustus Socinus. The prominence of these men in the movement for a more rational interpretation of Christianity gave to their societies and teachings the name Socinian. (See SOCINUS.) At the close of the sixteenth century there were more than four hundred Socinian churches in Poland. At Rakow there was a Unitarian college with more than a thousand students, and in 1605 there was published the so-called "Racovian Catechism," which is the definite and formal statement of the Unitarian theology of the Reformation period. The bitter hostility of the Roman Catholics and the tacit consent of the orthodox Protestants of Poland, united to overthrow the prosperity of the 'Free Brethren.' In 1658, after increasing persecutions, King John Casimir finally decreed the death or expulsion from Poland of all Socinians who would not embrace Catholicism. Thousands were killed and thousands more exiled, until by 1670 all trace of this Unitarian movement had disappeared from Poland.

In 1568 Francis David preached a similar doctrine in the streets of Klausenburg, in Transylvania, and began a movement of far-reaching significance. For a number of years the Unitarian views were disseminated without hindrance among the Hungarians. In the seventeenth century, however, persecutions began. The churches and schools of the Unitarians were confiscated, their printing-presses destroyed, and their lands wrested from them. But such was the tenacity of the people that in spite of two centuries of bitter trial the Unitarian cause survived in Hungary. Not till 1791 did royal decree restore to the Unitarians the free exercise of their religion. A last effort to crush them occurred as late as 1857, but with the help of fellow-believers in England and America the Hungarian Unitarians survived that attack also; and while fewer in number than in the seventeenth century, they are now again increasing.

One other definite landmark among the earlier assertions of the Unitarian spirit must be noted. In 1553 a fugitive Spanish scholar, Michael Servetus (q.v.), printed at Vienne a remarkable book called *The Restoration of Christianity*. In this book he declared that it was not alone a reformation of the Church, but a reformation of principles that was needed, and a return to the pure teachings of Jesus. Servetus was burned at the stake in Geneva in 1553, Calvin consenting, but his books were widely read.

The teachings of Socinus and Servetus found a ready reception in England. The "Racovian Catechism" was dedicated to James I., and attracted so much attention that in 1614 Parliament ordered all copies seized and publicly burned. A little later, denial of the Trinity was made punishable by death. The last persons put to death for religious opinions in England were Unitarians. John Biddle (q.v.), a schoolmaster in Gloucester, was the boldest leader of the early English Unitarians. In spite of persecution, he maintained that "there is no other authorized interpreter of Scripture than reason." Cromwell countenanced and pensioned Biddle; but after the Protector's death he was once more thrown into prison, where he died (1662). The story of Unitarianism in England during the seventeenth century is one of struggling and isolated martyrs. No public organization was possible, owing to measures of repression, but some of the greatest men of the age, such as John Milton, John Locke, and Sir Isaac Newton, recorded their final judgment in favor of the Unitarian interpretation of Christianity.

During the eighteenth century there was a steady broadening of religious thought in England. When the Act of Toleration in 1689 permitted the building of non-conformist chapels, a number of the English Presbyterian churches left their trust deeds 'open' and refused to bind their successors to any definite formularies. Before the end of the eighteenth century many of these churches, without any sudden change, had come to a Unitarian position. They did not take the name, but continued for the most part to call themselves Presbyterian, and some do so still. Joseph Priestley (q.v.), the discoverer of oxygen, was minister of one of these churches in Birmingham. His book on *The Corruption of Christianity* (1782) exerted a wide influence. In 1794 he emigrated to America and, settling in Pennsylvania, established in Philadelphia and in Northumberland Unitarian congregations.

The first church in England established with the definite Unitarian name was organized in 1774, by Theophilus Lindsey, who gave up his living in the Established Church and organized the Essex Street Chapel in London on the site where now stands Essex Hall, the headquarters of the British and Foreign Unitarian Association. To this nucleus slowly gravitated many of the Presbyterian churches already named, and others from the General Baptist Connection, and similar progressive communions. It was not, however, until 1813 that the penal laws against Unitarianism were finally repealed. The British and Foreign Unitarian Association was organized in 1825.

The seeds of the Unitarian movement were brought to America in the *Mayflower*. They were planted wherever a church was organized in New England with a *covenant* instead of a *creed*. It was among the oldest of the Puritan and Pilgrim churches that Unitarianism in America started, and the majority of the original Massachusetts churches followed later the lead of Channing. This devėlopment was without abrupt transitions, and did not require any alteration in the broad lines of the first covenants. The Pilgrims' Church in Plymouth, though now for a century Unitarian in fellowship, retains the original covenant by which in Holland the Pilgrims "formed themselves into a Church or State in the fellowship of the gospel to walk together in all His ways made known, or to be made known unto them." The First Church in Salem still retains the covenant of 1628. While the original Puritan churches in New England were rigidly orthodox in theology, the whole atmosphere of the colonial life was increasingly that of freedom. The democratic principles adopted in the State found also expression in the Church, and soon after the Revolution many ministers of the older churches in New England assumed a practically Unitarian position.

In 1787 King's Chapel in Boston, originally an Episcopal church, the first established in New England, modified the ritual of the Church by the excision of the more orthodox and Trinitarian phrases, and ordained James Freeman (q.v.) as minister of the first avowedly Unitarian church in America. In 1805, when Henry Ware (q.v.), known to be a decided liberal, was appointed professor of divinity at Harvard College, the lines were drawn between the orthodox and Unitarian parties in the New England churches. In 1819 William Ellery Channing, minister of the Federal Street Church in Boston, preached at Baltimore a sermon which became famous as the Unitarian Declaration of Independence, and within a year nearly one hundred and fifty Congregational churches in New England had declared their adhesion to Channing's position. (See CHANNING, WILLIAM ELLERY.) In 1825 representatives of these churches united in establishing the American Unitarian Association, and began organic progress as a united religious body. The National Conference was formed in 1865, and the International Council of Unitarian and other Liberal Religious Thinkers and Workers in 1900.

The briefest definitions of the Unitarian faith are such as these: "Christianity as Christ preached and lived it—not faith *in* Jesus, but the faith *of* Jesus;" or "the affirmation of the present life of God in the soul of man;" or "the two great commandments applied;" or "the affirmation of the humanity of God and the divinity of man." Unitarianism is not so much a system of opinions as a habit of mind and a principle of conduct. Unitarians ask no one to sign a creed, because they believe that dogmas are not essential to religious life. What seems to them essential is not a transient form of opinion, but a method of truth-seeking and the practice of righteousness. Unitarians believe in the unity to be discerned in all natural laws and processes; they hold that religion is natural, that faith is a matter not of tradition, but of personal insight, and that the true way to learn of the doctrines is by obeying the will of God.

Unitarians believe in one God, the Father, not in a Trinity of persons in the Godhead. They believe that Jesus is a son of God, not that he is God the son; they recognize him as the great teacher of spiritual truth and the example of the noble life, but they do not accept him as God, the equal of the Heavenly Father. They do not believe in worshiping Christ, but in following him, and they discover no need of a mediator between God and man. Unitarians believe in the Holy Spirit, not as the third person in the Godhead, but as the name for God's spiritual influence in the hearts of men. They consider all men God's children, not merely His creatures, and therefore they declare the dignity, not the depravity, of human nature. The doctrines of the fall of man and of sacrificial atonement have, therefore, for Unitarians no reality or significance. Unitarians believe that the Bible contains the Word of God, not that every word it contains is God's word; they use the Bible as an oracle of the spiritual life to touch the conscience and to draw the soul to God. They hold that salvation is won, not through miraculous substitution, but through the energies of a good life; they hold that fruitfulness is the test of religious vitality. To them heaven and hell are not places of bliss and misery, but states or conditions of the soul; each man making for himself his own heaven or hell and carrying it with him wherever he goes. Unitarians find an adequate basis for religious organization in a common purpose to do good and to be good.

There are in the United States about 460 Unitarian churches, with 554 ministers. In Great Britain and Ireland there are about 400 churches; in Hungary, 125; and the movement is represented by churches and individuals in every civilized land. In Great Britain and America these churches are purely congregational in government. In Hungary a modified episcopacy prevails. As is to be expected from the content of the Unitarian habit of mind, its energies have been expended not in the upbuilding of a denomination or of ecclesiastical institutions, but in philanthropy, literature, and public-spirited service. In England we find in connection with this movement during the last century many eminent scientists, scholars, and leaders among women. In America, while the Unitarian churches have never contained more than one two-hundredth part of the population, yet the members of these churches have been conspicuous out of all proportion to their number in public life.

The chief working organizations of the Unitarians are the American Unitarian Association, Boston, Mass.; the British and Foreign Unitarian Association, London; the Consistory of the Hungarian Churches, Klausenburg, Hungary; the Japan Unitarian Association, Tokio, Japan; the Icelandic Unitarian Association, Winnepeg, Manitoba, etc. In general alliance with these bodies are the *Protestantenverein* of Germany, the *Protestantenbond* of Holland, the *Brahmo-somaj* of India, and organizations of the liberal Protestants in France, Switzerland, and Scandinavia.

The chief training schools for the Unitarian ministry in Europe are the Unitarian College in Klausenburg, Hungary; the Manchester College, Oxford, England; the Unitarian Home Missionary College, Manchester, England; and the Presbyterian College, Carmarthen, Wales. In America the Unitarian ministry is chiefly supplied from two undenominational divinity schools, which were founded by Unitarians and are maintained largely by Unitarians, but which require no dogmatic tests and which welcome alike in faculty and student body members of all denominations. These two schools are: (1) The Harvard Divinity School, situated at Cambridge, Mass., in connection with Harvard University (q.v.), and (2) the Meadville Theological School, founded in Meadville, Pa., in 1844, which like the Harvard Divinity School, enjoys an ample endowment. The charter of the Meadville School provides that "no doctrine or text shall ever be made a condition of depriving any of the opportunities of instruction in this school."

Bibliography. The more important periodicals of the Unitarians are *The Christian Register* (Boston); *The Christian Life* and *The Inquirer* (London); *Unitarius Kozlony* (Klausenburg, Hungary). For the history of the Unitarian movement, consult: J. H. Allen, *Our Liberal Movement in Theology* (Boston, 1882), and his *Historical Sketch of the Unitarian Movement* (New York, 1894); E. H. Hall, *Orthodoxy and Heresy* (Boston, 1883); Bonet-Maury, *Early Sources of Unitarian Christianity in England* (London, 1884); Crooker, *The Unitarian Church* (Boston, 1902); Cooke, *Unitarianism in America* (ib., 1902). For the doctrines, consult: F. H. Hedge, *Reason in Religion* (ib., 1875); J. F. Clarke, *Essentials and Non-essentials in Religion* (ib., 1878); J. Martineau, *Seat of Authority in Religion* (London, 1890); B. Herford, *Forward Movement Lectures* (ib., 1895), together with the publications of the American Unitarian Association and the British and Foreign Unitarian Association. For further references, see the works of W. E. Channing, Theodore Parker, J. F. Clarke, M. J. Savage, and the biographies of W. E. Channing, Theodore Parker, R. W. Emerson, E. S. Gannett, and Dorothea L. Dix.

UNITED AMERICAN MECHANICS, Junior Order of. An order established in 1853 as a feeder to the Order of United American Mechanics (q.v.), providing for the admission of youths under the age of eighteen and their training for membership in the older organization. In 1885 the original purpose of the order was abandoned and it became an independent beneficiary organization. The total membership is about 112,000; total benefits disbursed from date of organization to 1903, $4,288,920.

UNITED AMERICAN MECHANICS, Order of. A patriotic, fraternal, and benevolent organization founded in Philadelphia in 1845 with the object of safeguarding the interests of the American mechanic against the dangerous competition of foreign-born immigrants. Members must be eighteen years of age, born on American soil or where the flag flies, advocates of the public school, and opposed to the union of Church and State. No colored people are admitted. The order has no affiliations with trade unions, and does not interfere in labor disputes. It has a funeral benefit department and an insurance department. The Loyal Legion of United American Mechanics is the uniformed division of the order, established by the national council in 1846. There is also a woman's auxiliary known as the Daughters of Liberty, established in 1875. The membership of the order is about 430,000 and the benefits disbursed since the date of organization amount to $120,000,000.

UNITED BAPTISTS. See Baptists, United.

UNITED BRETHREN, The. See Moravians.

UNITED BRETHREN IN CHRIST, The. A religious denomination which arose among the Germans of Pennsylvania, under the preaching of Philip William Otterbein (q.v.), an ordained pastor of the German Reformed Church, and Martin Boehm, a preacher among the Mennonites. As their converts increased, laymen were licensed to preach. Their first formal conference met in Baltimore (1789), and their first annual conferenc at Frederick, Md., in 1800. Here the name by which they have since been known was adopted, and Otterbein and Boehm were elected first bishops. The first General Conference met in 1815, when a Confession of Faith and a Discipline were adopted.

The organization of the United Brethren in Christ includes quarterly and annual conferences, and a quadrennial General Conference, which is the only legislative body, and since 1901 has been composed of an equal number of ministers and laymen. The superintendency of the Church is vested in the bishops, who, with the general Church officers, are elected every four years by the General Conference. Since 1889 women have been eligible to the ministry. All ordained preachers are elders, the only order recognized. Members are forbidden the use of intoxicating liquors, and must not traffic in them. Slavery was prohibited after 1821. The theology of the United Brethren in Christ is Arminian. They accept two sacraments, baptism and the Lord's Supper. The mode of baptism is left to the choice of the candidate. Infant baptism is practiced. The spiritually dynamic presence of Christ in the Lord's Supper is acknowledged. The practice of foot-washing is discretionary. The government of the Church is democratic. The itinerant system is enjoined, but pastorates are not limited as to time.

A commission appointed by the General Conference of 1885 prepared, without doctrinal change, a restatement of the Confession of Faith and a revision of the Constitution, which, having been approved by the members, was adopted and proclaimed by the General Conference of 1889. It provided for lay delegates to the General Conference and set aside a rule prohibiting membership in secret societies. At this time Bishop Milton Wright and 14 of the 125 delegates composing the Conference withdrew and formed a branch of the Church, which adheres to the Confession of Faith and the Constitution as they were before the revision.

The larger division of the Church, which accepted the new Constitution, had in 1902 47 annual conferences and mission districts, including those in Germany, Japan, Ontario, and West Africa, four bishops, 1967 itinerant ministers, 434 local preachers, 249,314 members, 263,041 pupils in the Sunday-schools, 3358 church houses, and 827 parsonages, and it contributed for all purposes $1,661,524. It has a theological seminary at Dayton, Ohio, eight colleges, and four academies. It has a publishing house at Dayton, and issues from its presses 16 different publications aggregating 10,000,000 copies annually. There is a Board of Education; a Home, Frontier, and Foreign Missionary Society sustaining missions in Africa, Japan, Germany, Porto Rico, Ontario, and the United States; a Woman's Missionary Association, conducting missions in Africa, China, and the Philippines; a Church Erection Society; a Young People's Christian Union, with 63,846 members; and an Historical Society.

The branch which retains the old Constitution had in 1902 32 annual conferences, 4 bishops, 766 societies, 281 active itinerant and 133 local preachers, 25,670 members, 28,293 pupils in the Sunday-schools, 523 church houses, 88 parsonages, and aggregate contributions amounting to $144,624. There is a Home, Frontier, and Foreign Missionary Society, sustaining missions in 16 conferences and mission districts, including West Africa, and a Woman's Missionary Association, a Board of Education, a publishing house in Huntington, Ind., and colleges at Huntington, Ind., Albion, Wash., and in Oregon.

The Religious Telescope (weekly), *The Watchword* (weekly), *The United Brethren Review* (bi-monthly), and *The Year Book of the United Brethren in Christ,* besides missionary and Sunday-school publications, are issued by the New Constitution branch at Dayton, Ohio. The Old Constitution Church issues *The Christian Conservator* (weekly), *The Missionary Monthly,* and a *Year Book* at Huntington, Ind. For the history of the Church, consult Berger, ***History of the Church of the United Brethren in Christ*** (Dayton, 1897); consult also biographies of Bishops Otterbein (ib., 1884) and J. J. Glossbrenner (ib., 1889), by A. W. Drury; Jonathan Weaver (ib., 1901), by H. A. Thompson; and James W. Hott (ib., 1902), by M. R. Drury.

UNITED EVANGELICAL CHURCH, The. A religious organization formed in 1894 as the result of a division which had occurred in the Evangelical Association (q.v.). A meeting attended by delegates from six annual conferences was held at Naperville, Ill., in November of that year, and constituted the first General Conference of the United Evangelical Church. The legislation necessary to perfect the organization of an independent Church was enacted; a Book of Discipline was adopted, based upon the old Discipline of the Evangelical Association, with certain changes, such as the introduction of lay representation into the conferences.

In 1902 the United Evangelical Church had 10 conferences (including seven mission conferences), 979 organized congregations, 820 church buildings, 2 bishops, 501 itinerant and 214 local preachers, 63,390 church members, and 83,381 pupils in Sunday-schools. Besides assisting the seven mission conferences, the General Missionary Society has a mission in Changsha, Honan, China; and the Woman's Missionary Society coöperates with it. A Church Extension Society was established in 1902. The educational institutions are Albright College, Meyerstown, Pa.; Dallas College and La Creole Academy, Dallas, Oregon; Western Union College, Le Mars, Iowa. There is a publishing house at Harrisburg, Pa. Besides Sunday-school and similar publications the Church periodicals are ***The Evangelical*** (weekly), ***Die evangelische Zeitschrift*** (weekly), and ***The Missionary Tidings,*** all issued at Harrisburg. Consult Stapleton, ***Annals of the Evangelical Association of North America and History of the United Evangelical Church*** (Harrisburg, 1900).

UNITED EVANGELICAL CHURCH, The (in Germany). A Church established in Germany in 1817 by the union of portions of the Lutheran and Reformed churches. Such a union had been attempted without success in 1529, 1631, 1661, and by Frederick I. of Prussia (1703-22). Frederick William I. published several decrees having the same object in view. It was favored also toward the end of the eighteenth century by the progress of theological thought. Schleiermacher proposed to establish an outward Church unity, leaving disputed points in scientific theology still open for discussion. At the tercentenary of the Reformation in 1817 a visible union was established, limited, however, at first, as many of its advocates supposed, to a common Church government, and a common celebration of the Lord's Supper. In this movement the Government of Prussia has always been the leader, and the United Evangelical Church is the State Church there, although dissensions have arisen at various times. A similar union of Lutherans with the Reformed Church has been accomplished in several other of the German States; while of the rest some are too exclusively Lutheran, and some too exclusively Reformed to warrant the attempt. In the United States a branch of the United Evangelical Church was established near Saint Louis in 1840. See German Evangelical Synod of North America; see also German Evangelical Protestant Church.

UNITED FREE CHURCH OF SCOTLAND. See Presbyterianism.

UNITED IRISH LEAGUE OF AMERICA. An association of Irish-Americans which is practically the successor of the Parnell Land League and of the Irish Federated Societies in sympathy with the Land League Movement. It was provisionally established in New York, December 4, 1901, and was ratified at the first National Convention of the United Irish League held at Boston, October 20-21, 1902. The purpose of the league is to act as an auxiliary in America to the national organization in Ireland in the achievement of its aims. These include self-government for Ireland, the abolition of landlordism there, and other reforms of political and economic conditions in the country. Membership in the league is open to all Irish-American Nationalists without distinction of class or creed, and to all sympathizers with the national claims of Ireland. The general management of the league when not in convention is vested in a national committee, consisting of the president, two vice-presidents, treasurer and secretary, and

31 members at large. The National Convention is held biennially or oftener at the discretion of the national committee.

UNITED IRISHMEN, SOCIETY OF. An Irish revolutionary society founded in 1791. It was an outgrowth of the sentiments inspired in Ireland by the French Revolution, which found earliest acceptance among the Presbyterians of Ulster, especially Belfast. Its object was to obtain complete political emancipation of both Catholics and Dissenters, and to reform the Irish Parliament. It soon spread among the Catholics of the south, and even members of the Established Church joined the movement. The Government in 1783 passed the Relief Act in the Irish Parliament. This gave the suffrage to Catholics, but did not qualify them for office. An attempted measure of Parliamentary reform was, however, rejected in 1794, and the recall of Lord Fitzwilliam removed the hopes of the society for reform through Parliamentary means. The society then became more revolutionary, collected arms and became to all intents and purposes a military organization. It promised the confiscation of the land of hostile landlords to the peasants and sent emissaries to France for aid. Its numerical strength was greatly increased in the south by the action of the Orangemen of Ulster (Peep o' Day Boys) in expelling the Catholic inhabitants, who were forced to find refuge in the south. In 1796 Wolf Tone, the chief agent in the organization of the society, was sent to France to procure military aid, and an expedition of 15,000 troops under the command of Hoche (q.v.) was fitted out. A violent tempest, however, prevented the French from landing and the expedition accomplished nothing. The society, nevertheless, remained ready for an invasion. Two directories were established, one in Belfast, and the other in Dublin. They were reputed to have 200,000 recruits, but the number was certainly an exaggeration. Meanwhile the Government resolved to repress the movement before an invasion by France could be attempted, and under the pretext of repressing disorder the leaders of the movement in Ulster were arrested, and the Protestant militia and yeomanry let loose on the population of the south. This irregular force committed the greatest brutalities, it being evidently the intention of the Government to incite the peasantry to open rebellion before the preparations for a revolution could be completed. The rebellion broke out on May 3, 1798, and was confined to parts of Leinster. As it necessarily assumed the aspect of a religious war, the Presbyterians of Ulster took no part in it. The rebellion was suppressed before the arrival of the French, and shortly afterwards Wolfe Tone himself was captured. The Constitution and Oath of the Society are printed in Plowden, *History of Ireland*, vol. iii. (Philadelphia, 1806). Consult also *The Proceedings of the Dublin Society* (Philadelphia, 1795). The most complete work on the subject is Madden, *The United Irishmen* (Dublin, 1858). For a brief account consult Hassencamp, *History of Ireland* (London, 1888).

UNITED METHODIST FREE CHURCHES. See METHODISM.

UNITED PRESBYTERIANS. See PRESBYTERIANISM.

UNITED PROVINCES. See NETHERLANDS.

UNITED PROVINCES OF AGRA AND OUDH, formerly NORTHWESTERN PROVINCES AND OUDH. A province of British India, occupying the Upper Ganges Valley. It is bounded by Tibet, Nepal, Bengal, the native States of Central India, Rajputana, and the Punjab (Map: India, C 3). Total area, 112,243 square miles, of which 83,198 belong to the Territory of Agra, 23,966 to Oudh, and 5079 to the native States of Garhwal and Rampur. Except the extreme northern part, which is a wild and elevated mountain region of the Himalayas, the province is a low alluvial plain watered by the Ganges and its numerous large parallel tributaries, chief of which is the Jumna. The climate is hot and unhealthful, especially in the large, marshy jungle region along the base of the mountains. The soil is fertile, but the western and southern parts of the province have a very uncertain rainfall, and are subject to severe droughts, so that these regions would be practically a desert were it not for their numerous large streams.

Extensive irrigation works have been constructed. The area irrigated in 1900 was estimated at 8,234,000 acres, or about one-third of the total cropped area. About two-thirds of this area was irrigated from wells and the remainder principally from reservoirs (tanks) and Government canals. The different crops produced are of more nearly equal importance than in any other province. The region ranks next to the Punjab as a wheat producer, and though rice is of much less relative importance than it is in Bengal and some of the other provinces, it covers almost as great an extent as does wheat, or about 4,500,000 acres. There are large acreages of millet, pulse, and other food grains. More sugar-cane is grown (1,000,000 acres) than in any other governmental district, and opium, cotton-oil seeds, and indigo receive considerable attention. The people eat little animal food, and stock-raising is of subsidiary importance. Cattle and buffaloes take the place of horses.

Modern methods of manufacturing have been little adopted. There are six cotton mills, employing about 7500 hands. Four of these mills are located at Cawnpore. The Ganges affords a means of water transportation. The province is better supplied with railroads than any other in India. It exports large quantities of oil seeds, wheat, raw cotton, hides, sugar, indigo, and opium, and imports cotton goods, metals, railroad materials, coal, and salt. A frontier trade is carried on with Tibet and Nepal.

The United Provinces are under the administrative control of a Lieutenant-Governor appointed by the Governor-General of India. There is a legislative council of 15 members, of whom 7 may be officials. There are 104 municipalities, in 98 of which the taxpayers elect a majority of the members of the municipal boards. There are also 44 district boards, over four-fifths of the aggregate number of board members being elected. There was a police force, in 1898, aggregating 24,888 officers and men. For the year ending March 31, 1901, the revenue collected amounted to $42,325,309, and the expenditure was $20,437,436. Allahabad is the capital.

In 1901 the population of the United Provinces without Oudh (q.v.) numbered 34,812,000, or 417 to the square mile. The eastern part is the most densely populated. A comparison with earlier census returns shows that the population is almost stationary. The people are mainly Hindus. Those who hold to some form of the Hindu religion outnumber the Mohammedans about 7 to 1. The Christians number about 100,000. There are more large cities in the United Provinces than in any of the other provinces. The chief are Lucknow (in Oudh), Benares, Cawnpore, Agra, Allahabad, Bareilly, and Meerut.

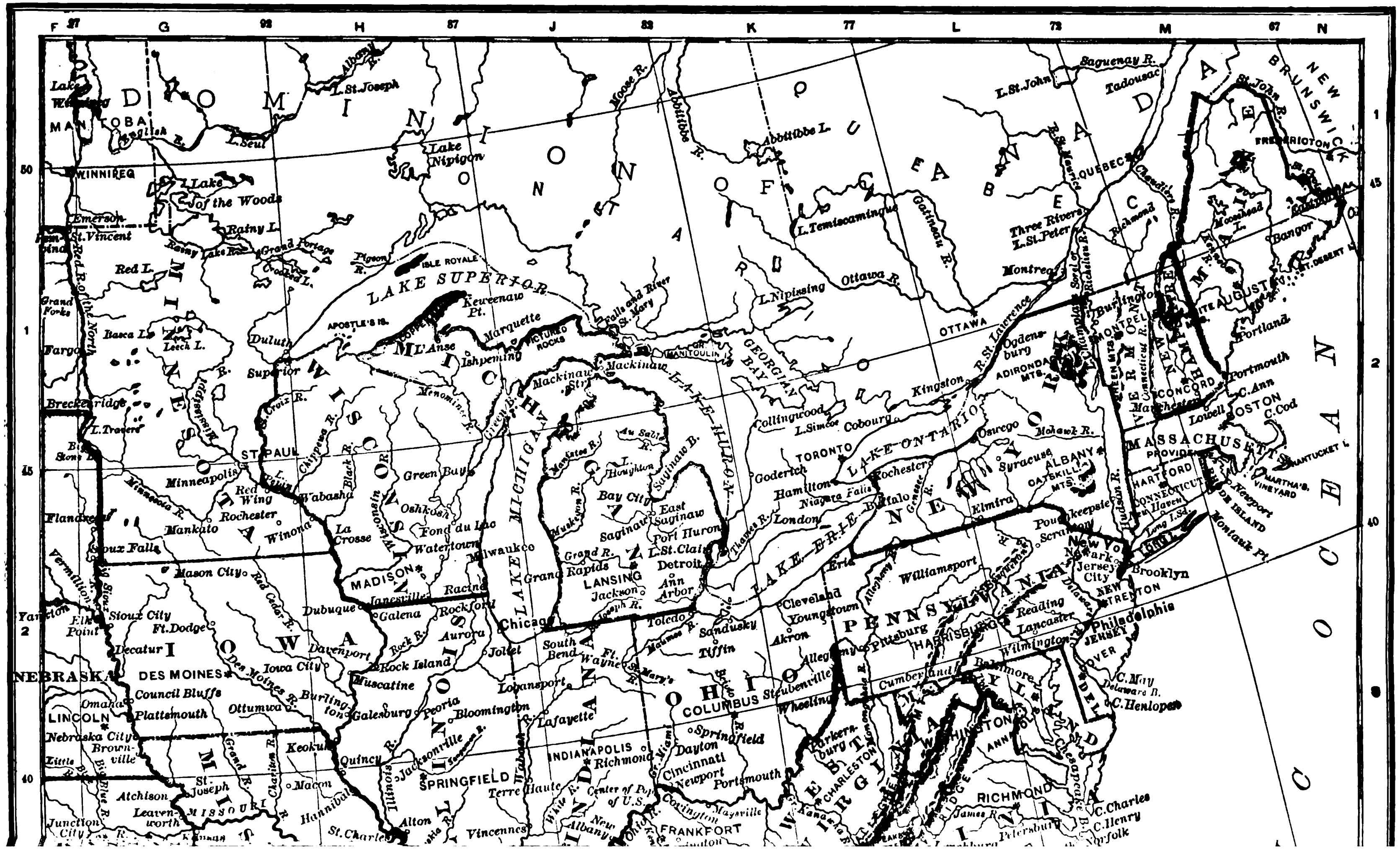
UNITED STATES. The territory of the United States of America, exclusive of Alaska and colonial dependencies, lies in the temperate portion of North America, but reaches almost to the tropical zone. It embraces an area of 2,970,038 square miles. The area including Alaska is 3,560,922 square miles; and including the colonial dependencies, 3,699,440 square miles. The United States proper, or the United States south of Canada, extends approximately from longitude 67° to 125° W. from the Atlantic Ocean (whose great arm, the Gulf of Mexico, forms half of the southern boundary) to the Pacific. The northern boundary is somewhat arbitrary in the east between New England and the Lower Saint Lawrence region, but from northern New York it follows the Saint Lawrence and the middle line of the Great Lakes to northern Minnesota. Beyond the Lake of the Woods the boundary follows the 49th parallel to the Pacific Ocean. The peninsula of Florida extends to about 25°, and the southern part of Texas to about 26°, north latitude. The parallel 49° is about that of Paris, while the latitude of Key West carries one far down into the Sahara. It may be further observed that New York is on the parallel of Naples and Constantinople, and Memphis on that of Gibraltar. The United States has preponderatingly a natural boundary of salt and fresh waters. On the side of Mexico and of British Columbia the boundary crosses the Cordilleran Ranges. This article treats of the United States proper except when otherwise stated. Alaska, and also the colonial dependencies (see section *Colonies* below), are treated under their respective heads.

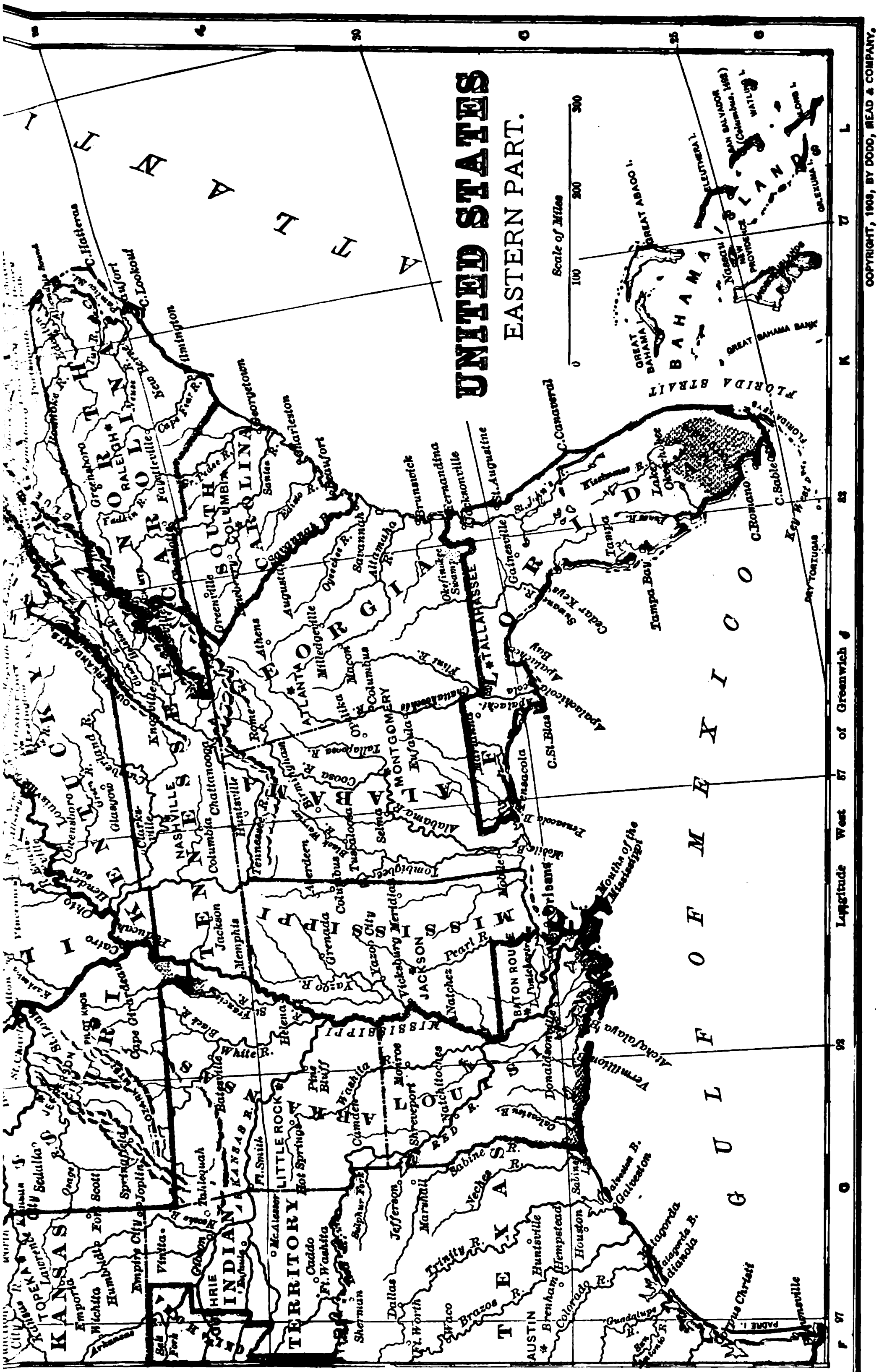
GENERAL DESCRIPTION. The lands of the United States may be roughly separated into four areas: the Atlantic lowlands, the Appalachian highlands, the Mississippi Valley, and the Pacific highlands. These regions are nowhere sharply separated from each other. Leaving out for a moment the narrow strip of Atlantic lowland, one may best view the United States as made up of two great uplands, with a broad lowland lying between. The country thus shows the physical plan of North America, for the Appalachian belt rises from the Gulf plains in Alabama and ends northward on the shores of Labrador. The Western uplands or Cordilleras begin virtually at the base of the continent; they rise to a great elevation in Mexico, maintain great heights and gain their greatest width in the Western United States; and thence continue through British America and Alaska. In like manner the Mississippi plains are continuous with the Hudson Bay region and the central plains of Canada to the shores of the Arctic Sea, and it is possible to pass from the delta of the Mississippi to the mouth of the Mackenzie River without rising 1000 feet above the ocean.

THE ATLANTIC LOWLAND. This region, although not large, contains a vast population, and is historically the most important. It made the interior of the continent accessible to discovery from the east, offered hospitable ground to the colonists, and is rich in the harbors that have led to the building of cities and the growth of commerce. These lowlands are not the same in origin in the North as in the South. The Atlantic rim of New England is a rough lowland rising from sea level to the height of four or five hundred feet. It is beset with rough hills, of native rock, and of glacial waste. It is an uneven but subdued or nearly worn-out mountain country, like western Massachusetts or northern New England, except that it is more fully degraded. South of New York, on the other hand, and reaching to Florida Strait, is the Atlantic Coastal Plain, including southern New Jersey, Delaware, and a broad belt of all the South Atlantic States. It is a smoother land, without projecting masses of rocky hills, and sloping gently up from the tide levels to the rougher lands of the Appalachian belt. It is intersected by Delaware and Chesapeake bays and their rivers, and by more southerly streams. It is often known as the 'tidewater country' because the sea enters its estuarine rivers for scores of miles. It is covered with fields of tobacco, cotton, rice, and fruit orchards, or with pastures or native forest. The region is in greater part a sea bottom uncovered at a comparatively recent period, and becomes continuous, beneath the Atlantic waters, with the continental shelf which lies between the land border and the deep seas. West of this plain is a much denuded belt of ancient Appalachian mountains, which is becoming known as the Piedmont Plain. It is from a few hundred to a thousand feet in altitude and lies between the coastal plain and the Blue Ridge. See PIEDMONT PLAIN.

One feature of the entire Atlantic coast is that the rivers are tidal. They may occupy narrow channels to the sea border, like the Hudson, or they may enter at the head of deep and spacious bays, as do the Delaware and the Susquehanna. Such a water system with the above rivers, the Potomac, James, and other streams, is well called a 'drowned' river system. By this is meant that the trunk valley and its branches were cut out by land streams, and that the sea has entered their lower parts because of a sinking of the edge or of larger parts of the continent. The historical meaning of these conditions can hardly be reckoned. It is enough here to observe that nearly all the harborages and quiet salt waters of our Atlantic border have this origin; and that thus have grown our great seaboard cities, where ships may ride safely at the mouth of tidal streams whose waters offer gateways to the interior of the continent.

THE APPALACHIAN UPLANDS. From the physical point of view these may be taken as the eastern part of the rocky skeleton of the country and the continent. In their highest points, the White Mountains in the north and the Black Mountains in the middle south, they attain elevations exceeding 6000 feet in the loftiest projections east of the Rocky Mountains. Historically they form the Appalachian barrier, with large consequences in colonial annals and in the opening of the lands that lie westward. See APPALACHIANS.


F
G
H
J
K
L
M
N
97
93
87
83
77
73
67
50
45
40
1
2
DOMINION OF CANADA
ONTARIO
QUEBEC
NEW BRUNSWICK
MANITOBA
Lake Winnipeg
WINNIPEG
Lake of the Woods
Rainy L.
Red L.
L. Seul
L. St. Joseph
Lake Nipigon
Abbitibbe L.
Abbitibbe R.
Moose R.
L. Temiscamingue
Gatineau R.
Ottawa R.
L. Nipissing
L. St. John
Saguenay R.
Tadousac
Three Rivers
L. St. Peter
Montreal
QUEBEC
OTTAWA
R. St. Lawrence
Kingston
TORONTO
Hamilton
Niagara Falls
London
Goderich
Collingwood
L. Simcoe
Cobourg
GEORGIAN BAY
MANITOULIN
LAKE SUPERIOR
ISLE ROYALE
Keweenaw Pt.
APOSTLE'S IS.
LAKE HURON
LAKE MICHIGAN
LAKE ONTARIO
LAKE ERIE
Duluth
Superior
ST. PAUL
Minneapolis
Red Wing
Rochester
Winona
Mankato
Sioux Falls
Flandreau
Breckenridge
Fargo
Grand Forks
St. Vincent
Emerson
Pembina
L. Traverse
Big Stone
Itasca L.
Leech L.
MINNESOTA
WISCONSIN
MADISON
La Crosse
Wabasha
Green Bay
Oshkosh
Fond du Lac
Watertown
Milwaukee
Racine
Janesville
MICHIGAN
Marquette
L'Anse
Ishpeming
PICTURED ROCKS
Mackinaw
Bay City
Saginaw
East Saginaw
Port Huron
L. St. Clair
Detroit
Ann Arbor
Jackson
LANSING
Grand Rapids
Muskegon R.
Manistee R.
Au Sable R.
Menominee R.
IOWA
DES MOINES
Council Bluffs
Plattsmouth
Omaha
Sioux City
Ft. Dodge
Mason City
Red Cedar R.
Dubuque
Davenport
Iowa City
Des Moines R.
Burlington
Ottumwa
Keokuk
Muscatine
Decatur
NEBRASKA
LINCOLN
Nebraska City
Brownville
Little Blue R.
Big Blue R.
Yankton
Vermillion
Elk Point
ILLINOIS
SPRINGFIELD
Chicago
Galena
Rockford
Aurora
Joliet
Rock Island
Galesburg
Peoria
Bloomington
Quincy
Jacksonville
Alton
Illinois R.
INDIANA
INDIANAPOLIS
Richmond
South Bend
Ft. Wayne
Logansport
Lafayette
Terre Haute
Vincennes
New Albany
Center of Pop. of U.S.
OHIO
COLUMBUS
Toledo
Sandusky
Cleveland
Youngstown
Akron
Tiffin
Steubenville
Wheeling
Springfield
Dayton
Cincinnati
Newport
Portsmouth
Covington
Maysville
FRANKFORT
MISSOURI
St. Joseph
Atchison
Leavenworth
Junction City
Macon
Hannibal
St. Charles
Grand R.
Chariton R.
PENNSYLVANIA
HARRISBURG
Pittsburg
Williamsport
Erie
Reading
Lancaster
Philadelphia
Cumberland
Allegheny R.
NEW YORK
ALBANY
Syracuse
Rochester
Buffalo
Oswego
Elmira
Poughkeepsie
Scranton
Brooklyn
Jersey City
Newark
NEW JERSEY
TRENTON
Long I. Sd.
Montauk Pt.
CATSKILL MTS.
ADIRONDACK MTS.
Ogdensburg
Mohawk R.
Hudson R.
Genesee R.
VERMONT
MONTPELIER
Burlington
GREEN MTS.
Connecticut R.
NEW HAMPSHIRE
CONCORD
Manchester
Portsmouth
MAINE
AUGUSTA
Portland
Bangor
Moosehead L.
MT. DESERT I.
FREDERICTON
St. John R.
Chaudière R.
Richmond
MASSACHUSETTS
BOSTON
Lowell
C. Ann
C. Cod
NANTUCKET I.
MARTHA'S VINEYARD
PROVIDENCE
RHODE ISLAND
Newport
HARTFORD
CONNECTICUT
New Haven
DELAWARE
DOVER
Wilmington
C. May
Delaware B.
C. Henlopen
MARYLAND
Baltimore
ANNAPOLIS
WASHINGTON
WEST VIRGINIA
CHARLESTON
Parkersburg
VIRGINIA
RICHMOND
Petersburg
James R.
C. Charles
C. Henry
Norfolk
OCEAN



COPYRIGHT, 1903, BY DODD, MEAD & COMPANY.

THE CENTRAL LOWLANDS. We give this name to the lower lands of the Mississippi basin, although it is but a vague designation. These plains pass gradually up into the plateau on the east. To the north they merge with the smooth lowlands about the Great Lakes, to the south they are continuous with the Gulf lands, and to the west they pass gradually into the high plains west and south of the Missouri River. The region is often called, in the same rough way, the Prairies. See PRAIRIE.

THE GREAT LAKE REGION. The lands about the Great Lakes have considerable variety. During the recession of the continental glacier the lakes had higher water levels and often much greater extent than now. During this flooded condition what are now the bordering lands received a cover of such fine muds as are spread upon the bottom of all great bodies of water. To some extent previous inequalities are masked, and the resulting surface is often very smooth and almost level. This is especially true of lakes Ontario, Erie, Huron and Michigan. Some of these lands were treeless and hence were properly called prairies, although modern physiography prefers to designate them as lake plains. Lake Superior is surrounded by older rocks, which have been greatly disturbed and metamorphosed, and the remnants of these ancient mountains form a higher and rougher land than about the lower lakes. This is true of the northern peninsula of Michigan, of Wisconsin, and of northeastern Minnesota. Naturally, therefore, these rocks hold vast stores of iron and copper, while the strata of the prairies offer little in the way of mineral resources except coal. See GREAT LAKES.

THE GULF PLAINS. These are most simply defined as a continuation of the Atlantic Coastal Plain, or another part of the younger fringe of the continent. In central Georgia and Alabama the younger formations abut on the older rocks of the southern Appalachians and mark approximately the encroachment of the later seas. By gentle uplift the marginal sea bottoms of the Gulf were laid bare, and form the flat lowlands of this semi-tropical region. This explains in brief the origin of the peninsula of Florida, most of whose surface has now an altitude of less than 100 feet. A gentle uplift of the sea bottom brought this land into existence. Cavernous openings in the rocks, underground streams, and springs of great volume result from the presence of extensive limestone formations as part of the bed rock of the region. The seaward edge of this land abounds in sand bars, coral reefs, and mangrove swamps, and this single State, counting its main shores, its bays and numberless islands, has more than 4000 miles of shore line. It is proposed to open a way for quiet water navigation down the entire east coast of Florida.

Westward from Alabama, the Mississippi River (q.v.) becomes the controlling feature in the topography of the Gulf region. The broad Gulf plain occupies a large part of southern and eastern Texas. As in the region to the eastward, the younger rocks have been made into land by uplift and retreat of the sea. As a rule the surface slopes gently toward the Gulf, but with escarpments and great local variations of topography. Some areas are prairie, while others are heavily forested, and the rise to the northwest leads first to the great plateau, or Llano Estacado, and then to the mountains of the Rocky Mountain Range. The shore line is a long crescent, bordered by extensive sand bars, which inclose stretches of quiet water. Galveston is on one of these bars, and it is thus exposed to the Gulf hurricanes.

THE GREAT PLAINS. This is the name usually given to the lands which rise gradually from the prairies to the eastern base of the Rocky Mountains. But the altitude of these lands is such that they might be called with propriety a plateau. From altitudes of about 1000 feet along the Missouri River in Kansas and Nebraska, they rise to heights of 5000 to 6000 feet at the foot of the western mountains. In general this rise is imperceptibly gradual, but its continuity is sometimes interrupted by escarpments, and the easterly flowing rivers have incised shallow valleys upon the region. The strata are little disturbed and thus the country resembles the prairie region, but the underlying beds are geologically younger and are overlain in many areas by large bodies of waste, which in part may have been deposited in lakes and in parts was no doubt distributed by torrents from the mountains. Climatic causes have also made the region different in aspect from the prairies The plains are semi-arid in the east and truly arid in the west, and are therefore but sparsely clad with vegetation. Forests are thus infrequent, the herbaceous vegetation is sparse and has the character of the desert, and agriculture as one goes west is dependent on irrigation. Over large areas the water supply for this purpose is deficient, and grazing is the only remaining resource. This region is a vast one, having the east and west limits already given, and reaching from central Texas to the northern border of the country, where it merges into the great Western plains of Canada. In the north the most prominent break in the plains is the Black Hills mountain area. Here an elevated mass of ancient rocks protrudes through the younger strata, giving a region of rugged relief, hard rocks, mines, and forests. In the Black Hills region, in much of the western Dakotas, and in Montana and western Nebraska, are the Bad Lands (q.v.).

UPLANDS OF MISSOURI AND ARKANSAS. There is yet to be noticed the most extensive body of elevated land between the Appalachians and the higher levels of the great plains. This lies in southern Missouri and in northern and central Arkansas and westward. In Missouri these uplands are of moderate height, dissected by the rivers, covered with forests, and known as the Ozark Plateau. Still better known, owing to their metallic deposits, are some low mountains of very ancient rocks familiar as Iron Mountain and Pilot Knob. Running through central Arkansas are the Ouachita Mountains. These rise from below the young sediments of the Mississippi Valley, and trend westward, passing through Indian Territory and Oklahoma into northern Texas. This upland region south of the Missouri River, therefore, is associated on various sides with the prairies, the alluvial plains of the Mississippi, the Gulf plains of the South, and the great plains of the West.

THE ROCKY MOUNTAINS. The name is properly applied only to an eastern range of the Cordilleran or Western Uplands. The range, with numerous peaks rising above 14,000 feet, extends through Idaho, Montana, Wyoming, Colorado, and New Mexico, and sends some outlying ridges into Texas. See ROCKY MOUNTAINS.

THE COLORADO PLATEAUS. West of the Rocky Mountains, in Wyoming, Colorado, Utah, New Mexico, and Arizona, is the basin of the Colorado River. This great stream confines its drainage, save near its mouth, to an upland several thousand feet above the sea. Having abundant sources in the rains and snows of the various parts of the Rocky Mountain Range, and rising at great altitudes, it has both velocity and volume, and hence has cut out the great cañons for which it is famous. This is a deeply but only partly dissected region consisting of blocks of strata, cut apart from each other by profound gorges, often intricate in pattern. Being an arid region, the abundant waters are of remote derivation and sunk in the cañons, while the sparse rainfall causes desert conditions to be general, with much exposed rock, little vegetation, and a general absence of conditions favorable to civilized life. Closely associated with these great plateaus are two short but lofty ranges of mountains. One of these is the Wasatch, marking the boundary between the plateaus and the Great Basin, in central Utah. The other is the Uinta Range, about 150 miles in length, and extending from northwestern Colorado through the border lands of Wyoming and Utah. Its chief development is in the latter State and in its east and west trend it departs from the usual direction of American mountain axes.

THE GREAT BASIN. This is an area of interior drainage, made up of many minor basins, of which the chief is that of the Great Salt Lake in Utah. See GREAT BASIN.

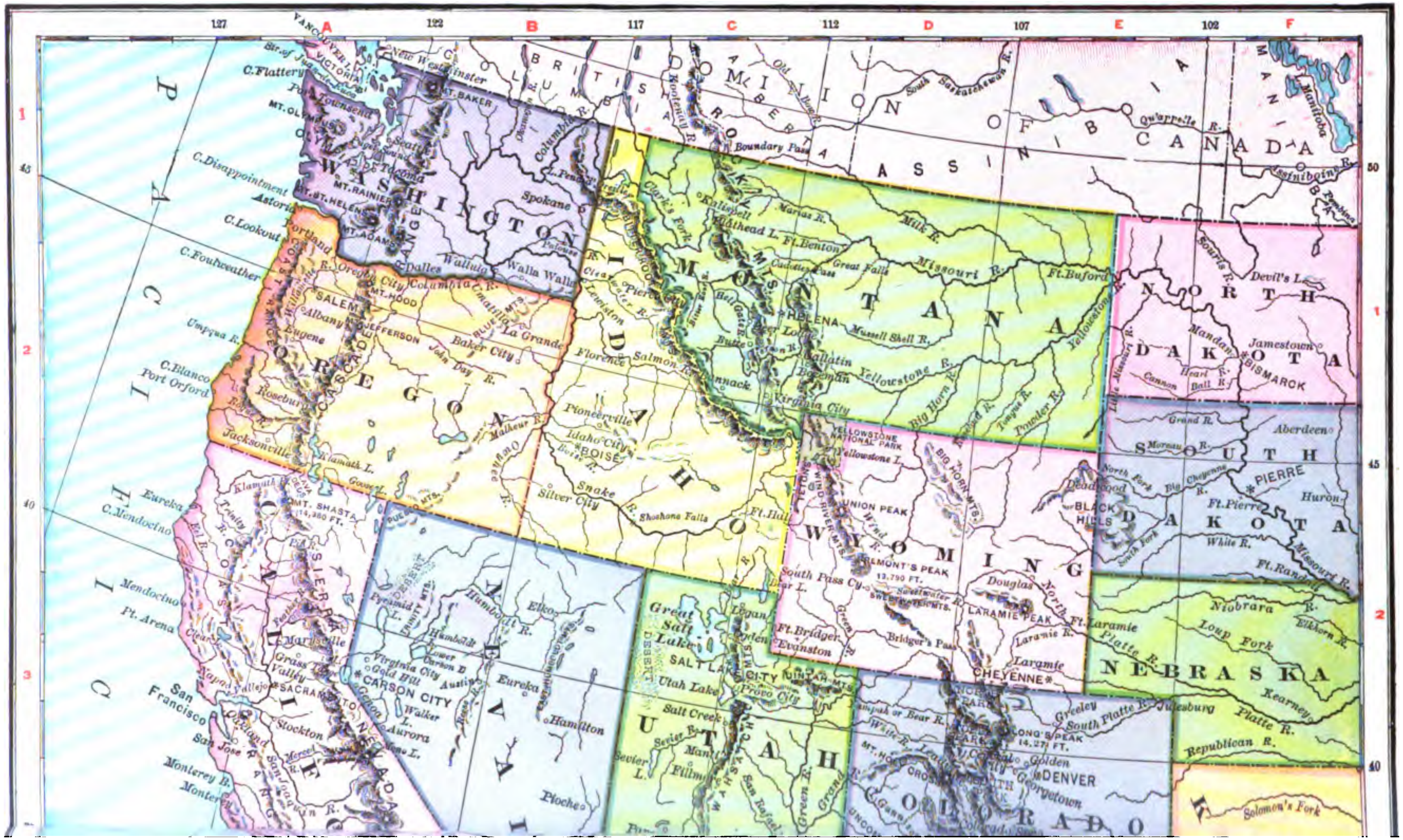
THE COLUMBIA AND SNAKE RIVER PLATEAUS. Large areas drained by these streams in Idaho, Oregon, and Washington are of volcanic origin, and along the Snake River in Idaho and Oregon the lavas form plateaus about 4000 feet in altitude. They are a natural desert, since the region is arid, but are capable of great development under the process of irrigation.

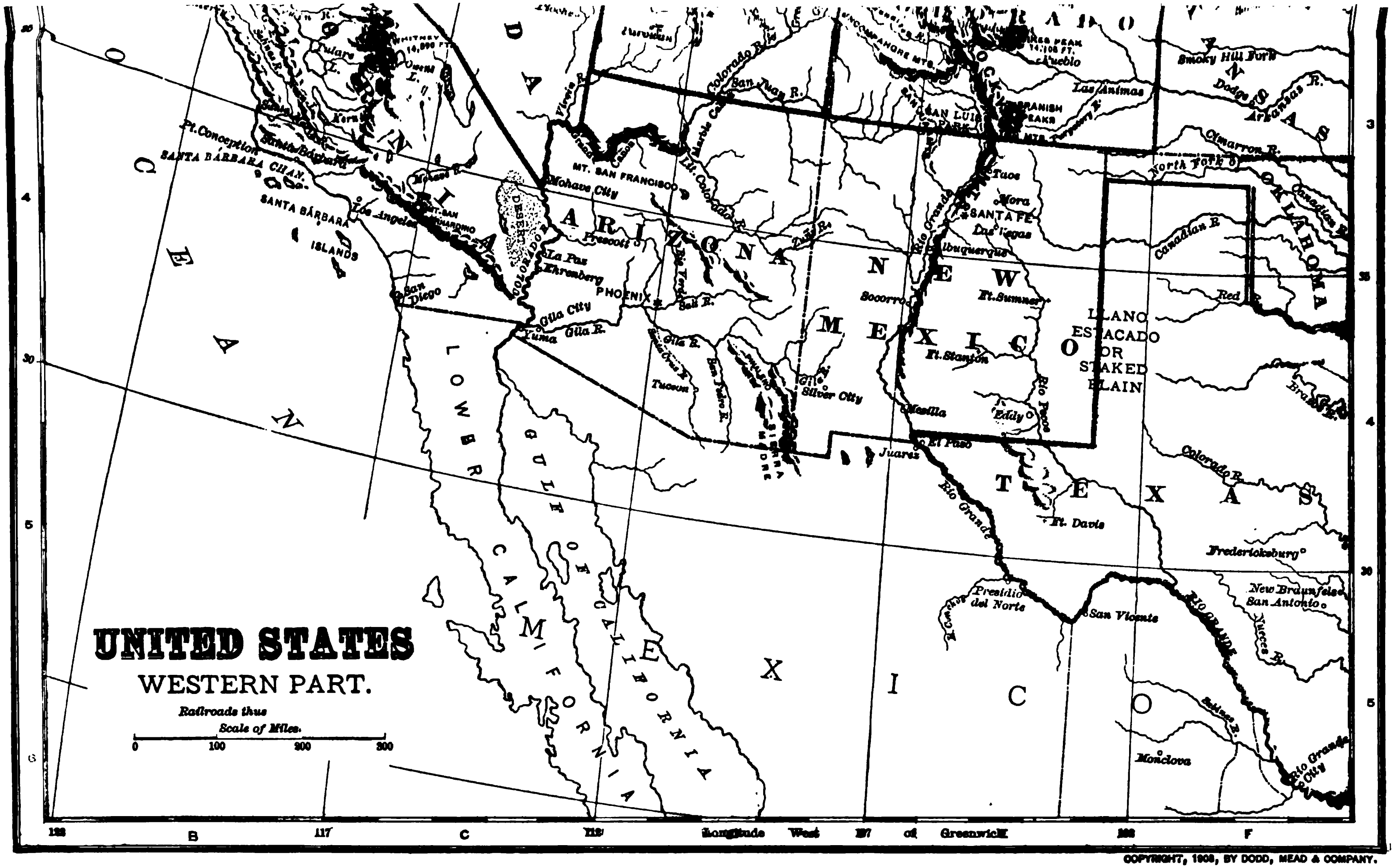
THE MOUNTAINS AND VALLEYS OF THE PACIFIC COAST. The features to which reference is here made belong to three States, California, Oregon, and Washington. They will be best understood if it is observed that a single lofty range, the Sierra Nevada, forms the eastern border of California, and that it extends, under the name of the Cascade Range, northward through central Oregon and Washington. Its culminating point, in California, is seemingly Mount Whitney (14,500-15,000 feet), which may also be the culminating point of the entire United States south of Alaska. Bordering the sea are lower and younger mountains, constituting also a prolonged range, but variously named, as the Coast Range in California, the Klamath Mountains in Oregon, and the Olympic Mountains in Washington. (See SIERRA NEVADA; CASCADE RANGE, etc.) Between these parallel ranges are lowland valleys of the utmost importance in the development of the region. In California there is the great valley drained by the Sacramento and Joaquin rivers, the centre of the fruit and grain culture of the State. In Oregon the Willamette Valley is analogous in origin and in human importance to this, as still farther north there is the Puget Sound Valley in the State of Washington. In association with these mountain ranges, reference should be made to the giant and minor volcanic cones which line their trend, and many of whose well-formed summits rise high into the snow-line (Shasta, Hood, Rainier, Baker). The coast line of the Pacific is not nearly so great as that of the Atlantic coast, because it is less indented. It has, however, a few of the choicest bodies of inland or protected waters to be found on any shore. Such are San Francisco Bay and Puget Sound, while the deep, tidal Columbia and Willamette rivers offer similar advantages to northern Oregon. It is thus seen that the Cordilleran system is made up of several parallel ranges of mountains, separated in turn by intermontane areas of lofty plateau, or, nearer Pacific Ocean, by broad and fertile lowlands.

HYDROGRAPHY. The drainage of the United States may be classed as Atlantic and Pacific. As with the entire continent, and with South America, the smaller ocean receives by far the greater contribution of fresh water from the lands now under review. The Atlantic streams may be considered as belonging to the Hudson Bay, the Gulf, or to open sea drainage. With unimportant exceptions farther west, the Red River of the North carries the contribution of the United States area to Hudson Bay waters. The open sea streams are all of moderate length and volume except the Saint Lawrence, which should be viewed as rising in Minnesota, although locally expanded into lakes of exceptional size. (For details concerning these bodies of water, the reader is referred to the article GREAT LAKES.) All the streams which enter the lakes from the United States are relatively small. Their courses are short, which is equal to saying that the line of water partings between the Laurentian and Mississippi basins is close to the lakes. The divide is also nearly everywhere quite inconspicuous. The streams have thus small capacity for transporting land waste into the lakes. Such waste as reaches the lakes rests in them, a condition from which results the exceeding clearness of Niagara, or of the Saint Lawrence waters that pass the Thousand Islands.

The open Atlantic streams, draining that part of the country which is historically oldest, and being often tidal, have a fame and a commercial value out of all proportion to their size. To begin with the rivers of New England, its conspicuous streams, the Penobscot, Kennebec, Merrimac, Connecticut, and Housatonic, are most of them entered by the tides for many miles. The Merrimac and Connecticut, above tide water, are types of many New England rivers which are interrupted by rapids due to glacial blockade, thus furnishing a great store of water power.

New York is composite in drainage. The Hudson, with the Mohawk, drains much of its central and eastern lands, but is chiefly important for its tidal course of 150 miles, with great harborage at its mouth, and an open gateway to the west from the head of tidewater. The Genesee, Black, and other rivers carry to the Saint Lawrence much of the run-off of northern and western New York. The Susquehanna, the Delaware, and the Mississippi take nearly all the remainder of New York waters. In a most anomalous manner, due to glacial change of slope, the Allegheny gathers for the Gulf of Mexico waters that fall within a few miles of Lake Erie.


127
122
117
112
107
102
A
B
C
D
E
F
1
2
3
50
45
40
DOMINION OF CANADA
BRITISH COLUMBIA
ALBERTA
ASSINIBOIA
MANITOBA
Manitoba
Vancouver I.
Victoria
New Westminster
Str. of Juan de Fuca
C. Flattery
Port Townsend
MT. OLYMPUS
MT. BAKER
Seattle
Tacoma
MT. RAINIER
MT. ST. HELENS
MT. ADAMS
WASHINGTON
Spokane
Walla Walla
Wallula
Columbia R.
C. Disappointment
Astoria
C. Lookout
C. Foulweather
Portland
Oregon City
Dalles
MT. HOOD
SALEM
Albany
Eugene
MT. JEFFERSON
Umatilla
Baker City
La Grande
BLUE MTS.
John Day R.
Umpqua R.
C. Blanco
Port Orford
Roseburg
Jacksonville
Klamath L.
Goose L.
Malheur R.
Owyhee R.
OREGON
CASCADE RANGE
COAST RANGE
IDAHO
Lewiston
Clearwater R.
Florence
Salmon R.
Pioneerville
Idaho City
BOISE
Boise R.
Snake R.
Silver City
Shoshone Falls
Ft. Hall
MONTANA
Kalispell
Flathead L.
Ft. Benton
Marias R.
Milk R.
Missouri R.
Great Falls
Ft. Buford
HELENA
Butte
Gallatin
Bozeman
Virginia City
Yellowstone R.
Big Horn R.
Tongue R.
Powder R.
Mussell Shell R.
Clark's Fork
Kootenay R.
Boundary Pass
ROCKY MTS.
BITTER ROOT MTS.
NORTH DAKOTA
Souris R.
Devil's L.
Mandan
BISMARCK
Jamestown
Heart R.
Cannon Ball R.
Little Missouri R.
SOUTH DAKOTA
Grand R.
Moreau R.
Aberdeen
PIERRE
Ft. Pierre
Huron
Big Cheyenne R.
White R.
Ft. Randall
Deadwood
BLACK HILLS
WYOMING
YELLOWSTONE NATIONAL PARK
Yellowstone L.
BIG HORN MTS.
UNION PEAK
WIND RIVER MTS.
FREMONT'S PEAK 13,790 FT.
South Pass City
Sweetwater R.
Douglas
North Platte R.
LARAMIE PEAK
Laramie
CHEYENNE
Bridger's Pass
Ft. Bridger
Evanston
NEBRASKA
Niobrara R.
Elkhorn R.
Loup Fork
Platte R.
Kearney
Julesburg
Republican R.
Solomon's Fork
COLORADO
Greeley
South Platte R.
LONG'S PEAK 14,271 FT.
Golden
DENVER
Georgetown
UTAH
Great Salt Lake
SALT LAKE CITY
Ogden
Logan
Utah Lake
Provo City
UINTAH MTS.
WAHSATCH MTS.
Salt Creek
Sevier R.
Sevier L.
Fillmore
Green R.
Grand R.
San Rafael
NEVADA
Humboldt R.
Elko
Eureka
Hamilton
Pioche
Austin
Virginia City
Gold Hill
CARSON CITY
Carson L.
Walker L.
Aurora
Genoa
Pyramid L.
CALIFORNIA
MT. SHASTA 14,380 FT.
SIERRA NEVADA
Eureka
C. Mendocino
Mendocino
Pt. Arena
Marysville
Grass Valley
SACRAMENTO
Vallejo
Stockton
San Francisco
Oakland
San Jose
Monterey B.
Monterey
San Joaquin R.
PACIFIC


UNITED STATES
WESTERN PART.

COPYRIGHT, 1903, BY DODD, MEAD & COMPANY.

The Delaware, Susquehanna, and Potomac are all important rivers which rise in the Catskill-Allegheny Plateau and find their way across the various mountain ridges of the Appalachian system by water gaps, and enter bays due to sinking of land and invasion of old valleys by the salt waters. In the plateau, where the strata are horizontal, the streams are dendritic, or finger-like, in arrangement. Within the mountain belt, the streams are in parts longitudinal, and in part transverse. By thus running between the ridges and cutting through them in water gaps, a rectangular or trellised drainage is formed which is widely found in the Appalachian region. The northern Appalachian waters thus flow mainly to the open Atlantic. In the south, however, or beyond the Potomac, the coastal rivers head in the eastern edge of the mountains, while the Kanawha and the Tennessee, with their branches, head far across the mountains and carry the waters to the Ohio River. The great core of the southern Appalachians, in western North Carolina, so convenient, it would seem, to the sea, is thus drained by a circuitous route into the Gulf of Mexico. The entire belt of Appalachian uplands has for the most part arrived at the stage of mature dissection, with abundant valleys, sunk from 500 to 1500 feet below the prevailing level of the uplands.

Many rivers of local importance rise on the eastern slope of the Blue Ridge, and cross the Piedmont Plateau and the Coastal Plain to the sea. Such are the James and other rivers of Virginia, the Roanoke, Cape Fear, Great Pedee Savannah, and Altamaha of the Carolinas and Georgia. The rivers of Florida are mainly small, but have important tidal courses. The other Gulf drainage is overshadowed in magnitude by the Mississippi. The greater streams aside from this are the Chattahoochee, Alabama, and Tombigbee on the east, and the Colorado (of Texas) and Brazos on the west, and the international Rio Grande, rising in Colorado and New Mexico.

THE MISSISSIPPI RIVER. See MISSISSIPPI RIVER.

PACIFIC DRAINAGE. The Rocky Mountains in Colorado offer the most compact source of important drainage within the United States. To the south they send forth the Rio Grande. To the east flows the Arkansas, while to the north and east pass important branches of the Missouri. From the southwest issues the San Juan, while farther north the Grand, White, and Yampa rivers leave the State. All these join the Colorado River, and thus introduce us to the most southerly of rivers in the United States that reach the Pacific Ocean. Some of the chief facts concerning this river have been given in the description of the topography of the region. Its ultimate sources are in the Wind River Mountains of Wyoming. Thence it crosses the plateau of the southeastern part of that State and passes by a great gorge through the heart of the Uinta Mountain Range. It is here known as the Green River, but becomes the Colorado after receiving the Grand. Thence it threads its greater cañons and crosses the low desert region to the Gulf of California. Not far from its mouth it receives the Gila from the east. The only remaining master stream is the Columbia, with its widespread sources in the Rocky Mountains. These largely belong to its tributary, the Snake River, which after passing the lava plateaus joins the trunk stream in southern Washington. The Columbia has an important tidal course before it enters the ocean, and this and the Saint Lawrence are the only rivers of the United States which receive great accessions to their waters from foreign territory.

The foregoing review has shown how various are the rivers of the United States in their physical features. The Hudson may be taken as the type of that great number of streams, especially on the Atlantic side, which have a tidal course. Within the glaciated district most rivers show serious inequalities in their beds, causing innumerable rapids and waterfalls. Such concentration of descent does not occur elsewhere, save in the mountainous belts. The greatness and destructiveness of floods depends upon rainfall, gradient, the porosity of the rocks or soil, and other features. Thus the Ohio has steep slopes, an impervious bed, and a moist climate, when compared with the Missouri taken as a whole. In its long course across the plains the latter loses by seepage, by evaporation, and by abstraction of water for irrigation.

The rivers exhibit great diversity in relation to human uses. The Merrimac and many other streams within the glacial belt are mainly useful for manufacturing or for water supply. The Mississippi is chiefly of value as a highway, while the Hudson combines transportation, water and ice supply, and the furnishing of power. The Colorado is thus far almost purely scenic in its relation to man, arousing interest by the origin and magnificence of its cañons. A new era of utilization of these American river waters is now being entered upon. See IRRIGATION.

CLIMATE. The greater part of the area of the United States proper has a climate pertaining to the temperate zone. The average annual temperatures vary from somewhat less than 50° on the northern border to 75° in the extreme southeast. The average temperature for July is about 60° on the northern border and for January it is about 20°. The whole country is exposed to much greater annual oscillations of temperature than occur in Europe. The average of the absolute maximum temperatures is as high as 115° to 120° in the drier portions of Texas and Arizona, and the average minimum falls as low as —40° in northern Minnesota. The climate of the United States is controlled very largely by its characteristic winds. In January these are from the west, but in July southeast winds prevail in the Southern States, which penetrate up the eastern slope of the Rocky Mountain range, but finally turn eastward with the westerly winds of the northern portion of this region.

The storm centres that pass across the country originate almost equally on the Pacific Ocean and on the Atlantic. Those that approach from the Pacific move southeastwardly into Kansas and Nebraska and then turn eastward over the lake region; those that come from the Atlantic move westward among the West Indies and turn northward toward the Lower Lake Region; a certain number originate on the southeastern slope of the Rocky Mountains and move northeastward to the lake region. The lake region is, therefore, on the average the stormiest portion of the continent, and indeed of the whole Northern Hemisphere. The passage of every storm centre is accompanied by a shifting of the winds from warm southerly to cold northwesterly, and this, consequently, gives to the interior of the United States its extreme variability of climate, so that even the southern extremity of the country scarcely belongs to the tropical zone. The cold air that flows in behind the storm centres is very dry and the sky is quite clear. Thus originate the so-called anti-cyclones or cold waves which follow each other rapidly, moving southeastwardly toward the Gulf of Mexico, while the areas of low pressure or cyclones move northeast over and beyond the lake region. The absolute annual range of temperature is therefore greatest in the interior of the country, being about 150° in the upper portion of the Missouri Valley and diminishing to 60° in the southern part of Florida and the northwestern part of Oregon. The suddenness with which the air temperature falls is an important consideration from many points of view. Thus changes of 20° in twenty-four hours occur far more frequently in the lake region than in the Ohio Valley, and there again oftener than on the southern coasts.

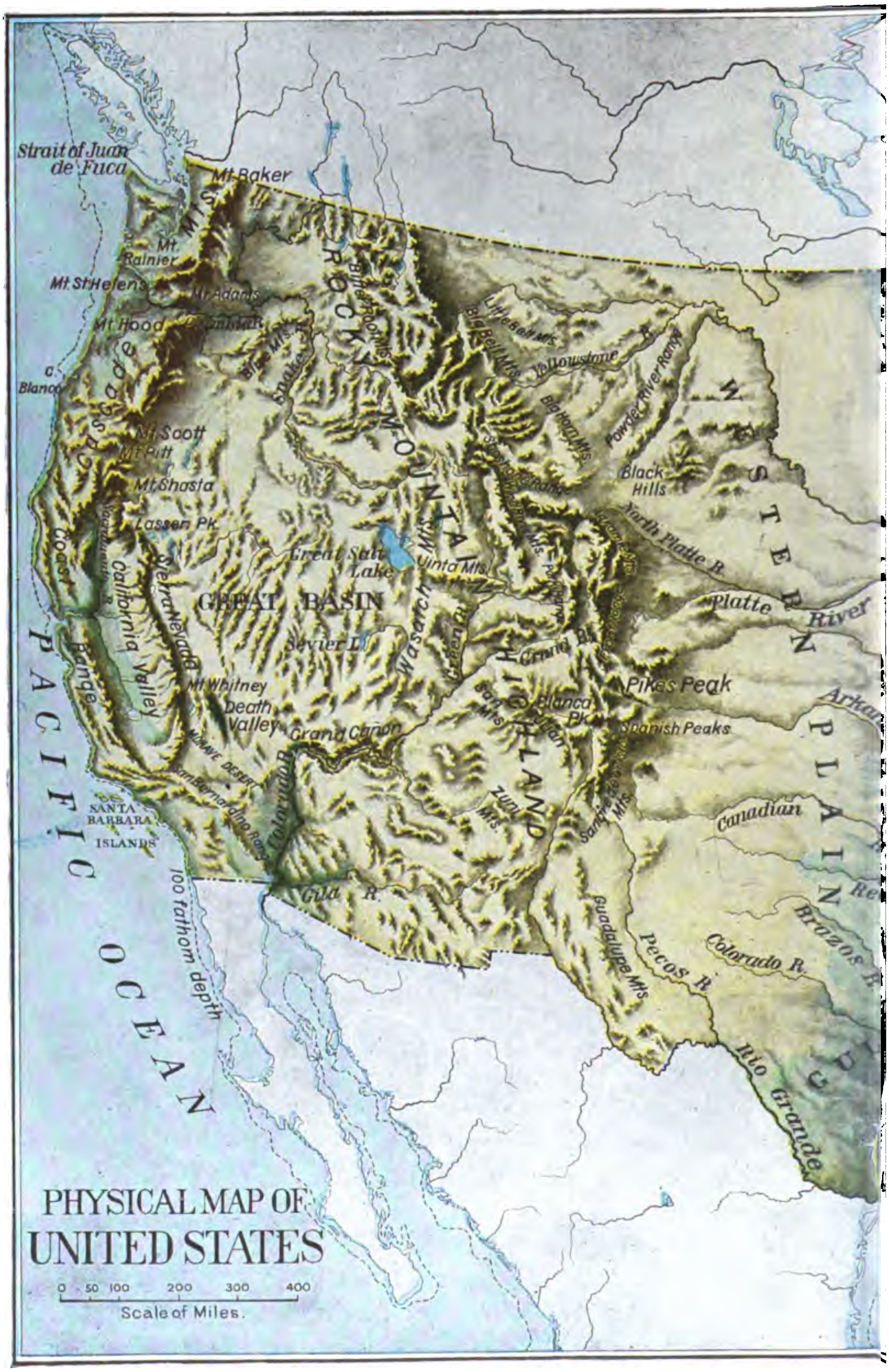
The average date of killing frosts in the spring and autumn determines the average length of the growing season for most of the important crops. The autumnal date is September 1st for the region from North Dakota to Lake Huron, and October 1st for the region from Colorado to Pennsylvania and northeastward along the New England coast. The latest spring frosts occur on May 15th from Idaho to Lake Superior and February 15th along the south Atlantic and east Gulf coasts. The growing season may be considered as the interval between the last frost of spring and the first of autumn, or it may also be defined as the season within which the average daily temperature does not fall below 40°. (See Maps accompanying article FROST.) From this point of view the growing season diminishes as one goes northward and amounts to about 120 days at the northern border of the United States. By a natural process of selection, stimulated by culture, plants that formerly required this length of time for maturity are now pushing northward beyond the borders into Canadian regions where the growing period is as much as twenty days shorter. Mr. Pennywitt of the Weather Bureau has published, in the *Monthly Weather Review* for February, 1901, three charts showing the dates on which the normal daily temperature at any place equals the annual mean at that place. There are two such dates for each station, dividing the year into the warmer half and the colder half. These are not quite the dates of frost, but generally come earlier than the frost in spring and later in autumn. His chart reveals the interesting fact that in general over the United States the warmer portion of the year is decidedly longer in duration than the colder season. This difference is greatest on the eastern slope of the Rocky Mountain range, and increases from thirty days in Texas and Kansas to forty-eight days on the northern border of Montana and probably increases somewhat as one goes north into Canada.

One of the most notable features in the climate of the United States is the great contrast between the Atlantic and Pacific coasts. This is due to the fact that the cold, dry air following each area of low pressure is confined in its movement southward between the Rocky Mountains and the Appalachian ranges. Occasionally dry, cold air descends from the north or northeast upon 'The Great Valley' of California with disastrous consequences, but in general the Pacific coast is under the influence of south and west winds, which bring abundant winter rains to northern California, Oregon, and Washington without severe cold weather. On the Atlantic coast the winter rains and snows are followed by very cold weather. The contrast between the mean temperatures on the immediate coast of the United States in January and July are shown in the following table. The temperatures here given are as read off on charts of isotherms, and refer to locations on the land at sea level near the shore. These temperatures are controlled largely by the prevailing winds and the adjacent oceans:

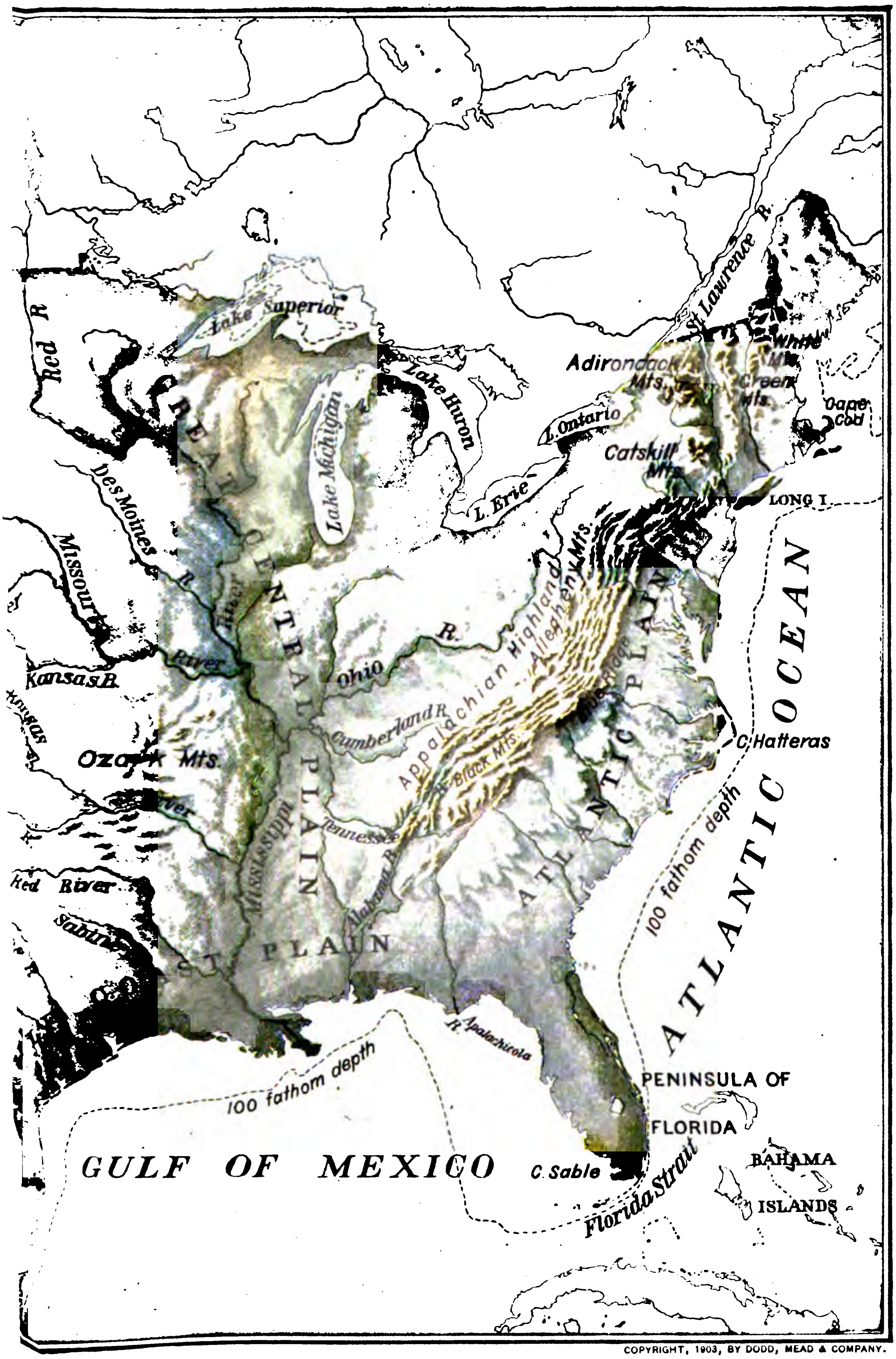
LATITUDE NORTH	January			July		
	Atlantic Coast	Pacific Coast	A—P	Atlantic Coast	Pacific Coast	A—P
50°	14°F.	41°F.	—27°F.	57°F.	55°F.	+ 2°F.
48	20	39	—19	58	57	+ 1
46	21	39	—18	61	59	+ 2
44	25	42	—17	64	59	+ 5
42	32	45	—13	68	59	+ 9
40	36	47	—11	75	57	+18
38	39	49	—10	75	57	+18
36	42	51	— 9	75	59	+16
34	47	54	— 7	76	62	+14
32	50	54	— 4	79	68	+11
30	58	56	+ 2	79	70	+ 9
28	60	60	0	79	75	+ 4
26	66	66	0	80	79	+ 1
24	71	68	+ 3	81	80	+ 1

Of course a similar great contrast prevails between the temperatures on the east side of Asia and west side of Europe, but nothing like this occurs in the Southern Hemisphere, owing to the presence of the great southern ocean and the small area and low altitude of the lands.

Another striking peculiarity in the climate of the United States is the great contrasts of dryness and rainfall. The heaviest precipitation and also a fairly uniform humidity prevail on the coast of Oregon and Washington; next to this are the humidity and rainfall of the coasts of Florida and the adjacent States. Throughout the Mississippi Valley and along the Atlantic coast from Cape Hatteras to Nova Scotia there are great fluctuations in moisture and evaporation. On the average the driest portion of the continent extends from southern California and Arizona eastward over the eastern slopes of the Rocky Mountain region. Not only is the rainfall here a minimum, but the humidity of the atmosphere is also very small and the proportion of the clear sky very large. Yuma, in Arizona, Santa Fe, in New Mexico, and Pueblo, in Colorado, have mean annual relative humidities of 43, 45, and 46 per cent. respectively. The amount of evaporation from the soil is correspondingly large in these regions, and artificial irrigation is quite essential for successful agriculture. Even the summits of the mountains of this portion of the continent show but little permanent snow, and that in sheltered spots. What would remain on the ground in an ordinary, moist climate is rapidly evaporated in this dry air. See map showing average annual relative humidity in the



Lowlands, below 1,000 Feet elevation, are shown in Green.



COPYRIGHT, 1903, BY DODD, MEAD & COMPANY.

Highlands, above 1,000 Feet elevation, are shown in Buff.

United States, accompanying HUMIDITY. See METEOROLOGY; CLIMATE; STORM.

FLORA. The flora of the United States, when compared with that of Europe, is characterized by a far greater variety and wealth of species. This is especially noticeable in the trees, of which there are about 400 species in the United States, representing nearly all the European genera besides a considerable number of genera unknown in Europe, such as the hickories, magnolias, tulip tree, sassafras, liquidambar, and sequoia. Within the United States one finds also great differences between the various sections of the country, not only the natural differences due to climate as one passes from south to north, but also still more remarkable differences between the eastern and western sections. The latter are of course due in part to climatic variations, but in a large measure they are also due to the geological and topographical isolation of the East and West. Many of the most common trees, shrubs, and herbs of the Eastern States are unknown on the Pacific Coast, some of them being not even represented by cognate species. On the other hand, most of the characteristic species in the West are absent in the East. It is in the East that one finds the greatest local variety in vegetation, hundreds of widely different forms growing in luxuriant profusion side by side within narrow areas, while in the West there is much greater uniformity, immense areas being almost monopolized by a single species or at least a single type. The Eastern section is also the great forested area of the country. West of of the Mississippi the forests rapidly disappear as one approaches the Great Plains, and reappear only on the mountains. Indeed, in the entire Western half of the country, with the exception of the northern part of the Pacific Coast, the forests are confined to the mountain slopes above a certain altitude, all the great valleys and lowlands being treeless except where irrigated by natural or artificial means.

Considering the country somewhat more in detail, one finds that it has been variously divided into floral regions. Under one of the most convenient and widely accepted systems the country is treated as belonging to eight such regions. Two of these are tropical, southern Florida and southern Texas, the latter being regarded botanically as a part of Mexico; two are subtropical or austral, the Southeastern Coast Region including the coast States from Texas to Virginia, and the Californian Region; the remaining four are temperate or boreal in character, namely, the Appalachian Region, including all the northeastern States north of the Southeastern Coast Region and east of the Mississippi; the Prairie or Great Plains Region, stretching from central Texas northward between the Mississippi and Rocky Mountains; the Rocky Mountain Region, included between the Great Plains and the Sierra Nevada-Cascade Range; and the Cascade Mountain Region, including the northern half of the Pacific Slope.

The flora of southern Florida is closely related to that of the West Indies and more remotely to that of South America. It consists largely of mangrove and cypress swamps and palm woods, with a profusion of vines and epiphytes, and including about 400 tropical species not found in any other part of the country. Southern Texas is a semi-desert area in which the mesquite and cacti predominate. The Southeastern Coast Region is characterized by large belts of pine forests in which the chief species are the long-leaf, short-leaf, and loblolly pine, as well as junipers, cedars, arbor-vitæ, and swamp cypress. The palmetto, the northernmost American palm, ranges as far as North Carolina. Other characteristic plants are the magnolia, live oak, and a number of evergreen angiosperms, as well as hickories and other trees common to the North.

The Appalachian Region has probably the most varied and luxuriant vegetation of all regions within the strictly temperate zones. This is due partly to the abundant rainfall coupled with the great and prolonged summer heat, partly to the fact that in this region a large number of Miocene plants survive side by side with the more recently evolved species. This is the great region of deciduous forests, and the one which contains nearly all the representatives of the European genera of trees, the oak, maple, ash, chestnut, elm, walnut, linden, poplar, beech, birch, etc., besides the strictly American trees, among which the tulip tree (*Liriodendron tulipifera*) is perhaps the finest and most characteristic example. Coniferous forests in this region are chiefly confined to higher ground, and the higher Appalachian Mountains have almost a typical Canadian flora, with their forests of hemlock, white pine, fir, mountain ash, and yellow birch. The undergrowth is also richly developed in this region, both in the mountains and lowland, and displays a wealth of vines and exquisite flowers, such as rhododendrons, honeysuckles, mountain-laurels, viburnums, and dogwoods. In the Great Plains Region the prevailing type of vegetation is the herbaceous, with grass predominating, but variegated with asters, sunflowers, and a number of other similar plants, while cottonwood and willows grow along the streams. In the Western plains the grasses give place to the sage-brush, and in the South, on the Llano Estacado, and in southern New Mexico and Arizona, to yuccas and cacti. In the Rocky Mountain Region the flora of the drier plains is extended into the valleys and lower plateaus, while the mountains are covered with coniferous forests. See paragraph *Flora*, under ROCKY MOUNTAINS.

The Californian Region, being protected by the lofty Sierras from the immigration of Eastern plants, has a flora unique in its numerous endemic genera and species. The forests, which, except in the north, are confined to the mountain slopes or the great central river valley, are almost wholly coniferous, and are especially remarkable for their gigantic trees. The giant sequoia, which grows nowhere else, ranks with the Australian eucalyptus as the largest forest tree on the globe. Enormous size is attained also by the redwood (*Sequoia sempervirens*), the sugar pine (*Pinus Lambertiana*), the Douglas spruce, and the giant cedar. The non-coniferous trees in California are not numerous, and are largely evergreen. There are several oaks, but few of the other Eastern trees. The Cascade Mountain Region is a northward continuation of the Californian Region, but differs from it in the absence of the sequoia and of the evergreen angiosperms, while deciduous trees are still more rare. The forests are of yet greater extent than in California, and reach down to the coast. The Douglas spruce, Western hemlock, noble fir, and giant cedar reach here their finest development. See FORESTRY.

FAUNA. The fauna of the United States is an integral part of that of the Nearctic Province (q.v.), and is fully representative of that of North America described in the paragraph *Fauna* under AMERICA. (See also DISTRIBUTION OF ANIMALS; and *Fauna* under ROCKY MOUNTAINS.) With the exception of a few strictly boreal species, such as the musk-ox (q.v.), almost all the genera and species of North American animals of every kind are represented within the boundaries of the United States and its adjacent waters; and most of the Arctic absentees are found in Alaska (q.v.). Reference to the articles cited above and to such articles as BEAR, BEAVER, BISON, DINOSAURIA, EAGLE, EXTINCT ANIMALS, FUR-BEARING ANIMALS, FOSSIL, GROUSE, HORSE, OYSTER, PRONGHORN, PUMA, QUAIL, RATTLESNAKE, SALMON, SKUNK, TURKEY, WHALE, WHITEFISH, and others, will give a conspectus of the fauna of the country.

GEOLOGY AND SOILS. North America, like other continents, combines very ancient areas with those that are geologically young. The primitive framework of the continent was drawn somewhat upon the lines of the existing mountain systems of the east and west, forecasting the Appalachian and Cordilleran uplands and the Mississippi lowlands of to-day. The oldest rock systems are known as Archæan and Algonkian. They are represented to the northward by an irregular V-shaped area inclosing the Hudson Bay between its arms, and resting its blunted apex upon the north border of the Great Lakes. Extensions of this early nucleus are found along the Appalachians to Alabama, and consist of hard crystalline rocks of igneous and metamorphic origin, granites, gneisses, schists, marbles, and quartzites being among the common kinds. Such areas are the Adirondacks, some tracts in New England, the Highlands of the Lower Hudson and of New Jersey, South Mountain in Pennsylvania, with the Blue Ridge and Unakas of the Southern States. Other primitive masses are found in Wisconsin and Minnesota and form a straggling archipelago in the West, as in the core of the Black Hills, along the axis of the present Rocky Mountain Range, and in the Wasatch and Sierran regions. It must not be thought, however, that the present boundaries of these belts of ancient rock mark the shores of the ancient islands, but the lands now belonging to the United States began thus in narrow strips and patches, east and west.

The next younger but still very old formations belong to the Paleozoic era. This interval of geological time was very long, and includes an extended succession of periods, with their subdivisions or epochs. The rocks of the Cambrian, or earliest of these periods, are mainly sandstones, conglomerates, and shales, and are found in limited outcrops about the borders of the Archæan and Algonkian. The Ordovician, Silurian, Devonian, and Carboniferous formations, on the other hand, cover wide areas, especially in the Eastern United States. They constitute the bed-rocks of a region extending from the Archæan axis of the Appalachians, beyond the Mississippi River, reaching into eastern Nebraska, central Kansas, and far into Texas. From the Great Lake region they are found southward to middle Georgia and Alabama, but do not appear along the Mississippi south of the Ohio River. Thus at the close of the Paleozoic era the territory of the United States was a semi-continent on the east, sending lobate areas southward, with the Mississippi embayment between them. There was also rock accumulation and land growth in the Cordilleran region, but it still held a group of islands rather than a continental area. The largest western lands of Paleozoic age are in the region of the Great Basin, but the regions of the Colorado plateaus and of the coastal Pacific States were still sea, the Rocky Mountain belt was a chain of islands, and an unhindered sea swept from the tropical waters to the Arctic.

The Paleozoic era closed, in North America, with what is known as the Appalachian revolution, that is, with the disturbances which created the great series of folds which now extend from eastern New York to central Alabama. There had long been mountains in the east, as the Adirondacks and Blue Ridge. What their height may have been is not known. During Paleozoic time also the Green and Berkshire ranges of New England were formed. But there were then no mountains west of the Blue Ridge. During all the periods of the Paleozoic era, the waste of the older lands on the east and north was swept into an interior sea that ranged from central New York far to the west and southwest. Thus originated the sandstones, shales, and limestones of the Cambrian and succeeding periods, to which reference has been made. Along the old Appalachian border these formations acquired a thickness of several miles. In the mountain-building which ensued, these thick beds were crumpled and built into a range of high mountains. These mountains, having wasted away during the long periods which have since elapsed, leave to the United States the low ranges found now in Pennsylvania, and west of the Blue Ridge in Virginia and more southern States. With the building of the mountains there was a general uplift in the east, which permanently banished the sea waters from the eastern and central States of the Mississippi basin, except in the south.

During the Mesozoic era and the succeeding Tertiary period, the additions to the land areas of the east were confined to the Atlantic border and the Gulf region. From the enlarged lands of the east, following the Appalachian uplift, materials were available for further extension. In the west the growth was interior as well as on the border, and these later times are marked by the filling in of partially inclosed seas, and by retreat of waters, due to massive continental uplift. Thus gradually the western interior sea of the Great Plains region disappeared (as did that of the Colorado basin), and the Pacific shore line was pushed to its present position.

Some of the important episodes of Mesozoic and Tertiary continental evolution may now be noted. The eastern border region has a series of areas of red and brown shale and sandstone, of Triassic age. These formations underlie the lowlands of the Connecticut Valley in Massachusetts and Connecticut. Another belt extends from the Palisades of the Hudson into Virginia, and there are other and smaller areas. Associated with these rocks are the lava sheets which form the Orange Mountains of New Jersey, the Palisades of the Hudson, and the Mount Holyoke range of Massachusetts. These rocks are known as the Newark formation and were not accumulated in the open sea, but in brackish or fresh waters, in basins whose character is little known. The Cretaceous and Tertiary beds of the Atlantic border form southern New Jersey, and the outside lowlands of all the States southward to Florida, and make the coastal plain of this region. They slant gently down and become continuous with the beds that lie below the marginal waters of the Atlantic. Owing to their comparative recency, they are often partially or wholly unconsolidated and occur as sands, gravels, clays, and marls. But they may consist also of well-indurated sandstones and limestones.

Similar statements may be made concerning the formations and the lands that border the Gulf. Here belongs the entire State of Florida, which is already given. It is low not because of denudation, but because of gentle and limited uplift of the undisturbed and youthful strata which lie beneath its surface. As has been intimated, the ancient Mississippi discharged, not far from the present mouth of the Ohio, into a gulf that thus lay between south-reaching lands on the east and west. Its successive burdens of land waste served gradually to fill the embayment, and its delta reached more and more to the south, encroaching, as it is still, upon the Gulf.

Mesozoic deposits of Triassic, Jurassic, and Cretaceous age are found along the eastern base of the Rocky Mountains, where they are upturned at various angles, as in the vertical or highly inclined strata of the Garden of the Gods. Eastward, at a little remove from the mountains, these beds, which have yielded perhaps the most remarkable series of fossil vertebrate remains that have been obtained in any country, become horizontal and are often covered with still younger stratified formations, which all together make the underlying masses of the Great Plains. The breaking and upturning of the strata seen in the Rocky Mountain foothills points to the main uplift of these mountains which took place at the close of the Mesozoic era.

After the Rocky Mountain revolution, the Great Plains area ceased to be a region of salt-water deposition and was characterized by swamps, and great lakes of brackish or fresh water. The Laramie formation belongs to this era of low-lying lands in that region when the sea was excluded, and some of the largest coal deposits of the West were accumulated in the marshes of the time.

Over many thousands of square miles in Colorado, Kansas, Wyoming, and Nebraska are sheets of incoherent or partly consolidated gravels, sands, and clays, which have usually been attributed to sedimentation in such lakes. It is probable, however, that in part, at least, these beds are due to torrents carrying down enormous volumes of waste from the mountains and distributing it in their wanderings over the plains. Present conditions were not approached in this region until the late Tertiary. By that time the entire belt, including the plains and Rocky Mountains, had received a massive uplift, by which the lakes were drained, and the plains given an eastward slant, from altitudes of 5000 to 6000 feet at the base of the mountains, to the low prairies west of the Mississippi River.

The rocks of the Colorado plateaus consist of some thousands of feet of sedimentary beds of Mesozoic and younger rocks, overlying a Paleozoic and Archæan foundation. The Colorado River furnishes a great natural section, since for some distance it has sunk its channel through the Paleozoic strata and cut far down into the basal granites. Like the Great Plains, it was long a region of marine deposition, followed by lakes and streams as the lands emerged. Here, too, great and widespread uplifts took place, in which the strains were so great as to produce profound fractures and dislocations or faults, and attended at times by large outflows of lava. These upflows sometimes stopped below the surface, and domed up the overlying strata, making a kind of mountain known as laccolithic, of which the Henry Mountains, in Utah, are the type. Largely by such faults, running in a north and south direction, the ancient strata of the Great Basin have been cut into large blocks, and so tilted that the higher edges of the blocks make the parallel ranges of Utah and Nevada.

The initial uplifts of the Sierran mountain belt were made in Mesozoic time, and the strata involved were formed from the waste of the older lands in the present Great Basin region to the eastward. But it was not until late Tertiary time that the entire block or mass of the Sierras was lifted to a great height and tilted to the west. In connection with this uplift a lofty fault scarp developed, which now forms the steep eastern front of the mountains. This crest, therefore, is toward the east, and the principal drainage is down the gentler western slope into the valley of California. The Sierras continue northward as the Cascade Mountains of Oregon and Washington. The Willamette Valley in Oregon and the Puget Sound Valley in Washington are the analogues of the valley of California, and they are separated from the ocean by a young range of mountains, known in its various parts as the Coast Range, the Klamath Mountains, and the Olympic Mountains.

Thus it appears that the Western United States have had a composite history. It began with island nuclei which grew by sedimentation and uplift. The several great ranges of mountains mark several periods of folding, faulting, and uplift, while both mountains and plains rose by massive and wide-ranging or continental movements, thus adding to the height of the mountains and making the plains into plateaus of from 3000 to 8000 feet in altitude. With these disturbances, especially in Tertiary times, were the most extensive outflows of lava of which this continent shows any record. These are found either as remnant sheets and volcanic necks, or as vast sheets scarcely changed since their outflow. They occur in nearly every Cordilleran State, as on both sides of the Rocky Mountains in Colorado, in New Mexico, in Utah, in Mount Shasta, and the great cones of the Cascades, and especially in the lava plateaus of the Snake and Columbia rivers in Idaho, Washington, and Oregon. As a lingering episode of their interior volcanic energy we may, perhaps, recognize the geyser phenomena of the Yellowstone Park.

Through all the periods which have been passed in review, the process of land sculpture was active and all varieties of relief have been shown, even in the same area, in successive cycles of denudation and uplift. Thus New England is everywhere mountainous in structure, although much of its surface is now reduced to hills, and to valleys whose bottoms are not far above base level. The Connecticut Valley, as it now exists, is rather a product of downwear along its course than of uplift on its sides. The same is true of the Hudson, and, indeed, of all the valleys of the Appalachian region. Much of the Archæan core of this Eastern mountain system is well worn, like the coastal parts of New England. Such a region is the Piedmont belt of hills and low mountains lying between the Blue Ridge and the coastal plain in the South Atlantic States. So, too, the Appalachian Mountains of post-Paleozoic age were perhaps raised to Alpine heights, but have been greatly reduced and given their present relief of ridge and valley by processes of wasting and the survival of more resistant formations.

The strata of the Mississippi basin have for the most part never been raised to considerable heights, and the streams have not had sufficient vigor to be the instruments of largest denudation. But among the mountains and plateaus of the Cordilleran region the land forms owe their reliefs to long continued denudation, conditioned by the composition and structure of the rocks. For example, in the Grand Cañon region, or more broadly, everywhere among the Colorado plateaus, vast thicknesses of the upper strata have been bodily removed. Those that remain present south-facing escarpments of ragged outline, and their masses are in turn profoundly dissected by the swift river and its branches. The true measure of denudation is not the cañons, however, but the amount of stripping that has been accomplished over the whole region. Similarly, the lava sheets have been deeply channeled, as by the Snake River, or have often been nearly removed, and volcanic cones are in all stages of decay, from the little marred Mount Shasta to the 'necks' that mark the complete disappearance of overlying cones.

The principal reliefs were given to the country prior to the glacial invasion. But within the field of glacial movement important changes were effected, and in some cases the combined effect of the wearing of hill and mountain tops, and of the filling of valleys, was to diminish the total relief by several hundred feet. The territory affected includes all of New England, the Middle States into northern New Jersey, and Pennsylvania, and the Central States to lines not far from the Ohio and Missouri rivers. Eastern Nebraska was included, with much of the Dakotas, Montana, and the more northern Cordilleras. Small remnant glaciers are still found in the high Sierras, on the volcanic cones of the Cascades, and in Montana and Colorado. The general effects of the ice sheet were the grinding and transport of rocky waste, coarse and fine, the commingling of this material with the preëxistent soils, the formation of moraines and other bodies of drift during retreat, the blockading of ancient valleys causing innumerable changes of drainage, and the formation of thousands of lakes.

Since the departure of the ice, or during post-glacial time, many of the smaller or more shallow lakes have been filled by sediment, or by deposits of vegetable origin, sometimes forming beds of peat. In the larger lakes deltas and marshy areas have been formed in the same manner. The interrupted streams have resumed their flow along the lowest line of levels that they could find, and in so doing have often cut through the veneer of drift and worn deeply into the underlying rock. This is the origin of most of the gorges of the Northern States. They are young, post-glacial valleys, and the old, buried channels are often to be found not far away. These conditions have not only produced striking scenic results, in the gorges and waterfalls of the Northern States, but have created nearly all the available water power of the same region. Before the ice invasion many streams flowed at lower levels, in the deep and mature valleys of the time. But the obstruction of these valleys has compelled the streams to flow at greater altitudes, and the rocky masses and spurs encountered in their downcutting have caused a concentration of descent in rapids or falls, and thus have made the streams a source of power, while at the same time obstructing the otherwise open ways of commerce.

The soils of the country may roughly be divided into two classes by virtue of their origin. Outside of the glacial region they are known as residual soils, being in the main the product of the local rock disintegrating in place. In this case the more soluble minerals, such as calcium carbonate, have largely been removed. The chief movements of such soils have taken place along the course of rivers and by means of them. The soils of the Lower Mississippi are an illustration of this latter phase, having been gathered from all parts of its basin. The remaining soils are glacial. The ice sheet invaded the residual soils of pre-glacial time, plowed them up, pushed them forward greater or less distances, and thoroughly mingled them with materials often coarse, and mechanically derived from the rocks lying in the track of the glacier. These soils, therefore, partake of the variety of the numerous rock masses from which they have been derived.

FISHERIES. The United States fishing industry originated in New England shortly after its settlement, and was gaining considerable prominence until England attempted to place restrictions upon it. It also was seriously damaged by the War of 1812, as well as by subsequent conflicts between American and British interests. The extermination of certain species of fish has at various times seemed probable, due to a lack of definite knowledge regarding the habits of the animals, and the fact that there were no limitations placed upon the number which could be captured. Measures have of late years been enacted which to a large extent have obviated these difficulties. (See FISHING LAWS.) The United States Fish Commission, by its establishment of hatcheries and its investigations and experiments, also, has aided greatly in the development of the industry. (See FISH; FISHERIES; and FISH CULTURE.) The chief centres of fisheries are naturally those States bordering upon the Atlantic, Pacific, and Gulf coasts and Great Lakes, the Mississippi Valley, and Alaska. The following table shows the status of the industry for the years 1880, 1890, and 1900, the figures for 1900 being estimates based on the latest reports of the United States Fish Commission:

YEAR	Number of persons employed	Invested capital	Value of products
1880	131,246	$37,955,349	$42,740,163
1890	163,348	43,602,123	44,277,514
1900	213,000	71,600,000	46,500,000

In the New England States the principal products are cod, halibut, and mackerel. Massachusetts leads in the value of products, while Maine has the greatest number of persons engaged in the industry. Maryland ranked first among the Middle Atlantic States which are especially concerned in oyster and shad fishing. Shad and oysters are also the leading fish products of the South Atlantic States. The Gulf States produce oysters and sponges. Among the Gulf States Florida holds first place in the fishing industry. Of the fish output of the Pacific States, about half is represented by salmon. Herring, lake trout, and yellow perch are the leading products of the Great Lakes division. The period of greatest development in this region was from 1880 to 1885, when the number engaged in the industry and the value of the production increased 100 per cent. The yield of the Mississippi Valley exceeds in quantity and nearly equals in value the combined production of the remaining interior waters of the United States, except the Great Lakes. Buffalo-fish, catfish, and German cod are especially plentiful. Alaska is the centre of the fur-seal industry, and is also noted for its large number of cod, halibut, and other deep-sea fish. (For further details, see the several State articles; the articles on WHALE, SEALING, etc.; and also articles on the various fish species: COD, MACKEREL, MENHADEN, etc.) The exports of fish and fish products have greatly increased in value since 1870, but during the period 1890 to 1902 they remained practically stationary. The value of the exports in 1902 was $7,705,065. Europe was the destination of over half the output. Canned salmon formed the largest single item. The value of the imports of fisheries has increased from $5,457,785 in 1892 to $8,527,097 in 1902. The largest part of the import trade is with Canada. The main items of importation are pickled herring and dried cod in the cured list, while lobster is the chief product in the class of fresh fish. In the census year 1900 there were 348 establishments concerned in fish curing, packing, and canning. The total value of their product was $22,253,749. The curing of cod, herring, and mackerel, the canning of sardines in the New England States, and salmon-packing in the Pacific States are the leading fish interests in the United States.

MINING. Prior to the nineteenth century the mining industry in the United States was quite insignificant, and it was not until nearly 1850 that it began to be important. Since that period the industry has developed with a rapidity equal to that of manufactures and transportation. It is significant that the production of the mines constitutes over one-half of the total freight tonnage handled by the railroads. In 1902 the United States had advanced to first rank in the production of most of the useful minerals, and the total value of the combined mineral ouput was far greater than that of any other country. The growth of the industry since 1880 is seen in the following table:

YEAR	Metallic products	Non-metallic products
1880	$190,039,865	$173,279,135
1890	305,872,422	312,776,503
1897	302,531,147	327,655,427
1901	524,873,284	566,351,096

To the above should be added an unspecified sum amounting in value to $6,000,000 in 1880, and to $1,000,000 in each of the other years given. The total mining output for 1901 was valued at $1,092,224,380. The United States probably has more mineral lands in proportion to its total area than any other country. Nearly every mineral that is needed in the arts is mined.

COAL. Coal is the most widely distributed mineral and is far in advance of any other in the annual value of its output. It is regularly mined in thirty States. (For localization of coal areas, see article COAL.) The area of the coal fields, not including those occurring in the Rocky Mountains and Pacific Coast States, is about 220,000 square miles. Of this only a small portion consists of the anthracite variety, which is almost wholly confined to the middle-eastern portion of Pennsylvania. Authorities have not attempted to estimate the probable duration of the supply of bituminous coal, but it has been estimated that the anthracite would last at the present rate of consumption one hundred years. Bituminous coal mining began regularly in 1750, while anthracite mining did not begin until fifty years later. The production of each was very small for a number of years. The rapid growth of the industry did not begin until after the Civil War. From the following table it will be seen that the output of bituminous coal has doubled for each decade since 1870. The output of anthracite was five times as great at the end of that period as at the beginning. The total production of coal in short tons in 1870 was 33,003,315; in 1880, 73,647,997; in 1890, 156,073,611; in 1900, 293,298,516. The following table shows, in short tons, the production of coal in the ten leading States in the years 1870, 1880, 1890, and 1901:

In 1866 Great Britain produced six and one-

STATES	1870	1880	1890	1901
Pennsylvania (anthracite)	15,650,275	26,249,711	46,468,640	67,471,668
Pennsylvania (bituminous)	7,798,517	21,280,000	43,302,173	82,305,946
Illinois	2,624,163	4,480,000	15,274,727	27,331,552
Ohio	2,527,284	7,840,000	13,203,522	20,943,807
West Virginia	618,878	1,404,008	6,002,800	24,068,402
Alabama	10,999	380,000	4,090,409	9,099,052
Maryland	1,819,824	2,692,497	3,357,813	5,113,127
Iowa	263,487	1,792,000	4,021,739	5,617,499
Colorado	4,500	375,000	3,075,781	5,700,015
Indiana	437,870	1,680,000	3,305,737	6,918,225
Kentucky	150,582	1,120,000	2,483,144	5,469,986

half times as much coal as the United States. In 1899 it was surpassed for the first time by the United States, and in 1901 the United States led by 42,790,730 tons. American coal is more easily mined than the coal of most countries, and the product sells at the pit cheaper than pit coal sells in any other part of the world. The total value of bituminous coal in 1901 was $236,201,899, and of anthracite $112,504,020. It will be seen from the above table that the Appalachian region has always contributed the bulk of the product. In spite of the enormous absolute gain in Pensylvania, its relative importance has declined. West Virginia and Alabama are two of the fastest developing coal-mining States. The greater development of the Appalachian region is not due to the greater abundance of resources, although the quality of the Eastern product is generally superior to that of the West. It is due rather to convenience to the market. The thickly populated region to the north and east of Pennsylvania is without coal, and a large part of the anthracite product is consumed in that region for household purposes. Pennsylvania is also the most convenient coal-producing State so far as nearness to the industrial centre of the country is concerned, and a large part of its bituminous product is consumed in its own large iron manufacturing and railroad establishments. Its proximity to the shipping facilities of the Ohio River early gave it a command over the markets reached by the Ohio and Mississippi waterways. The want of a local market and the lack of railroad facilities have been against the development of the southern Appalachian coal region.

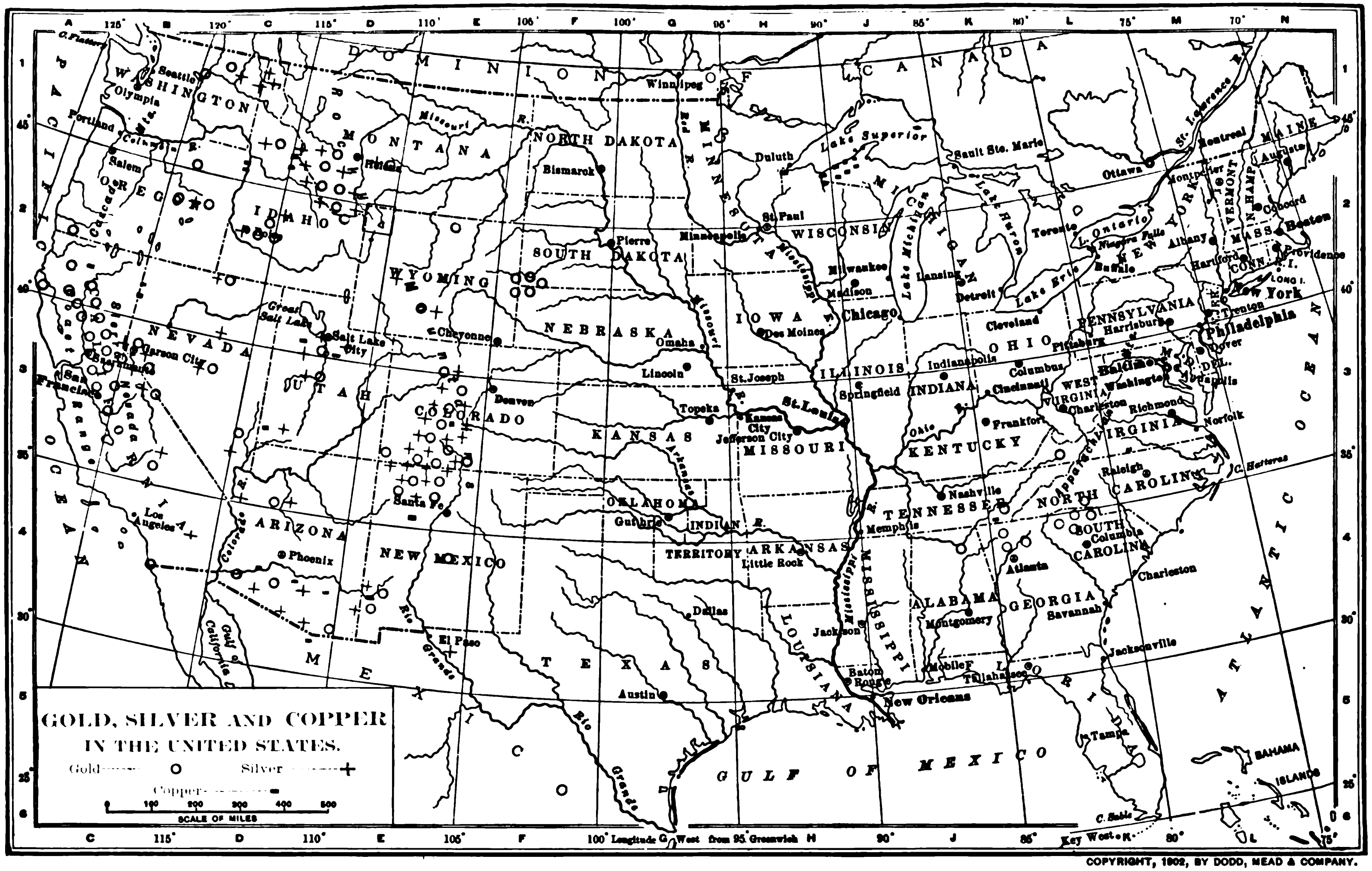
Petroleum. The production of petroleum began in western Pennsylvania in 1859. The United States soon became the chief source of the world's supply of this article. The recent development in Russia, however, has since 1897 placed that country ahead of the United States in rank. The production of the country increased slowly to 6,293,194 barrels in 1872, and then more rapidly to 45,823,572 barrels in 1890, and 69,389,194 barrels in 1901, the value in the last year being $66,417,335. The output in Pennsylvania reached its maximum in 1891, when it amounted to 33,009,236 barrels. Since that year the product has declined in that State until in 1901 it was only 12,625,378 barrels. About 1886 Ohio came into prominence in the production of petroleum, the output advancing rapidly to 17,740,301 barrels in 1891, and 21,648,083 barrels in 1901. The petroleum industry began early in West Virginia, but did not develop rapidly until in the last decade of the nineteenth century, the output increasing from 492,578 barrels in 1890 to 14,177,126 in 1901. The industry also developed slowly in California until 1899, increasing its output more than twofold in the following two years, the product in 1901 being 8,786,330 barrels. The production in Indiana did not begin until 1889, but has advanced steadily until 1901, when it amounted to 5,757,086 barrels. The last State to develop its resources of petroleum is Texas, the output having advanced from 50 barrels in 1895 to 4,393,658 barrels in 1901. In 1902 and 1903 important discoveries were made in Louisiana which is destined to become a large producer of petroleum. See Map under Petroleum.

Natural Gas. Natural gas has been extensively exploited in some parts of the United States in recent years. It began to come into use in western Pennsylvania after 1875, and by 1880 the value of the product for that State was estimated at $19,282,375. The production then declined until its value was less than one-third this amount, but revived during the four years ending with 1901, the production in that year being valued at $12,688,161. After 1885 Ohio and Indiana began to produce large quantities, but there was an early decline in Ohio, the value of the output in that State in 1901 being only $2,147,215, while Indiana more than held its own, the value for the same year being $6,954,566. Since 1895 extensive developments have occurred in Kansas and West Virginia. The total value of the natural gas for 1901 was estimated at $27,067,500, an amount twice as great as the reported value for 1897.

Iron. Iron-mining ranks in importance next to coal, iron ore, like coal, being very widely distributed in the United States. In 1901 25 States reported its production. The mining of iron began in early colonial days and it was the first mineral mined in the country. However, it did not rise into importance until near the middle of the nineteenth century. From a total output in that year of 1,560,442 long tons there was a steady increase to 5,250,402 long tons in 1870, 16,276,584 long tons in 1890, and 28,887,479 long tons in 1901, valued at the mines in the last-named year at $49,256,245. The production of pig iron exceeded that of Great Britain for the first time in 1890, and in 1902 was over twice as great, and equaled the combined output of Great Britain, Germany, and Belgium. Of the total output in 1901 the red hematite variety amounted to 24,006,025 long tons, brown hematite 3,016,715, the magnetite 1,813,076, and the carbonate 51,663 long tons. The Lake Superior ore is almost wholly of red hematite variety. The Virginias are the largest producers of brown hematite. Pennsylvania and New Jersey yield the largest quantities of magnetite. Alabama and Tennessee produce considerable quantities of both red and brown hematite. Prior to 1870 Pennsylvania was the chief iron-producing State, and yielded in that year 44 per cent. of the total product. This and other States east of the Appalachian Mountains produced 62 per cent. of the output for that year. Since then other regions have so far outstripped Pennsylvania and other Eastern States that the

PRODUCTION OF IRON IN LONG TONS

	1850	1870	1891	1901
Minnesota	....	....	645,105	11,109,537
Michigan	2,700	859,507	6,127,001	9,654,067
Alabama	1,838	11,350	1,986,830	2,801,732
Pennsylvania	877,283	2,337,286	1,272,928	1,040,684
Virginia and West Virginia	67,319	84,108	665,116	925,394
New York	46,385	446,945	1,017,216	420,218



GOLD, SILVER AND COPPER IN THE UNITED STATES.

COPYRIGHT, 1902, BY DODD, MEAD & COMPANY.

latter have become comparatively unimportant, as will be seen in the preceding table.

To this should be added in 1901 Wisconsin and Tennessee each with over 700,000 tons, and Colorado and New Jersey with over 400,000 tons each. The development of the Lake Superior iron region is one of the most significant of recent industrial movements in the United States. It has been rendered possible largely through the advantage afforded by the Great Lakes for transportation. With the improvement of the canals connecting the lakes and the increased tonnage of vessels there has been a resulting decrease in freight rates and a greater impetus given to the mining industry. (See section on Transportation.) The industry has also profited by the improved methods adopted to facilitate the transfer of the ore in transit and especially by the use of machinery and the mining operations themselves. Furthermore, in the principal mining range—Mesabi—the ore is sometimes found so near the surface that with the removal of a few feet of earth it is mined by the open-pit method, the ore being scooped by huge steam shovels directly from the pit to the car. Probably in no other mines in the world does massive machinery play so great a part in mining operations and hand labor so little. Work in the Mesabi Range began in 1892, and the output grew rapidly until 1901, when it amounted to 9,303,541 long tons. The Southern iron region shares with the Northern Appalachian region in the advantage of having coal and limestone, two essentials in the reduction of the ore and found in close proximity to the ore itself. The South has the additional advantage of cheap labor, but it is under the disadvantage of having a limited local market.

Gold. The mining of gold on an extensive scale did not begin until the discovery of the placer gold in California in 1848. Between 1820 and 1830 some interest had developed in the States of Virginia and North and South Carolina, and for a number of years the output averaged about $1,000,000. In 1850, within two years after the California discoveries, the output was $50,000,000, and it did not fall below this figure until 1860. The product greatly exceeded in total value the value of all other minerals mined during that period. The gold output has ever since been large, though subject to fluctuation. As ordinary placer mining began to be unprofitable, quartz mining and hydraulic mining were resorted to, and California continued to be an important gold-mining State. The working of placer mines in Montana between 1860 and 1870 helped greatly to sustain the high record which California had earlier established, Montana being credited in one year (1866) with an output valued at $16,500,000. Considerable amounts were contributed also by other Western States, particularly by Nevada, owing to the Comstock Lode. With the exception of two years the annual output from 1871 to 1895 stood below $40,000,000. With the decline in the value of silver, attention was turned to gold. Improved methods of mining and of extracting the metal from the ores reduced the cost, and made possible the working of mines that were unprofitable under the old methods. Almost every Western mountain State has shared in the increase that raised the total output of gold from $33,000.000 in 1892 to $78,666,700 in 1901 Colorado took first rank in 1897 and in 1901 produced $27,693,500. California ranked second with an output of $16,891,400. South Dakota, Utah, and Arizona are three of the most rapidly developing sections. Alaska's (q.v.) contribution in 1901 was $6,885,700.

Silver. The development of silver-mining in the United States was almost as sudden as was that of gold. The production of this metal had been quite insignificant until the discovery of the Comstock Lode (q.v.) in western Nevada in 1859. The United States then became the leading silver-mining country of the world. The only other nation that now competes with it in this industry is Mexico. The output of the Comstock Lode declined rapidly after 1877. Nevertheless other mines were developing, and the silver product of the country continued to increase. The two largest contributors to this increase were the lead mines of Colorado and later the copper mines of Montana, large quantities of silver being extracted from both the lead and the copper ores. The total output, after falling to 49,501,122 ounces in 1894, had increased to 59,653,788 ounces in 1901, the commercial value of which at the mines was $35,792,200. Over one-third of the total product in the latter year was produced by Colorado, Montana and Utah yielding the greater part of the remainder.

Copper. Very little copper was mined prior to the development of the Lake Superior copper mines, which began operations in 1845. From that year the product has continued to increase steadily and rapidly. In 1866 the famous Calumet and Hecla mine was opened, and in 1890 its annual product had grown to 59,868,106 pounds, and in 1901 to 82,519,676 pounds. In 1880 Lake Superior ores furnished 82.2 per cent. of the total product of the country. About this time Arizona began to figure prominently in copper-mining, and a little later Montana also, the latter advancing so rapidly that in 1885 it produced 40.9 per cent. of the total product, as against 43.5 for Lake Superior and 13.7 for Arizona. Though the Lake Superior output continued to increase, its per cent. of the total had fallen to 25.9 in 1901. Montana more than doubled its output in the decade ending 1901, producing in that year 38.2 per cent. of the total product, while Arizona increased its output three and one-half times in the same period, having 21.7 per cent. of the total product in 1901. In the last years of that decade California and Utah rapidly advanced in their output of copper. The principal Montana mines are located at Butte, the largest mining centre in the world. The Anaconda mine produced, in 1901, 101,850,224 pounds, and the Boston and Montana nearly half that amount. In Arizona the Copper Queen yielded 39,781,133 pounds, and the United Verde 34,520,695 pounds. The total output for the United States increased from 27,000 long tons in 1880 to 115,966 in 1890, and 268,782 long tons in 1901, these amounts being respectively 17 per cent., 43 per cent., and 53 per cent. of the world's product. The value of the output in 1901 was $86,629,266. The United States is now the controlling factor in the world's copper markets.

Lead. The United States ranks first among the countries of the world in the production of lead. The mining of this mineral began as early as 1720 in the southeastern part of what is now

Missouri, but it was not until a century later that operations assumed much importance. About 1825 mining began in the region which includes the adjacent corners of the three States of Wisconsin, Illinois, and Iowa, and later in southwestern Missouri and the adjacent corner of Kansas. For a number of years the mining of lead was, after iron, the most important metal-mining industry in the United States. It was mined in Utah in 1858. About 1875 work began on the Leadville Mine, Colorado. The Leadville ores are argentiferous, and the silver obtained in the early days of mining was of greater value than the lead itself. A little later argentiferous lead mines were developed in Idaho (Cœur d'Alêne) and other Cordilleran States. The total product of the country increased from 8000 short tons in 1830 to 30,000 in 1845, then decreased to 14,700 in 1865, since which time it increased almost steadily to 97,825 short tons in 1880, 178,554 in 1891, and 270,700 short tons in 1901, valued in the latter year at $23,280,200. Of the total only 57,898 short tons were soft lead, the remainder being desilverized lead. Idaho, Colorado, and Utah in the order named led in importance, the Mississippi Valley mines producing the greater part of the rest.

Zinc. Zinc-mining in the United States is limited chiefly to the lead-mining region of the Mississippi Valley above described. Its development began about 1850. Northern New Jersey at one time yielded considerable quantities of spelter, but its output has declined in recent years. The total product of zinc increased from 7343 short tons in 1873 to 63,683 in 1890 and 140,822 in 1901, giving the United States second rank among the countries of the world. The principal contributing States were Kansas, 74,240 short tons; Illinois, 44,896; Missouri, 13,083; and all other States, 8603. The value of the product was $11,265,760.

Clay. The various kinds of clay suitable for brick, tile, pottery, and other purposes are widely distributed and largely exploited. The total value of the different products made in 1901 was $110,211,587. Ohio is the largest producer, followed by Pennsylvania, New Jersey, Illinois, and New York, in the order mentioned.

Quicksilver. The mining of quicksilver began about 1845 in California, and its production has been confined almost wholly to that State. The output in 1900 was 29,727 flasks (76½ pounds per flask), valued at $1,382,305. The United States rivals Spain for first rank.

Aluminum. The production of aluminum began in 1883, and developed rapidly, the product in 1901 amounting to 7,150,000 pounds, valued at $1,920,000, this being over one-half of the total product of the world.

Stone. Stone suitable for building and other industrial purposes is abundant in almost every State. Because of its bulk and the consequent shipping expenses, its production is largely limited to a comparatively local market. Hence in many of the States which have the most valuable resources of stone the quarrying industry has scarcely more than begun. The utilization of stone varies with the economic condition of the country, the total value having fallen from $53,035,620 in 1889 to $31,346,171 in 1896, and advanced steadily to $55,615,926 in 1901. Limestone is in most common use, only a few States failing to report its production in the latter year, when its aggregate value was $21,747,061. This figure does not include limestone to the value of $4,659,836 used for flux. About $8,204,054 worth of limestone was burned into lime, the bulk of the remainder being used for building purposes, or crushed for road-making. Indiana leads in the quarrying of limestone for building purposes. Granite is second in importance, the value of the product in 1900 being $14,266,104. While its production is also widely distributed, New England yields the largest quantities. Maine leads in its production for building purposes, and Vermont in its production for monumental purposes. The value of sandstone in 1901 was $8,844,974, including bluestone, grindstones, and whetstones. Pennsylvania, Ohio, and New York are the largest producers of these varieties. New York and Vermont produce most of the slate and Vermont and Georgia the bulk of the marble, the value of these two products in 1901 being respectively $4,787,525 and $4,965,699. The value of trap-rock was $1,710,857, about one-half of which was contributed by New Jersey.

Salt. Salt is somewhat broadly distributed as between the East and the West. In 1901 the United States produced 20,566,661 barrels, valued at $6,617,449. Michigan leads and New York follows closely. Kansas is third and Ohio fourth in rank. Nearly 90 per cent. of the total domestic product in 1901 came from these four States. California, Louisiana, and Utah are important producers. The deposits are of various ages. Thus the deposits of New York are of Silurian age, being interstratified with the sedimentary rocks of that time. The salt of Kansas and Louisiana is of Mesozoic or Tertiary age, and that of the Great Salt Lake region is recent.

Cement. The production of Portland cement has a very recent development in the United States. From 335,500 barrels in 1890 the output increased steadily to 12,711,225 barrels in 1901, valued at $12,532,360. Of the total, 67.7 per cent. was reported from Lehigh and Northampton counties, Pa., and Warren County, N. J. The output of natural hydraulic cement in 1901 amounted to 7,084,823 barrels, valued at $3,056,278.

Gypsum. The production of gypsum increased from 256,259 short tons in 1892 to 659,659 short tons in 1901, valued in the latter year at $1,577,493. Michigan is the largest producer, followed by Kansas, Iowa, New York, and Ohio.

Phosphate Rock. The United States is the world's largest producer of phosphate rock. The production of this mineral began in South Carolina in 1867, and reached a maximum output there of 541,645 long tons in 1889, having decreased to 321,181 long tons in 1901. Its production in Florida began in 1888, and has increased almost steadily to 751,996 long tons in 1901. Tennessee, the only other State producing large quantities, began to yield in 1894, and in 1901 it produced 409,653 long tons. The total value in 1901 for all the States was $5,316,403.

Mineral Waters. Almost every State has mineral-water springs from which water is sold annually. The production of the United States increased from 2,000,000 gallons in 1880 to 18,392,732 in 1891, and 55,771,188 gallons in 1901, valued in the last year at $7,586,962. New York, Michigan, and Wisconsin are the largest producers. See section on *Geographical Distribution*, under MINERAL WATERS.

MISCELLANEOUS. A moderate value of asphaltic products is realized each year. These consist of bituminous sandstones, asphaltic limestones, asphaltum, and gilsonite, from California, Kentucky, Indian Territory, Texas, and Utah. Peat is not worked to any important degree, but forms a not inconsiderable reserve of fuel in some Northern States. Slate is extensively produced in Vermont and Pennsylvania. Graphite occurs in the Champlain region of New York, also in Pennsylvania, Georgia, and Alabama. Among other important products are abrasives, borax, pyrite, mineral paints, talc, soapstone, and manganese ore. Almost all the minerals and metals used in the arts are produced, and in quantities sufficient to meet the needs of the home markets. Tin, antimony, platinum, nickel, sulphur, and gems and precious stones are the articles most largely imported.

AGRICULTURE. The United States produces a larger value of agricultural products than any other country. Until the last quarter of the nineteenth century agriculture strongly predominated in the industrial life of the nation. It still employs a much greater number of individuals than any other industry. Owing to the vast area and great variety of physical and climatic conditions, most of the staple products known to the world can be raised. The agricultural development of the United States has had an immense influence on the progress of the world—not only by revolutionizing the system of farm machinery, but by adding to the European food supply and making possible a more rapid growth of population. With respect to the country's adaptability to agriculture, the most prominent features are: First, the preëminence of the Mississippi Valley for agricultural purposes; and, second, the vast waste areas to the west which are but little suited to tillage. If to the arable portion of the Mississippi drainage basin be added the area drained into the Gulf of Mexico by other streams, it would include about one-third of the total area of the United States. In this division, almost unbroken by mountain or swamp area, the soil is generally of great fertility, and probably over four-fifths of the value of the agricultural products may be accredited to this region. The climate of the Gulf States, particularly Florida. But there is no protection in this region against the cold winds from the north which occasionally sweep southward and bring frosts even to that State. Although much farther south than Southern Europe, the Gulf region is less adapted to the growing of tropical products. The Appalachian Mountains and the Atlantic Ocean together have a somewhat moderating effect upon the Carolina-Virginia region and the region farther north; hence this area has an advantage in the raising of some products, especially fruit, over the region west of the Appalachians. In the north the lakes have a moderating influence, making that territory also favorable for fruit-growing. On the Pacific Coast the ocean breezes and the mountains together afford the most highly protected portion of the United States, and make it unequalled as a fruit region.

AREA OF FARMS AND IMPROVED LAND. In the following table it will be seen that the total farm area of the United States increased in the last half of the nineteenth century nearly threefold:

ACRES OF LAND IN FARMS

CENSUS YEAR	Total	Improved	Unimproved
1850	293,560,614	113,032,614	180,528,000
1860	407,212,538	163,110,720	244,101,818
1870	407,735,041	188,921,099	218,813,942
1880	536,081,835	284,771,042	251,310,793
1890	623,218,619	357,616,755	265,601,864
1900	841,201,546	414,793,191	426,408,355

The total farm area in the decade 1860-1870 stood practically stationary, but the improved area increased during that period. The large gain made between 1890-1900 consisted mainly of unimproved land. This was due mainly to the inclusion in the census of large areas of grazing land throughout the West, particularly Texas, in which State the unimproved area increased from 30,660,722 to 106,230,941 acres. In the North Atlantic States the census shows a considerable decrease since 1880 in the improved area, but this was largely due to a change in census methods, and the real decrease was less than indicated. The improved area in the South Atlantic States has increased constantly since 1870. The following table shows the acreage of improved and unimproved land and the total land area in 1900:

STATES BY DIVISIONS	Total land area, square miles	Total improved and unimproved farm area, acres	Improved farm area, acres	Unimproved farm area, acres
North Atlantic	162,103	65,409,089	38,920,614	26,488,475
South Atlantic	268,620	104,297,506	46,100,226	58,197,280
North Central	753,550	317,349,474	222,314,099	95,035,375
South Central	610,215	257,738,845	80,007,867	177,730,978
Western	1,175,742	93,796,860	27,155,681	66,641,179

Appalachian and Atlantic seaboard region contains much broken and rocky land, and much soil of only moderate or of inferior quality. Throughout the eastern half of the United States the rainfall is ordinarily sufficient for growth of crops. Westward, however, in the longitude of central Kansas, the rainfall is greatly diminished and the transition from cultivated region to grazing lands is fairly abrupt. The Gulf of Mexico has a decidedly moderating effect on the

The most noteworthy fact shown is the great importance, absolutely and proportionately, of the north central division. Over one-half the total farm area in this section is improved. There are but few large regions in the world so easily and uniformly adaptable to cultivation. In Iowa 97.4 per cent. of the total land area was in farms in 1900, and of this 86.5 per cent. was improved. Illinois makes almost an equally good showing, and Indiana, Ohio, and Missouri are other States in this group which have a large percentage of improved land.

Size of Farms. From the following table it will be seen that the size of farms varies greatly in different parts of the country:

Average Number of Acres per Farm by Geographic Divisions.

GEOGRAPHIC DIVISIONS	1900	1890	1880	1870	1860	1850
The United States	146.6	136.5	133.7	153.3	199.2	202.6
North Atlantic	96.5	95.3	97.7	104.3	108.1	112.6
South Atlantic	108.4	133.6	157.4	241.1	352.8	376.4
North Central	144.5	133.4	121.9	123.7	139.7	143.3
South Central	155.4	144.0	150.6	194.4	321.3	291.0
Western	386.1	324.1	312.9	336.4	366.9	649.9
Alaska and Hawaii*	1,142.1	....	....	....	....	....

*No report prior to 1900.

The most fundamental principle in determining the size of the American farm is that it is adapted to an area convenient for the average family. Unlike the English farmer, the typical American farmer does not expect to employ a large number of hands. Neither does he expect to supplement his farm work by hiring himself to others, as is common among the peasant class of France. A son who is a member of a large family often works for a farmer who is not blessed with a surplus of sons, and thus there is an adjustment to suit the average family. The United States, therefore, has no peasant class corresponding to that of Europe. The recent settlement of the West, in which the average homestead (160 acres) was adapted to the average family, has tended to establish this condition of things; but it is also true of the older States. One may note also that in the South, where the plantation system formerly prevailed, a rapid readjustment is taking place to suit the family unit. But the size of farm that a family can cultivate varies with the methods used in cultivation, that is to say, whether capitalistic, intensive, etc. Thus the same labor that will suffice for a grain or stock farm of a given size is sufficient for only one-half or less of that amount when a cotton farm is in question. There are certain kinds of farms that for special causes tend to depart more or less from the system above described. Such are the grazing farms of the West, the Louisiana sugar plantations, the bonanza wheat farms of the Northwest and California, and, in a less degree, the garden farms of the Atlantic Coast, where, though the farms are small, much help is employed. Referring to the foregoing table, in the Western division we have two extremes: large grazing or wheat farms, and small irrigated or fruit farms. In Wyoming less than one-seventh of the total number of farms in 1900 contained less than 100 acres each, while 42 per cent. of the farm land was contained in farms over 1000 acres and the average size for the State was 1333 acres. In Utah the average size of farms was 212.4 acres, and considerably over three-fourths of the total number of farms contained less than 100 acres each. The average given for the North Central States is the most truly representative of the average given for any group. In that division 29.9 per cent. of the farms were between 100 and 175 acres each. The following table shows the relative number of farms in the different-sized groups for three census years:

Percentage of the Number of Farms in each of Seven Specified Areas in Acres—1880-1900.

CENSUS YEAR	Under 10	10 and under 20	20 and under 50	50 and under 100	100 and under 500	500 and under 1,000	1,000 and over
1900	4.7	7.1	21.9	23.8	39.9	1.8	0.8
1890	3.3	5.8	19.8	24.6	44.0	1.8	0.7
1880	3.5	6.3	19.5	25.8	42.3	1.9	0.7

The increase shown in the group 20 to 50 acres was mainly in the Southern States and particularly in the cotton belt of that region. The South Central States had 23.6 per cent. of its farms in this group in 1880 and 30.1 per cent. in 1890. The decrease in the group 50 to 100 acres was mainly in the North Central States, there being at the same time a general increase in this class in the Southern States. The decrease in the group 100 to 500 acres was most marked in the South and West. The two larger groups decreased in the South and increased in the North Central and Western divisions. In 1900 the census made three classifications for farms having between 100 and 500 acres, with the results as follows: Group 100 to 175 acres, 24.8 per cent. of the total farms; group 175 to 260 acres, 8.5 per cent. of the total farms; and group 260 to 500 acres, 6.6 per cent. of the total number of farms. The large number in the group 100 to 175 was partly the effect of the homestead claim laws. Over two-thirds of the farms in Oklahoma were in this group. The decrease in the average size of farms from 1860 to 1880 was due primarily to the rapid decrease in the size of farms in the South. The increase shown in the period 1880 to 1900 was due to the development of large bonanza and grazing farms and to the increased use of machinery.

Farm Tenure. As the country becomes older there is a rapidly increasing and almost universal tendency toward the renting system, though this is much more marked in some regions than in others. In the earlier period of development the man of small means took a claim, but now he is forced to rent. The frontier, as it pushed across the country, has been characterized by the fact that most of its farms were operated by owners. In the table below it will be seen that the highest percentage of owned farms is in the West, but the renting of farms began at once and steadily increased. The increase in tenancy has generally been deprecated as indicating a decadence in agricultural welfare, but in the following table it is shown that the increase in the number of tenants has not been at the expense of owners, for the farms operated by owners have also rapidly increased. In fact, the increase of these tenants since 1850 has been faster than the increase of the agricultural population. The increase in both the number of owners and the number of tenants has been at the expense of the wage-earning employees.

YEAR	Total farms	Number of farms operated by			Number of persons out of each 1000 males engaged in agriculture on farms operated by		
		Owners	Cash tenants	Share tenants	Owners	Tenants	Other persons
1900	5,739,657	3,713,371	752,920	1,273,366	423	231	346
1890	4,564,641	3,269,728	454,659	840,254	420	166	414
1880	4,008,907	2,984,306	322,357	702,244	422	145	433

The first class may be further subdivided as follows: owners, 54.9; part owners, 7.9 per cent.; owners and tenants, 0.9 per cent.; and managers, 1 per cent. There is an increased tendency to delegate the management of farms. In the south especially, the large number of the owners are absentees. Of the total number of owners of rented farms in 1900, 1,005,479 owned but one farm each, 142,838 owned two farms each, 67,719 owned three and under five farms each, 28,698 owned five and under ten farms each, 8966 owned ten and under twenty farms each, 3241 owned twenty farms and over. Of the last group 2332 owners were in the South Central States and 704 in the South Atlantic States. The following table shows the number of owned and rented farms and the tenancy in each class:

YEAR	Total number of farms	Number of farms operated by		
		Owners	Cash tenants	Share tenants
North Atlantic division				
1900	677,506	536,724	66,361	74,421
1890	658,569	537,376	52,120	69,078
1880	696,139	584,847	49,011	62,281
South Atlantic division				
1900	962,225	536,627	172,699	252,899
1890	740,600	461,057	96,098	194,445
1880	644,429	411,673	74,946	157,810
North Central division				
1900	2,196,567	1,583,841	207,732	404,994
1890	1,923,822	1,474,086	147,248	302,488
1880	1,697,968	1,350,225	88,743	259,000
South Central division				
1900	1,658,166	852,620	286,091	519,455
1890	1,086,772	668,972	151,901	265,899
1880	886,648	565,556	105,092	216,000
Western division				
1900	242,908	202,596	18,782	21,530
1890	145,878	128,237	7,292	10,349
1880	82,723	72,005	4,565	7,153

The percentage of rented farms and the rate of increase of these are greatest in the South. The greater proportionate number of rented farms in that section results from the industrial change incident to the overthrow of slavery. Negroes prefer renting to wage-earning. In 1899 there were 769,528 farms operated by colored farmers, of whom 451,799 were in the South Central division of States. Of the latter number 86,748 owned their farms, and 13,895 farms were operated by part owners, 917 by owners and tenants, 623 by managers, 171,105 by cash tenants, and 178,511 by share tenants. It is noteworthy that in the two Southern divisions of States the negro cash tenants almost equal in number the negro share tenants; while at the same time the white share tenants outnumber the white cash tenants 8 to 3. Renting is least customary in the North Atlantic States. (See article NEGRO IN AMERICA, and section on *Cotton* in this article.) Rented farms average less in size than the owned farms, and a larger percentage of the rented farms is improved. This is particularly true in the South and is most noticeable in share-rent farms. Farms in that section are leased mainly for raising crops. Farms in the United States are usually rented for short periods, one year at a time being the most common. In Great Britain, by contrast, the long term system of tenure prevails.

METHODS. See the article AGRICULTURE.

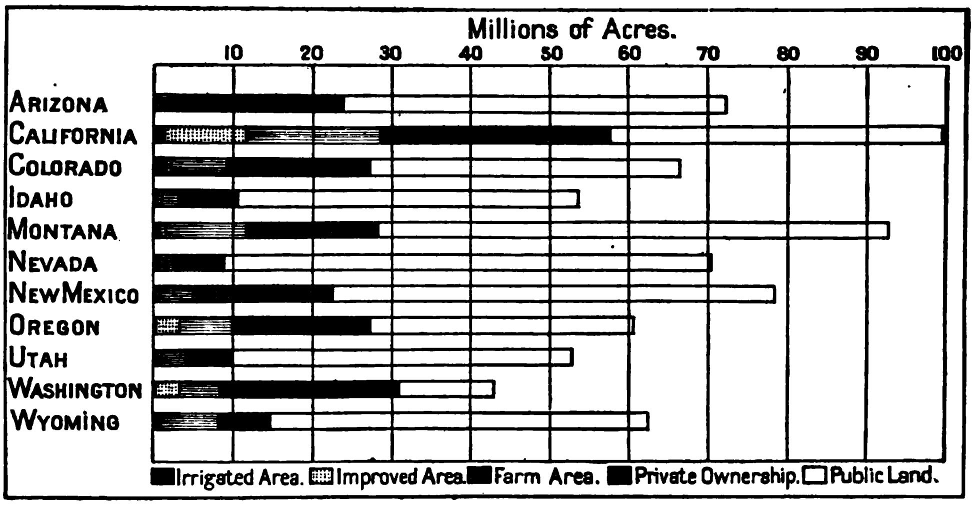
IRRIGATION. It was not until after the humid region had been generally settled that the arid region was occupied. The Mormons, in 1847, were the first to practice irrigation in the West. In 1870 there were only 20,000 acres irrigated. In the Great American Desert the area at present under irrigation and cultivation is insignificant as compared with the uncultivated portion. It is estimated that the water supply is sufficient to irrigate only one-fifth of the arid region.

The decade 1870-80 was characterized by rapid development of small ditches. In the latter year there were about 1,000,000 acres irrigated. The following decade was characterized by rapid construction of canals, nearly all of which resulted financially in failures. In many instances the supply does not equal the demands placed upon the canals. There are now but few unused sources from which water can be largely obtained. Hereafter the extension of the irrigation system will depend mainly upon the construction of large reservoirs. Irrigation has suffered much from the want of adequate laws. In only three States—Colorado, Nebraska, and Wyoming—is the system of supervision and control complete. In several States no public control is exercised. The laws are often indefinite or contradictory. There have arisen disputes as to the rights of the different States to the use of a stream which may pass through their territories. In 1902 a new act was passed by Congress which provided that the Department of the Interior should deal with questions of the water supply, and the location, construction, and management of irrigation works. Receipts from the disposal of public lands are set aside for construction works. Water is to be furnished both to public and private lands. Before the beginning of survey for contemplated works, the Secretary of the Interior is to withdraw from entry, except under homestead laws, any land that may be irrigated from such works. In anticipation of the rise of land values through national irrigation, there was a rush of speculators who, through a perversion of the intention of the Desert Land Law, the Timber Law, and the commutation clause of the Homestead Law, acquired large areas without actual settlement. The following table shows the status of irrigation in the arid States and Territories:

	NUMBER OF IRRIGATORS		ACREAGE IRRIGATED						Value of irrigated crops, 1899	Cost of construction of irrigation systems
	1899	1889	1899			Total, 1889	In pasture and unmatured crops, 1899	In crops, 1899		
			From streams	From wells	Total					
Arizona	2,981	1,075	184,422	974	185,396	65,821	48,163	137,233	$2,250,519	$4,438,352
California	25,611	13,732	1,293,366	152,506	1,445,872	1,004,233	287,694	1,158,178	32,975,361	19,181,610
Colorado	17,613	9,659	1,604,213	7,058	1,611,271	890,735	311,447	1,299,824	15,100,690	11,758,703
Idaho	8,987	4,323	602,324	244	602,568	217,005	94,385	508,183	5,440,962	5,120,399
Montana	8,043	3,706	951,154	....	951,154	350,582	195,289	755,865	7,281,567	4,683,073
Nevada	1,906	1,167	504,034	134	504,168	224,403	180,816	323,352	2,853,149	1,537,559
New Mexico	7,884	3,085	202,889	1,004	203,893	91,745	21,089	182,804	2,757,107	4,165,312
Oregon	4,636	3,150	388,111	199	388,310	177,944	99,269	289,041	3,062,926	1,843,757
Utah	17,924	9,724	624,186	5,107	629,293	263,473	91,705	537,588	7,462,370	5,865,302
Washington	3,513	1,046	133,698	1,772	135,470	48,799	17,672	117,798	2,361,838	1,722,369
Wyoming	3,721	1,917	605,232	646	605,878	229,676	203,779	402,099	2,886,949	3,973,165
Total	102,819	52,584	7,093,629	169,644	7,263,273	3,564,416	1,551,308	5,711,965	$84,433,438	$64,289,601

California has the largest number of irrigators, but Colorado has the largest irrigated area. The number of irrigators increased faster than the area irrigated, thus showing a tendency to subdivide large irrigated tracts and cut them up into smaller homesteads devoted to fruit-raising. Streams are the principal source of the water supply, although wells are of some importance in California. The value of crops grown on irrigated land is much the greatest in California. In the census year the crops irrigated with their acreage were as follows: Hay and forage, 3,665,654 acres; cereals, 1,399,709 acres; orchard fruits, 251,289 acres; other crops, 226,881 acres.

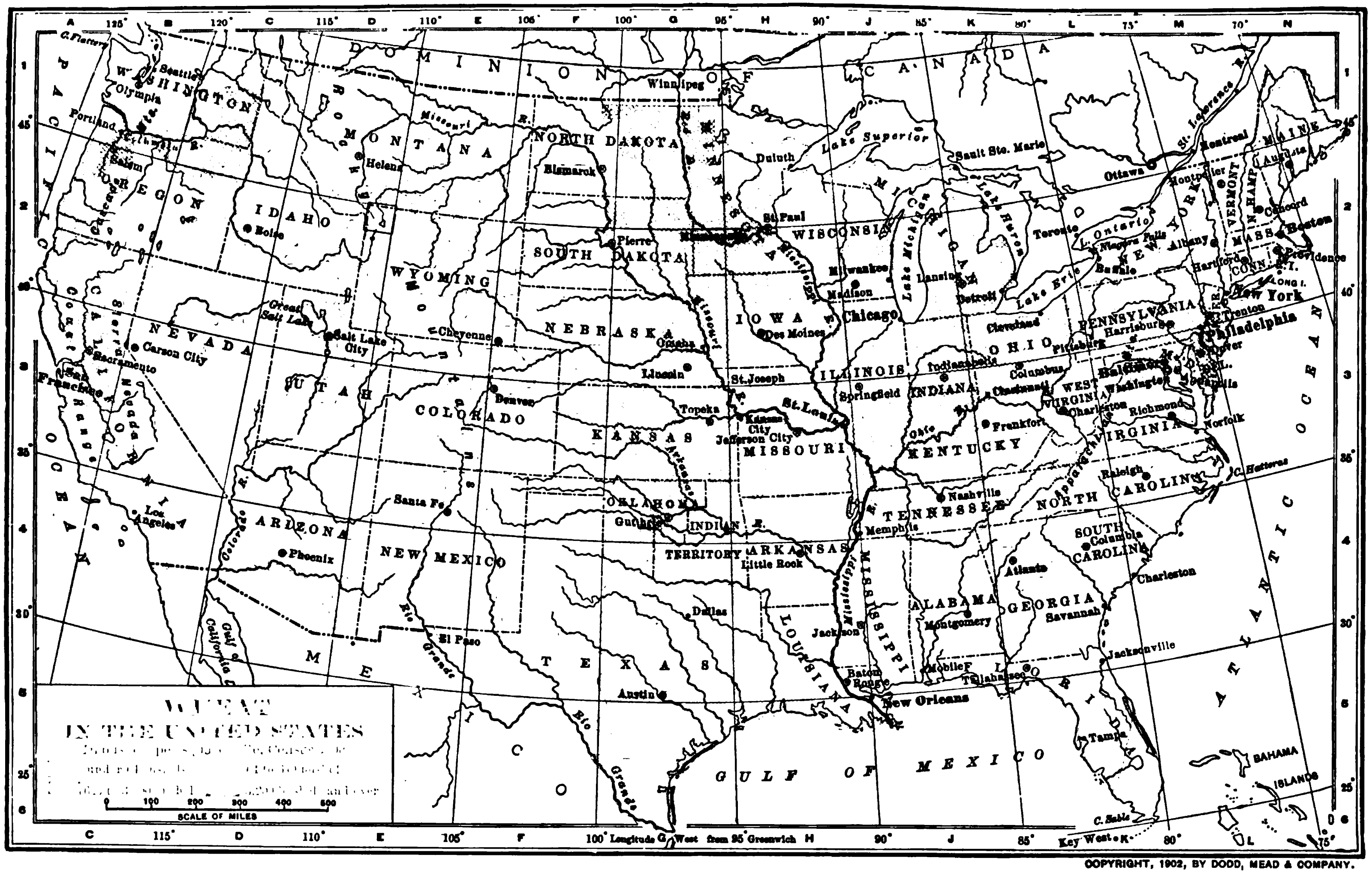
The following diagram shows the relative size of the eleven arid States and Territories, with area in private ownership, farm area, and improved irrigated acreage:



The table on page 67 shows the development and the distribution of the four largest crops. These, together with cotton, are by far the most important crops in the United States, constituting over nine-tenths of the entire crop area.

Corn. The largest and most valuable American crops are corn and hay. They are at the basis of the great stock-raising interests of the country. Since the bulk of both crops are consumed on the farm and not placed upon the market, and hence are not 'money crops,' their importance is usually lost sight of in discussions of American agriculture. Corn stands without a rival either in respect to area or value. It is indigenous to America, and its production is still largely confined to this continent, the United States producing about three-fourths of the world's supply. It is the distinctive American crop. It has a larger acreage than all other cereals combined. See **Maize.**

Hay. As compared with corn, hay is of greater relative importance in regions which are not well adapted for the growing of corn, but where the demand for stock-food is nevertheless great. Thus in the North Atlantic States the acreage of hay is nearly one-third greater than the total area devoted to cereals, and in the Western division of States the acreage of hay is over twenty-nine times that of corn and seven-eighths as great as that of all cereals combined.



COPYRIGHT, 1902, BY DODD, MEAD & COMPANY.

	North Atlantic States		South Atlantic States		North Central States		South Central States		Western States	
	Acres	Bushels*	Acres	Bushels*	Acres	Bushels*	Acres	Bushels*	Acres	Bushels*
Corn—										
1900	2,633,120	90,681,350	12,024,742	169,468,960	57,119,558	1,941,220,100	22,894,637	460,250,905	241,616	4,703,055
1880	2,740,199	91,038,700	9,709,842	129,266,107	35,697,248	1,285,284,661	14,062,153	245,520,048	159,062	3,482,160
1850		56,629,174		125,504,362		222,208,502		187,338,602		390,464
Wheat—										
1900	2,213,587	33,114,070	3,368,872	31,902,857	35,496,201	441,300,918	5,922,170	61,901,477	5,587,744	90,314,930
1880	2,410,758	34,178,947	3,244,860	28,534,367	23,930,197	329,550,755	3,244,321	24,278,499	2,600,197	42,940,519
1850		31,181,273		20,493,117		43,842,037		4,436,027		533,489
Oats—										
1900	2,792,296	87,273,495	1,268,061	14,874,888	22,196,879	764,279,166	2,328,291	47,407,503	954,171	29,554,323
1880	2,906,929	83,967,199	2,231,526	21,992,934	8,843,653	270,166,435	1,826,491	22,645,208	335,994	10,087,223
1850		59,570,301		23,294,810		42,328,731		21,318,218		72,119
Hay—										
1900	12,919,041	15,128,311	2,161,201	2,194,115	35,676,042	46,158,805	3,883,662	5,083,825	7,051,123	10,687,006
1880	12,026,364	12,665,694	1,128,420	943,941	15,490,866	19,182,478	633,433	524,414	1,351,971	1,836,184
1850		9,471,369		752,029		3,336,919		271,109		7,216

*For hay, tons.

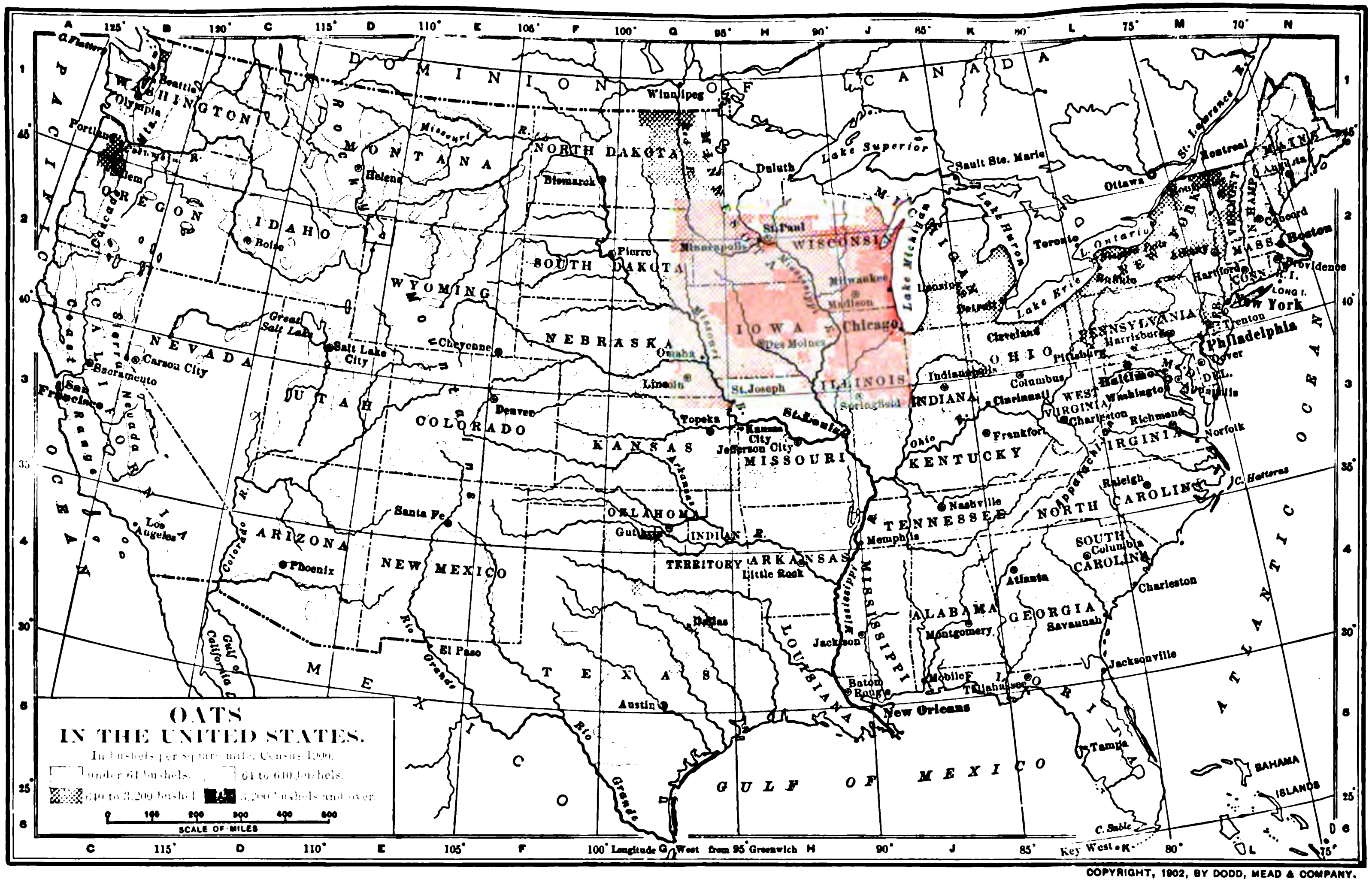
In the latter region a large part of the crop has the advantage of irrigation. In most of the North Central States hay is the second crop in respect to acreage and value. In the cotton States but little attention is given it, although there has been a significant increase in this section in recent years. (See Table.) The increase in the acreage of hay has been especially rapid since 1880, the area devoted to it having doubled between 1880 and 1900, the greatest part of this gain being made in the earlier of the two decades, corresponding to the period in which there was a decadence in wheat culture. The prairie region was easily adaptable to the raising of this crop. Moreover, the increased attention given to cattle and horses, and the need of putting the soil under grass to improve its productivity in the older States, have tended to develop this crop. The principal variety of hay is timothy, its production being confined largely to the North Central and the North Atlantic States. But comparatively little of any other kind is grown in the latter division of States. Next in importance are wild salt and prairie grasses, which are produced in the region in which timothy is little grown—the more arid prairie region and westward. Clover ranks third in acreage, but is a long way removed. Its production is largest in the North Central States. In the Western division of States alfalfa is the most important hay. Two or more crops of this variety of hay are obtained annually, and alfalfa stands first in yield per acre. In the far West, especially California, large quantities of grain are cut green for hay. Millet and forage crops are grown in most parts of the country.

Wheat. There are two other crops which greatly exceed each of the foregoing as money crops, wheat and cotton. The greater part of each of these crops is sold, particularly cotton. They represent also by far the most important exports, and hence are brought to the notice of the public eye in a degree almost out of proportion to their importance. Cotton is the great money crop of the Southern States, and wheat of the North Central and Western States. The United States wheat crop varies in amount from one-third to one-half that of Europe. Wheat can be successfully grown in every State of the Union. However, the competition of certain favored regions has limited its cultivation in others. A hardy crop and of quick growth, it is the principal crop in the far North, and also in the West, wherever the climate is unseasonable for corn. The climate and soil are less favorable to its growth in the South. Wheat, more easily than most other crops, may be handled by machinery, and therefore by capitalistic methods. The existence of level prairie lands, unobstructed by stones or stumps, and purchasable at low figures in large quantities from railroad companies, or, as in California, from the extensive Spanish land grants, explains the rise of the bonanza wheat farms—the most typical of which are found in the valley of the Red River of the North and the Great Valley of California. On some of these farms wheat is cut and threshed in one operation by machines, propelled by steam. In the planting of the grain, also, the highest type of agricultural machinery is used. In some instances steam machinery plows, cultivates, and sows in one operation. These farms are being gradually broken up, and mixed farming is taking their place, as the soil becomes exhausted from the too great repetition of the one crop. During the period from 1870 to 1890 wheat cultivation developed in Argentina, India, and other regions, and these countries came into competition with the United States in the European market. In consequence of this fact there was a decrease in the price of wheat, and in turn in the cultivation of wheat over the greater part of the United States, During the decade 1880-90 there was a decrease in the aggregate wheat acreage of five and two-tenths per cent. But the development of wheat cultivation in the countries mentioned has not been so great since 1890, prices have improved, and wheat culture in the United States has revived, the area devoted to its cultivation having increased fifty-six and six-tenths per cent. in the decade 1890-1900. In the regions where the winters are rigorous, especially where the snowfall is not heavy enough to protect vegetation, as in the Red River Valley, or where the rainfall may be inadequate in the autumn, the wheat crop is sown in the spring. In 1901 a little over four-sevenths of the total wheat acreage was winter wheat. With the development of the Northwest, the raising of spring wheat is rapidly gaining upon winter wheat, having increased from about one-third of the total wheat acreage in 1901. Wheat benefited even more than corn from the improved machinery which came into use about 1850 and subsequently. This, together with the improvement of transportation which made it possible for the product of the interior to reach the European market, and together with the adaptability of the prairie soils to wheat culture, resulted in a more rapid increase in the acreage devoted to it than was true of corn.

Cotton. While the value of the cotton crop is not so great as is that of wheat, the receipts from its sales and especially from its exportation are much greater. (See paragraph on *Commerce.*) There is no other field product which gives employment to so large a number of people. The total area devoted to cotton in the United States increased from 14,480,019 acres in the census year 1880, to 20,175,270 in 1890, and 24,275,101 acres in 1900, the production in bales for those years being respectively 5,755,359, 7,472,511, and 9,534,707. (For detailed tables and map see Cotton.) Through the reduction of the high prices prevailing after the war, the cultivation of cotton is being abandoned almost entirely in the border States. Its area of production is in the region southeast of the Appalachian Mountains, beginning in the north at the southern tier of counties in Virginia, and including over two-thirds of North Carolina and nearly all South Carolina, Georgia, and Alabama, then the region extending north in the Mississippi Valley, embracing western Tennessee, southern Arkansas, Indian Territory, Oklahoma, and the region southward to the Gulf. Florida and the coast plains of the States mentioned are not so favorable for its production as the region farther inland. In recent years there has been a remarkable development of cotton-growing in Texas, Indian Territory, and Oklahoma. Texas now yields twice the amount produced by any other State. Its production in that region, however, has suffered severely from the ravages of the boll-weevil. In 1900 43.80 per cent. of the crop was produced west of the Mississippi River. From the time of the introduction of the cotton gin to the time of the Civil War, the cultivation of cotton was one of the most rapidly developing industries of the United States, being favored by the high prices obtained for its products and the advantages which water transportation afforded in the South to place it upon the market. The most rapidly developing period was 1850-60, when the area devoted to cotton in the ten principal States increased 100 per cent. It was during this period that cotton first asserted its supremacy in the South. The area devoted to corn increased only 17 per cent. in the same period. The construction of railroads and the development of corn-raising in the North Central States made possible the importation of that product, and the cotton-grower believed it more profitable to import his corn and devote his soil to cotton. While corn was well in advance of cotton in acreage at the outbreak of the Civil War, the still higher prices of cotton prevailing after the war turned attention more than ever to it, and subsequent to 1870 the importation of corn became general and the acreage of its cultivation in the cotton States fell below the acreage of cotton. A number of other factors that assisted in strengthening the domination of cotton were operative after the war. The war left Southern planters without capital. In order to secure supplies of food, farm equipments, etc., of the merchant, the farmer was obliged to place his land and his crop under mortgage to the merchant. Cotton was a cash crop, being easily marketed, and was the most acceptable to the merchant, who insisted upon a large production of it in order to make himself safe in case of a partial crop product. Nor did the farmer on his part care to take the risk of experimenting with new or mixed systems of farming. This condition became greatly emphasized by the presence of a large ex-slave population. The negro preferred to become a tenant-cultivator, and as such has become the special prey of the crop-mortgage system. His obligations and his inclinations both tended to restrict him to cotton. Thus, although the price of cotton fell between 1875 and 1900 more than the price of any other crop, rendering its production unprofitable, the economic system which had fastened itself upon the South made it impossible to check cotton cultivation. A vigorously conducted agitation, participated in by the Cotton Trust and by the planters themselves, to reduce the cotton-growing area, had but little result. The utilization of the cotton seed has tended in a measure to offset the consequences of the disastrous fall in the price of the fibre. In 1899 the cotton-seed product amounted to 4,566,100 tons, valued at $46,950,575. The development of manufacturing in the South has tended to enlarge the local markets for all farm products. In some sections this demand for a greater diversity of crops has tended to diminish the dependence upon cotton and the mortgage-holder. But in the greater part of the cotton area proper the tyranny of cotton has scarcely been weakened.

Oats. The only other crop which is grown on a scale comparable with the foregoing crops is oats. The acreage of oats is indeed greater than that of cotton, but the value is much less. It belongs in the group with corn and hay in that it is produced almost wholly for consumption on the farm. More hardy than corn, it is grown as a stock-food substitute for it in the States where corn does not grow well, namely the northern tier of States. In New York, Wisconsin, and some other commonwealths, oats has the largest area of any cereal. In a number of other States it ranks second, including the two largest oats-growing States, Illinois and Iowa, in each of which oats is twice as extensively grown as is wheat. The greatest growth of the industry occurred in the decade 1880-90, when the acreage increased from 16,144,393 to 28,320,677. This increase was associated with the development of the Northern States and the decline of wheat in the region already under cultivation. In New England, the Southern States, and the Far West the crop did not figure prominently. The United States produces less than two-thirds the oats products of the world.

Rice. Although rice was introduced as early as 1700 and has been grown ever since, it was not until near the year 1900 that its cultivation began to assume large proportions. For 150 years its cultivation was confined mainly to the delta lands and tidal rivers of the Carolinas and Georgia, where it was cultivated by the aid of irrigation. It was for a long time the only crop in the United States to which irrigation was applied. South Carolina ranked first in its production until 1880. A new epoch in rice cultivation began in 1897-98, when it was successfully grown by the aid of irrigation in the coastal prairie lands of southwestern Louisiana. The cultivation of rice in that region developed with remarkable rapidity and the production of the coun-


OATS IN THE UNITED STATES.

In bushels per square mile, Census 1900.

☐ under 64 bushels.	☐ 64 to 640 bushels.
▨ 640 to 3,200 bushels.	■ 3,200 bushels and over.

COPYRIGHT, 1902, BY DODD, MEAD & COMPANY.

try increased from 115,000,000 pounds in 1898 to 331,000,000 in 1902. Of this last amount, which was only a little short of the consumption of the country, Louisiana and Texas together produced over 90 per cent. In 1900 there were 315,344 acres in rice, of which 201,685 were in Louisiana.

OTHER CEREALS. Other varieties of cereals than those mentioned flourish, but have not become favorites as in some other countries. Barley is rarely grown throughout the greater part of the country. The United States produces only one-ninth of the barley crop of the world and is exceeded by three of the European countries. Barley is most important in California, where it is used as a stock-food substitute for corn. The other States in which it is most grown are Minnesota, Wisconsin, Iowa, and the Dakotas. Its total acreage increased from 1,997,727 in 1880 to 4,470,196 in 1900. Rye, the chief staple in some of the European countries, is wholly unimportant in the United States. Its production is greatest in Wisconsin, Pennsylvania, and other Northern States. Its acreage in 1880 was 1,842,233, and in 1900, 2,054,292 acres. Pennsylvania and New York produce over five-eighths of the total buckwheat for the country, the area devoted to it in 1900 being 807,060 acres. Kaffir corn is found adaptable to the semi-arid regions and is grown most abundantly in western Kansas, Oklahoma, and Texas. There were 19,900 acres of it cultivated in 1900.

VEGETABLES. Almost every American farmer is a gardener to the extent that he endeavors to raise vegetables for family consumption. Gardening on a larger scale than this is determined principally by the question of soil and climate and convenience to market. Market-gardening is therefore a greatly localized industry, and is most common in proximity to the large centres of population. In the census year 1900, New Jersey and Rhode Island devoted over 11 per cent. of their improved land to the cultivation of vegetables, Massachusetts ranking next with 7 per cent. devoted to vegetables. Of the total value of all crops the vegetable product of Rhode Island amounted to thirty-four and nine-tenths per cent., then in order followed New Jersey, Massachusetts, Maine, Florida, Connecticut, Delaware, Maryland, and New York. The value of the vegetable crop in the last named State amounted to 18.1 per cent. The supply of the early market at these centres must be from the South, and hence garden farming has developed extensively at favored points along the Atlantic coast down to Florida, this region not only possessing an advantageous climate and soil, but also cheap water transportation to its markets.

POTATOES. The most extensively grown and most valuable of the vegetables are potatoes, yet the production is small as compared with that of Europe, or even Germany alone. The area devoted to them is greatest in the Northern States; indeed, there is a tendency for them to localize in the northern tier of States. Between 1889 and 1899 the five States, Maine, New York, Michigan, Wisconsin, and Minnesota, increased their area devoted to potatoes 35.9 per cent., whereas in Indiana, Illinois, Kansas, Nebraska, Kentucky, and Tennessee there were decreases ranging from 20.1 per cent. to 26.7 per cent. About one-third of the comparatively small Southern product is shipped north to supply the early market. Of vastly greater importance in the South are sweet potatoes, but these in turn are scarcely raised at all in the extreme Northern States. This crop is the second most important of the vegetables. The total area in Irish potatoes in 1900 was 2,938,778 acres, and in sweet potatoes 537,312 acres.

MISCELLANEOUS VEGETABLES. In recent years there has been an enormous increase in the production of miscellaneous vegetables. This has been partially due to the development of the canning industry, and the consequent greater consumption of vegetables out of their season. This is especially true of sweet corn and tomatoes, the production of which has attained large proportions in some States, Maryland, New Jersey, and New York being in the lead. In 1900 the total value of canned vegetables was $29,368,158, of which over three-quarters consisted of tomatoes and corn. Of other varieties of vegetables the most important are watermelons, which are grown most extensively in the South, Georgia and Texas having the largest acreage. Muskmelons are less restricted as to locality. Cabbages and onions are generally grown, New York leading in their production. The United States contrasts strikingly with Great Britain and some other European countries in that turnips do not figure prominently among the vegetable crops. The census of 1900 reported 2,115,570 acres under miscellaneous vegetables.

FRUITS. The most remarkable development of any phase of American agriculture in the decade 1890-1900 was made in fruit culture. This industry almost doubled in magnitude in that period. The number of orchard trees, for instance, increased from 193,452,588 to 367,164,694 (not including sub-tropical varieties). Most varieties of temperate zone fruits are grown in every State. The use of refrigerator cars has made it possible to transport fruits long distances, and thus all parts of the country have the advantage of the general market. However, climatic differences tend to localize. From the following table it will be seen that the apple has a decided primacy among American fruits:

FRUITS	Trees	
	1890	1900
Apples	120,152,795	201,794,764
Peaches and nectarines	53,885,597	99,919,428
Pears	5,115,055	17,716,184
Plums and prunes	7,078,191	30,780,892
Cherries	5,638,759	11,943,287
Apricots	1,582,191	5,010,139
Total	193,452,588	367,164,694

Although it is grown throughout the country, the apple receives most attention in the North Central group of States and New York, Pennsylvania, and Virginia. The region of greatest development during the years 1890-1900 included Missouri, Illinois, Kansas, and Arkansas. Missouri more than doubled its number of trees, and it is much in advance of all other States. The southwest corner of the State, and the adjacent region of Arkansas and Kansas, have become famous for the production of this fruit. Peaches require a more moderate climate, and consequently are most important in the South. In Georgia and some other Southern States the raising of peaches to supply the early Northern market is a rapidly developing industry. In the North peach culture is developing most rapidly in protected regions, especially along the lake coast region, where the trees are protected from frost by the moderating influence of the Great Lakes. The number of trees in Michigan increased 322 per cent. between 1890 and 1900, and that State took first rank, the centre of peach culture being along lower Lake Michigan. On the Pacific Coast California has become an important peach-growing State. The production of plums and prunes is restricted largely to the Pacific Coast, particularly California. There was the largest increase in this variety of trees of any included in the foregoing list. The United States now produces more prunes than it consumes. Cherries and pears are grown throughout the country. The raising of apricots is mainly restricted to California. Grapes are another crop which require a moderate climate. California is the most favored region for them, and it has over three times more vines than any other State. It is the only State which produces raisins. Besides California, the chief region for the production of wine grapes is the climatically favored Lake Erie region in northern Ohio and western New York.

The production of the three most important varieties of small fruits—strawberries, raspberries, and blackberries—is well extended over the country, but their production in commercial quantities is localized largely in the South, so as to have the advantage of the early market. Cranberries require boggy lands, and are limited to the Cape Cod region, southern New Jersey, and central Wisconsin. Massachusetts has the smallest area, but produces over 60 per cent. of the product. California is unsurpassed as a region for the growing of all kinds of sub-tropical fruits, as the remarkable development of that region during the period 1880-1900 fully demonstrates. While oranges and lemons constitute the chief varieties, olives, figs, and other fruits are included. This region is also the chief centre of almonds and English walnuts. Southern Florida is also a large centre of orange culture and is the only important centre of pineapple culture of continental United States. (For a fuller description of sub-tropical culture, see CALIFORNIA and FLORIDA.) Arizona and New Mexico also give promise of becoming important centres for the growth of sub-tropical plants.

TOBACCO. Virginia maintained the primacy in tobacco production until 1850, when it was surpassed by Kentucky. The latter State has steadily increased, until it represents over twice the acreage and value represented by the former. In the decade 1890-1900 North Carolina more than doubled its acreage and thus advanced ahead of Virginia. In 1900 Kentucky had 384,805 acres; North Carolina, 203,023; Virginia, 184,334; and Tennessee, 71,849. The limestone soil of central Kentucky and of the district northward into Ohio contains potash and other chemical elements required by the tobacco plant, which gives this region special advantage in its production. The principal other States producing tobacco are Wisconsin, Pennsylvania, South Carolina, New York, and Connecticut. The total acreage increased from 695,301 acres in 1890 to 1,101,483 acres in 1900. See map under TOBACCO.

SUGAR AND SUGAR-PRODUCING CROPS. The raising of sugar-cane in the United States proper is largely confined to Louisiana (q.v.). The area devoted to sugar-cane in the United States in 1899 aggregated 386,986 acres. The production of cane sugar in 1899 amounted to over 158,000,000 pounds. The production of sugar-cane molasses in the same year amounted to over 6,213,859 pounds, and of syrup, 12,293,032 gallons. Sorghum cane is grown very generally throughout the United States. The total acreage in 1899 was 293,152, and the syrup produced amounted to 16,972,783 gallons. In the early history of the country a large part of the sugar and syrup consumed was manufactured from the sap of the maple tree. The maple sugar made in 1899 amounted to 11,928,770 pounds, which was but little more than one-third of the product reported in every preceding census year from 1850 to 1890. About two-thirds of this was made in Vermont and New York. The maple-syrup product in the same year amounted to 2,056,611 gallons. Since 1890 there has been a rapid development of the beet-sugar industry. The production of beet sugar increased from 2,203 tons (of 2240 pounds each) in 1889-90 to 195,463 in 1902-03. The latter amount was produced from 175,000 acres of beets. Over two-thirds of this acreage was in Michigan and California, and the remainder was distributed through a number of States. Unlike sugar-cane, the sugar beet is usually grown as an incidental to other farming operations. Owing to their high value per acre, they are both, however, important to the sections in which they are grown.

STOCK-RAISING. Compared with crop-growing, stock-raising is of much more importance in the United States than in European countries. The per capita number of horses, cattle, and hogs is much greater in the United States than in any of the principal European countries. The United States has five times as many hogs, over twice as many cattle, and as many horses as has European Russia, but the latter leads the United States in the number of sheep. Australia and Argentina are the only prominent countries in which the relative importance of domestic animals is greater than in the United States. Of the total value of agricultural products in 1899 more than one-fifth was fed to live stock. In the North Central division one-fourth (in value) of the products was fed to live stock. The following table shows the number and the increase of domestic animals on farms and ranges since 1850:

	1850	1860	1870	1880	1890	1900
Neat cattle	17,778,907	25,620,019	23,820,608	39,675,533	57,648,792	52,489,237
Horses	4,336,719	6,249,174	7,145,370	10,357,488	15,266,244	16,964,799
Mules	559,331	1,151,148	1,125,415	1,812,808	2,251,876	3,089,424
Swine	30,354,213	33,512,867	25,134,569	49,772,670	57,426,859	62,876,108
Sheep	24,000,000	22,471,275	28,477,951	42,192,074	40,876,312	39,937,573

The foregoing figures do not include the young of animals. Furthermore, the census methods of enumeration have not been uniform, and the figures are therefore only approximately comparable. In some instances there has been uncertainty as to whether range animals have been included or excluded. Thus, in the decade 1890-1900 the decrease shown for the number of cattle is thought to be mainly if not wholly apparent, and not real. It will be seen in the table that there has been a much more rapid increase in the number of horses and cattle than of swine and sheep. A comparison with the census figures of population will show that, with the exception of horses and mules, the increase in the numbers of live stock since 1850 has not kept pace with the increase in population. The following table shows the increase in his stock since 1850:

	North Atlantic division	South Atlantic division	North Central division	South Central division	Western division
Total neat cattle—					
1900	5,081,616	3,490,301	23,309,460	13,823,384	6,699,067
1880	5,797,296	3,951,728	15,834,221	9,715,733	4,376,555
1850	4,711,874	4,179,915	4,378,712	4,163,425	349,981
Horses—					
1900	1,641,395	1,014,543	9,070,366	3,175,869	2,050,018
1880	1,554,951	801,239	5,467,031	1,921,393	612,874
1850	1,073,641	770,806	1,398,749	1,056,250	37,273
Mules—					
1900	46,083	545,840	652,360	1,677,607	111,147
1880	38,749	346,944	539,799	836,718	50,603
1850	7,687	153,098	63,256	324,225	11,065
Swine—					
1900	2,322,206	5,562,762	40,474,289	13,047,827	1,460,957
1880	2,521,077	5,720,132	28,118,617	12,212,141	1,200,708
1850	2,670,469	7,497,036	8,536,182	11,609,287	41,239
Sheep—					
1900	2,533,579	1,706,199	10,055,721	3,328,848	22,228,620
1880	4,971,032	2,579,006	13,662,889	6,397,811	14,581,836
1850	7,693,699	2,980,105	7,743,347	2,892,610	413,489

In this table will be observed the great predominance of the North Central division in the number of horses, cattle, and hogs, of sheep in the Western division, and of mules in the Southern. Prior to 1850 the prairie areas west of the Mississippi, and particularly the arid and semi-arid region, including the Cordilleras and a broad belt bounding it on the east, had not been generally utilized. Settlement thus far had been mainly in a wooded region in which there was little natural pasture well adapted to cattle, while swine, being more hardy, could shift for themselves in the forest. The South particularly was much better suited to hogs than to cattle; consequently hogs received much attention west of the Appalachians and in the South. Tennessee, which had the largest number in 1850, had more than the whole North Atlantic division, including as it does New York and Pennsylvania. There was in the latter region much pasture land, and cattle and sheep received considerable attention. As there were no forests to be removed in the West, and the pasture area increased, and the means of transportation opened up the grazing area of the trans-Mississippi region, cattle-raising became of relatively greater and greater importance. The increase in the use of machinery since 1850 has created a larger demand for horses and mules, which, however, has been somewhat checked since 1890 by electric transportation and the bicycle. Mules are increasing much more rapidly than horses in the South. A remarkable fact shown by the table is that in the South Atlantic division there has been, generally speaking, a retrogression in stock-raising. About 1850 cotton began to dominate the agricultural industry, and thus resulted an actual decrease in the number of cattle, swine, and sheep. The same has been true of that portion of the South Central division which was productive in 1850, the increase shown for that division being due to the development of new territory in Texas, Indian Territory, and Oklahoma. A large part of this region is in the grazing and grain belt. Little was done prior to the beginning of the nineteenth century to improve the breeds. By the year 1900 the rate of improvement had become very rapid.

HORSES. The most distinctive success attained in American horse-raising has been in the development of a new and superior breed of race-horses. American racers are now the best in the world. Vermont early became well known for the raising of driving horses, but the Blue-grass region of Kentucky now contains a large number of the most famous breeding farms of driving horses in America. (See article HORSE.) In 1895 there were 120,000 registered standard-bred trotters in the United States. From the trotting stock are bred roadsters and coach horses, the European breed of coach horse not being extensively bred in the country. The United States has not developed any new breeds of draught horses, but imports stock horses of this kind from Europe. The favorite breeds are the English draught, Clyesdale, and Percheron. On the whole, the United States is still far behind Great Britain and some other European countries in respect to the proportion which the number of its thoroughbred horses bears to the total number of horses. Until recently the American farmer was inclined to favor a horse for general purposes, but there is now a decided tendency to breed for special purposes—draught, roadsters, coach, racers, etc. The steady growth in the demand for horses prior to about 1890 resulted in the breeding of the low grade as well as the better class, a condition very much against the improvement of the breed. The decline in demand and depreciation in price between 1890 and 1895 checked the breeding of inferior animals, and since then the grade of horses has improved much faster than before.

CATTLE. The nineteenth century was well advanced before stock cattle from Europe had been imported to any considerable extent. Shorthorns were for several years imported in the largest numbers, and there are more pure-blooded and grade shorthorns in the United States to-day than all other breeds. The 'hustling' qualities of the Herefords made them favorites in the range States. The polled Angus were introduced later (1870), but have become rivals of the Herefords for beef purposes, especially in the North Central States. These three breeds comprise practically all the pure-blooded cattle in the United States used for breeding and for grading up native cattle for beef purposes. In feeding and breeding beef cattle it has been the aim in recent years to reduce the time necessary to prepare the animal for market. In the Western and South Central States the average age of range cattle decreased six months from 1890 to 1900. It was claimed that in the latter year cattle matured a year earlier than in 1880. Pure-blood bulls are most common in the range States of the West.

The method of cattle-raising in the range region has greatly changed in the last quarter of the nineteenth century. Formerly cattle were pastured and driven about without hindrance over Government lands. To-day much of the range area is inclosed by wire fences. Part of the former range area has been settled by small farmers, but produces more cattle than under the old system. Instead of letting range cattle shift for themselves in winter, as formerly, it is common to provide food and protection for them.

The recent remarkable development in the dairying industry has exercised a decided influence over cattle-raising. The number of milk or dairy cows increased from 6,385,000 in 1850 to 17,139,674 in 1900, while the increase in dairy value of these cattle was proportionately much greater. See CATTLE, and DAIRYING.

HOGS. The United States has accomplished more in the development of new and superior breeds of hogs than in that of any other farm animal. Indeed, in both the quality of the breed and in absolute number the United States stands almost alone in this branch of industry. In 1900 the United States had as many hogs as the entire Continent of Europe.

The hog is the largest consumer of American corn, and where there is an abundance of one there are large holdings of the other. The hog is ready for the market at an early age, and is therefore a 'quick-money' animal. If it can be saved from disease it is the most profitable investment for the corn-grower. It has won the appellation of 'mortgage-lifter.' Until toward 1850 the most common grade was the half-wild, long-legged, thin animals known as 'razor-backs.' They are still common in the Southern States, but before 1830 a distinct breed, the Chester White, had been developed in Chester County, Pennsylvania, and about 1840 another new breed, the Poland China, originated in southwestern Ohio. The Durocs or Jersey Reds, another native breed, first became common in New Jersey, and is now well known over the country. Through these and other improved native breeds, together with the imported Berkshires, the grade of hogs in the North Central States has been improved until it has reached a very high standard. Stockmen have aimed at securing a breed that will fatten quickly and at an early age. The Poland China satisfies this condition, and its imprint is most noticeable among American hogs.

SHEEP. Sheep hold a much lower rank in the agricultural economy of the United States than in that of most modern nations. The industry has labored under the disadvantages of a vacillating tariff policy, and for a number of years has had to compete with the growing flocks of Australasia and of the Plata region of South America. In the United States the number of sheep increased from 28,477,591 in 1870 to 50,626,626 in 1884, after which year there was a rapid decrease in numbers. During the middle of the nineteenth century the merino was the prevailing breed, and in 1870 more than four-fifths of all the sheep in the United States were either pure breed or grade merino. In 1900 it is estimated that 30 per cent. of the flocks in the range country were of mutton breeds, and that from seventy to eighty per cent. of those in the farming States had a predominance of English blood. The merino blood still predominates in the range States. In consequence of this change the average value of sheep nearly doubled between 1870 and 1900. The average weight of the fleece increased from 4.8 pounds in 1880 to 5.6 pounds in 1890 and 6.7 in 1900. Thus, although the number of sheep decreased, there was a large gain in the total wool production, amounting to 16.8 per cent. in the decade 1890-1900. The number of sheep in the United States in 1900, outside of the Western division of States, was not so great as in 1850. Sheep-grazing began to spread rapidly in the Western division about 1870. Since 1890 there has been most remarkable development in sheep-grazing in the northern Cordilleran States. In Montana, the foremost sheep State in the Union (4,215,000 head in 1900), the increase amounted to 79.2 per cent.; in Wyoming, which ranks third, the increase amounted to 367 per cent.; while in Idaho it was 449.5 per cent. In New England the dairy industry has supplanted sheep-raising, so that the number of sheep in 1900 was less than one-third the number in 1850. Since 1880 there has been a decline in the North Central States, particularly Ohio. Texas in 1890 had attained first rank, but in 1900 had only one-third the number of sheep reported for the earlier year. Elsewhere through the Southern States the industry was never important, and has declined generally since 1850.

POULTRY. The importance of the production of eggs and poultry in the United States is not generally realized. The value of the poultry and the egg products in 1899—$136,891,877 and $144,286,370 respectively—was two-thirds greater than the value of wool and about one-fourth than that of oats produced in that year. The egg production (chicken) for the year amounted to 1,293,818,144 dozen, an increase of 474,000,000 dozen over 1889. This gain was partly due to the greater use of the incubator. The value of the egg product in Ohio and Iowa in 1899 each exceeded $10,000,000. The different kinds of fowls in 1900 numbered as follows: Chickens, 233,598,005; turkeys, 6,599,367; geese, 5,676,863; and ducks, 4,807,358. The foregoing figures are for farms, not villages, and do not include fowls under three months old.

FORESTS AND FOREST PRODUCTS. See the articles on FORESTRY and LUMBER INDUSTRY.

MANUFACTURES. The United States is the foremost manufacturing country in the world. The net value of its manufactured products in 1900 was nearly double that assigned by Mr. Mulhall to the manufactured products of Great Britain in 1894; and, according to the United States census estimate, was considerably over a third greater than the value of the British products in 1900. In the United States nearly 1,000,000 more persons were employed in 1900 in manufactories than were similarly employed in 1899 in Great Britain. Mr. Mulhall also estimated that if the extra value of United States products due to a protective tariff be included, the United States produced about one-third of the total manufactures of all nations. He claimed further that American manufactures multiplied twenty-fold between 1840 and 1894, while those of Europe only doubled. Manufacturing is absolutely the most rapidly growing of the American industries, and has become of coördinate importance with, if not of greater importance than either of the two other leading American industries—agriculture and trade and transportation.

The net value of the products of manufacture in 1900 was more than double the value of the net products of the farm. Even after the crude materials contributed by the farm, the forest, the mine, and the sea have been eliminated from the total net value of manufactured products, the value remaining still exceeds by more than one-sixth the net value of agricultural products. The value of manufactured products was twelve times as great in 1900 as in 1850, whereas the value of agricultural products was only three times as great. The number of individuals engaged in manufacturing was nearly a fourth less than the number in agriculture and over one-fourth greater than the number engaged in trade and transportation. See paragraph on *Occupations* in section on *Population*.

Natural Advantages. There is nothing strange in the large proportions which the manufacturing industry is attaining. There is no other territory under one government in the world with so much productive power. The abundance of raw material required by the manufacturing industries, the degree of availability, including transportation facilities, and the capabilities of the producers are unequaled. Both food supplies and agricultural materials for manufacture are cheaper, more abundant, and more varied in the United States than in any other manufacturing country. The well-distributed forests contain most varieties of timber needed in large quantities, and in amounts that admit of heavy exportations. The mineral resources also include nearly every variety required for manufacturing industries. In the production of the two minerals which constitute the basis of modern manufactures, coal and iron, the United States ranks foremost, and, indeed, produces nearly a third of the world's output of each. Moreover, the deposits of these minerals, together with deposits of limestone, which is needed in fluxing the iron ore, are frequently found in the same locality.

The transportation facilities include 18,000 miles of navigable rivers and a railway mileage that is greater than that of all Europe and that is over 39 per cent. of the railroad mileage of the world. The competition of the waterways with the railways gives the country the advantage of cheap rates. Another advantage about which little is said, but which, nevertheless, is great, is the freedom of interstate commerce. In no other equally large area in the civilized world is trade unrestricted by customs, excises, or national prejudice. The freedom which the United States enjoys from tradition is another factor of prime importance. At the same time the manufacturing industry has profited by reason of the contribution of ideas of people schooled under different industrial systems. The immigrant, like the native-born, is animated by the prospects of large possibilities, and a greater energy and ingenuity pervades industrial society in the United States than is known in the European countries. As a result the individual laborer accomplishes more in this country than he does abroad.

Mulhall says that nearly all American manufactures are produced by machinery, while in Europe more than one-half is hand work. With respect to the completeness of organization, the minuteness of its subdivision, and the rapidity with which work is expedited, the United States also excels. The United States has developed a system of 'interchangeable mechanism' which has proved of inestimable value to the progress of the manufacturing industry.

Localization. The manufacturing industry is very unevenly distributed over the country. There is a decided tendency to centralize in limited localities. The greater part of the manufacturing is carried on in the region north of the Potomac and Ohio rivers and east of the Mississippi. The centre of manufactures has always been well to the north and east of the centre of population, but has at every decade moved westward, and was nearer the centre of population in 1900 than in 1850. In 1850 the New England States produced 27.8 per cent. of the total products of the United States, and the Middle States 46.4 per cent. Notwithstanding the great increase in both sections, their relative production had decreased respectively to 14.4 and 38.0 in 1900. About 1850 the Central States were occupied chiefly with agricultural pursuits, and produced only 14.3 per cent. of the total product. But nowhere else in the world has there been so rapid a transformation of the occupations of the population. In 1900 that section produced 30.7 per cent of the total product. The Southern States suffered greatly in consequence of the Civil War, the per cent. of the total product contributed by that section having fallen from 10.3 in 1860 to 6.6 in 1870. Since 1870, however, there has been a rapid revival of industry, and in 1900 it produced 9.1 per cent. of the total product of the country.

In the localization of industries the factor of transportation in its relation to the supply of raw materials and the market has been one of primary importance. This applies especially to bulky and heavy products which are shipped with difficulty. Thus Pennsylvania and eastern Ohio become the iron-manufacturing region, since coal and iron are brought together here at a minimum cost. Live animals cannot be so easily shipped as packed meats, and hence the slaughtering industry is confined mainly to the West. The saving in the cost of transportation is a chief reason for the recent devlopment of cotton manufacturing in the cotton-growing region. Proximity to the supply of wood and iron, and convenience to the market, give the Lake States the advantage of manufacturing agricultural implements at a minimum transportation cost. The densely populated Atlantic Coast region from Baltimore to Maine enables manufactures located in that section to reach a large market with a minimum transportation cost.

Another important natural condition affecting localization of industries is water power. This was formerly more important than at present, and is more prominent in determining the exact spot than the general section. Often, however, the natural advantages mentioned are of secondary importance, or decline in relative importance after an industry is well established. In such cases the momentum which an industry has received by its early start is often sufficient to carry it on. After long-continued success at a given point a certain precedence may become attached to the name of the place and a fostering local atmosphere is developed. In many industries technical training is of greater importance than accessibility to raw materials. Abundance of capital and labor are other prominent advantages. The North Atlantic States have benefited greatly from each of the three advantages just mentioned. Agriculture in this section long since ceased to absorb the available local capital, or afford an occupation for the surplus labor. For the growth and extent of manufactures, see MANUFACTURES, and the separate articles on the various manufacturing industries, such as COTTON; IRON and STEEL; WOOL; etc. Also see the paragraph on *Manufactures* under the various States, and see FLOUR.

TEXTILES. The group of industries called textile in 1900 ranked first in the number of wage-earners employed, second in the amount of capital invested, and third in the value of products. If allowance be made for duplications, the value of products given in the table of the 15 groups of industries would be reduced to $1,095,127,934—the net value of products ready for direct consumption. The following table shows the growth of the combined textile industry since 1850 and its importance in 1900:

INDUSTRIES	Year	Number of establishments	Capital	Wage-earners; average No.	Value of products
Combined textiles	1900	4,312	$1,042,997,577	661,451	$931,494,566
Cotton manufacture:					
Cotton goods	1900	973	460,842,722	297,929	332,806,156
Cotton small wares	1900	82	6,397,385	4,932	6,394,164
Wool manufacture	1900	1,414	310,179,749	159,108	296,990,484
Silk manufacture	1900	483	81,082,201	65,416	107,256,258
Hosiery and knit goods	1900	921	81,860,604	83,387	95,482,566
Flax, hemp, and jute	1900	141	41,991,762	20,903	47,601,607
Dyeing and finishing textiles	1900	298	60,643,104	29,776	44,963,331
Combined textiles	1890	4,276	767,705,310	517,237	759,262,283
Combined textiles	1880	4,018	412,721,496	384,251	532,673,488
Combined textiles	1870	4,790	297,694,243	274,943	520,386,764
Combined textiles	1860	3,027	150,080,852	194,082	214,740,614
Combined textiles	1850	3,025	112,513,947	146,877	128,769,971

The inflation of the currency for 1870 makes the money figures for that year too large, and the increase in the following decade seems too small. It will be seen that, omitting flax, hemp, and jute, the capital invested has multiplied more than 8 times in 50 years and that the value of products has increased almost seven-fold. The much less relative increase of wage-earners (336.1 per cent.) indicates the growing importance of machinery in the manufacture of textiles.

The cotton-manufacturing industry has developed in recent years with great rapidity, and has placed the United States first with respect to the number of bales of cotton consumed. According to one estimate the average number of bales consumed for the five years ending with 1870 was 875,000 for the United States, 1,842,000 for the Continent of Europe, and 2,639,000 for Great Britain. The consumption for the year 1900 was respectively 4,599,000, 5,720,000, and 4,079,000 bales. However, when it is considered that the greater part of the spinning in the United States is of coarse or medium yarns, whereas the average spinning on the other side of the Atlantic is much finer, and the estimate is based upon the number of spindles or persons employed, it will be found that Great Britain is far in the lead. In 1900 the United States had 19,008,000 spindles, the Continent of Europe 33,000,000, and Great Britain 46,000,000. The data for the comparison of woolen manufacture in the different countries is less satisfactory. An estimate of wool consumption for 1894 accredited North America with 458,000,000 pounds, the Continent of Europe 1,247,000,000 pounds, and Great Britain 507,000,000 pounds. The United States exceeds but slightly, if at all, any of the three leading Continental woolen manufacturing countries—France, Germany, and Austria. The recent rapid development of silk manufacturing has placed the United States second in rank, and of the total product of the United States and Europe the former produced in 1900 23.3 per cent. The manufacture of flax, hemp, and jute in the United States is comparatively small.

WOOL MANUFACTURES. The greater part of the manufactures of wool consumed in the United States is of domestic production, the imports of woolen goods ranging in value from one-twenty-fifth to one-sixth of the value of the domestic production. The bulk of the wool used in manufacture is domestic, but the imports of raw wool also fluctuate enormously. The percentages of imports to the supply for the years 1896-1900 inclusive were respectively 46.3, 58.0, 20.9, 22.2, and 29.4. The total amount imported during that period was about two and one-half times the amount imported from 1881 to 1885 inclusive. Wool manufactures may be grouped under the general heads of woolen goods, worsteds, carpets (other than rag), felt goods, and wool hats. Until very recently the first of these groups had comprehended the greater part of the industry. There has been, however, a decline in the value of the products of woolen goods from $160,606,721 in 1880 to $118,430,158 in 1900. In the latter year there were 68,893 wage-earners employed in 1035 establishments. The decline in the manufacture of woolen goods is due to the introduction of worsted cloth for men's wear and the development of knit-goods manufacture. The change from one to the other was incident upon the mechanical improvements which made possible the combing of short staple wool and to the adaptation of American wools to the combing process consequent upon the crossing of the merino sheep with those of English blood. See AGRICULTURE.

The manufacture of worsteds began in 1843. The progress has been rapid and steady, the value of the product in 1900, $120,314,344, being in excess of the value of woolen goods for the same year. There were 57,008 persons engaged as wage-earners in the industry. The first carpet manufactory was opened in 1791. The power loom was adapted to the weaving of ingrain carpets in 1844, and later to the weaving of Jacquard Brussels, Wilton, tapestry Brussels, and other makes. In 1900 28,411 persons were engaged as wage-earners in the industry and the product was valued at $48,192,351. The value of felt goods in 1900 was $6,461,691, and wool hats, $3,591,940. The woolen industry is almost wholly confined to the New England and the Middle Atlantic States, Massachusetts and Pennsylvania together producing over half the total product. Pennsylvania—chiefly Philadelphia—produces 48 per cent. of the carpet product of the United States. The following table shows the number of spindles employed in wool manufactures:

COMPARATIVE STATEMENT OF SPINDLES, 1890 AND 1900

	Woolen		Worsted		Cotton	
	1900	1890	1900	1890	1900	1890
Woolen mills	1,789,683	1,742,288	65,762	19,750	51,136	53,342
Worsted mills	150,026	207,180	1,125,644	479,675	93,356	68,225
Carpet mills	67,033	53,046	138,849	151,132	8,324	4,680
Felt mills	24,286	13,829	....	....	....	....
Total	2,031,028	2,016,343	1,325,255	650,557	154,816	126,247

HOSIERY AND KNIT GOODS. The hosiery and knit goods products were formerly classed with the woolen goods, but since cotton has become the chief material used they have been separately classified. The industry is of recent development and has almost equaled the worsted and the silk industry in rapidity of growth. In 1850 the product was valued at only $1,028,102; in 1900 it was over 90 times that value. In the latter year 83,387 persons were engaged as wage-earners in the industry. New York and Pennsylvania produced about four-sevenths of the total product.

SILK MANUFACTURES. In 1850 the value of silk manufactured in the United States was $1,809,476. In 1900 it was 60 times that amount, and the amount of raw silk consumed exceeded that consumed in France, the lårgest European manufacturer of silk. There were 483 establishments, employing 65,416 wage-earners. Almost the entire supply of raw silk used in the census year, 9,760,770 pounds, was imported from Japan, China, and Italy. The principal silk manufacturing district is northern New Jersey, after which come Pennsylvania, New York, and Connecticut.

FLAX, HEMP, AND JUTE MANUFACTURES. The value of the flax, hemp, and jute products increased from $37,313,021 in 1890 to $47,601,607 in 1900. In the latter year there were 20,903 wage-earners employed in 141 establishments. Binder twine and rope together constitute about five-ninths of the total product. Hemp is the principal material used. Very little success has attended the spasmodic attempts to establish linen manufactures in the United States. The flax grown here is not suitable for spinning. Massachusetts, New York, and Pennsylvania are the chief manufacturing States in this line.

CLOTHING. The production of men's ready-made or 'factory-made' clothing was already well advanced by 1850, but the manufacture of women's ready-made clothing has developed almost wholly since then. The total value of men's clothing—factory product—in 1900 was $276,861,607, an increase of 10.3 per cent. between 1890 and 1900, a decrease in price having made this figure much smaller than it would have been on the old scale of prices. The value of women's factory-made clothing meanwhile increased 133.8 per cent., the value in 1900 being $159,339,539. There are few other important branches of industry that employ so many wage-earners in proportion to the value of the product. In 1900 there were 120,950 engaged in the manufacture of men's clothing, and 83,739 in that of women's clothing. Since about 1876, however, there has been a revolution in the system of manufacturing men's clothing, resulting from the greater division of labor and the use of machinery, so that there has been a decrease of nearly one-fourth in the number of wage-earners.

Prior to about 1876 ready-made clothing was made principally by skilled ,tailors, assisted by members of their household. About that time the 'team-work' and task-price system was introduced, which divided the work between a number of persons. Each person performs only a small detail of the work, and little or no skill is required. Since the work requires no previous experience and no knowledge of the language, the unskilled foreign element in the large population centres have naturally drifted into it. The manufacturer, åfter the cloth and the linings have been cut, usually lets the work to contractors, who sublet it to be done in private houses or small workshops. This 'sweating system,' so called, represents one of the most unsatisfactory labor conditions in America. Very recently a new system, called in contradistinction the 'factory' system, is supplanting the task system. More persons are employed in a shop, and sometimes more than 100 persons are engaged in the making of one coat. More skill is required in the manufacture of women's clothing, and the task system has not been applied much in cloak manufacture. Considerably over one-third of the total product of men's ready-made clothing and over two-thirds of women's ready-made clothing are made in New York City. The increase in the value of men's ready-made clothing between 1890 and 1900 was greater for New York State than for the whole country. The business formerly done in Massachusetts has been largely transferred to New York.

The value of the clothing product of men's custom work and repairing for 1900 was estimated at $137,714,282, and of women's custom-made clothing and dressmaking, $48,356,034. Other important items of clothing manufacture for the same year were: Shirts, $49,022,845; men's furnishing goods, $43,902,162; and hats and caps, $52,797,697.

Iron and Steel. The United States is abundantly provided by nature with resources that are necessary for the production of iron and its manufacture. (See Mining.) No other industry compares with it in the absolute growth made since 1880. In 1890 the United States led the world in the production of pig iron and steel, and in 1900 its production of pig iron was 46 per cent. greater than that of Great Britain and its production of steel was more than twice as great as that of the rival country. In 1902 the United States produced 15,000,000 tons of steel out of a total world product of 35,000,000. Next to the United States were Germany, with 7,780,000 tons, and Great Britain, with 5,000,000 tons. The following table shows the growth since 1880 of the total iron and steel industry and of its three fundamental divisions: pig iron; steel ingots, steel castings, and rolled iron and steel; and iron blooms, billets, and hammered bar iron:

	Year	No. establishments.	Capital	Average number wage-earners	Tons product	Value product
Iron and steel total	1900	669	$590,530,484	222,607	29,507,860	804,034,918
	1890	719	414,044,844	171,181	16,264,478	478,687,519
	1880	792	209,904,965	140,798	6,486,733	296,557,685
Pig iron	1900	224	148,226,113	39,358	14,452,234	206,823,202
	1890	304	134,604,543	33,415	8,845,185	145,643,153
	1880	341	89,531,362	41,695	3,375,912	89,315,509
Steel ingots and steel castings and rolled iron and steel	1900	438	441,795,983	183,023	15,040,129	596,689,284
	1890	395	278,559,831	137,295	7,388,244	331,860,872
	1880	358	116,458,390	96,164	3,046,038	203,274,042
Iron blooms and hammered bar iron	1900	7	508,388	226	15,497	522,432
	1890	20	876,470	471	31,049	1,183,494
	1880	93	3,915,213	2,939	64,783	3,968,074

Coke is the principal fuel used in blast furnaces, while bituminous coal and slack are the most important fuel used in the rolling mills and steel works. There has been a great decrease since 1880 in the number of furnaces using charcoal for fuel and also in the number using anthracite alone and mixed anthracite and coke, but an increase in the number using coke or bituminous coal and coke, the latter class numbering 235 in 1900. The production of Bessemer pig iron in the census year amounted to 8,475,530 tons, while that produced by the basic open-hearth method amounted to 937,439 tons. Blast-furnace stacks decreased from 681 in 1880 to 399 in 1900, of which 326 were active. The value of iron rails manufactured decreased from $20,974,697 in 1880 to $31,180 in 1900. The value of steel rails manufactured, on the contrary, increased from $37,892,075 in 1880 to $60,272,575 in 1890, and then decreased to $46,501,979 in 1900, this decrease being due to a fall in price, there having been a large gain in tonnage. The value of iron and steel bars and rods, not including sheet or tin plate bars or wire rods, increased from $56,696,679 in 1880 to $100,597,221 in 1900. Other large items of manufacture in 1900 were iron and steel wire rods, $35,529,529; iron and steel hoops, bands, cotton ties, and skelp, $49,159,747; iron and steel boilers and other plates and sheets, except nail and tack plate, black plates, or sheet for tinning and armor plate, $68,109,223; iron and steel roll blooms, slabs, billets, tin plate bars, and sheet bars, $96,321,887. The following table shows the growth of the industry for the three leading States:

STATE	Year	Number establishments	Capital	Wage-earners, average number	Value of products
Pennsylvania	1900	291	$321,985,659	110,864	$434,445,200
	1890	311	226,294,407	92,473	264,571,624
	1880	321	102,956,223	57,952	145,576,268
Ohio	1900	107	86,477,552	33,677	138,935,256
	1890	101	37,642,887	23,546	65,206,828
	1880	103	22,807,606	20,071	34,918,360
Illinois	1900	26	43,356,239	16,642	60,303,144
	1890	24	34,689,919	8,685	39,011,051
	1880	16	5,795,620	5,253	20,545,289

See the articles Iron and Steel, and Pennsylvania.

Electric Apparatus and Supplies. There is no industry of so recent development that has attained the magnitude of the electrical apparatus and supply manufacturing business. The total product was valued at only $2,655,036 in 1880, and increased to $91,348,889 in 1900. In the latter year the industry employed 40,890 wage-earners, in 580 establishments. The product comprehended a great variety of things, the most important of which were motors, valued at $19,505,504; dynamos, $10,472,576; and telephones, $10,512,412. The industry centres mainly in a few of the largest cities.

Shipbuilding. Shipbuilding was, after agriculture, the first industry to develop in colonial America. The possession of an abundance of timber has always given the United States a great advantage in the building of wooden vessels. Vessels constructed in the United States carried the bulk of the American trade until after 1860. The zenith of the shipbuilding industry was reached between 1850 and 1860, at which time the superiority of the American-built 'clippers' for endurance, speed, and safety was conceded. About the time of the Civil War, which was in itself a serious blow to the industry, the British shipbuilders were changing from sail to steam and from wood to iron in the construction of vessels, neither of which changes was adopted by the American builders. In consequence American shipbuilding failed to hold its own absolutely, and relatively fell far behind foreign countries. For many years American shipyards have done little more than supply vessels for the large domestic water-borne trade, which has by law been restricted to vessels built in the United States. The aggregate tonnage of American-built vessels registered for the foreign trade in 1900 amounted to only 42.2 per cent. of the total product turned out by American shipyards for that year. Only one steel steam vessel was built in the United States during 1900 for the foreign trade. The figures for the construction of iron and steel vessels have been greatly swollen in recent years in meeting the requirements of the Navy Department. The order for warships has been placed with domestic firms, in the belief that it would lead to the equipment of plants in a way that would enable them successfully to engage in the construction of large steel merchant vessels. The value of products for the private iron and steel shipbuilding establishments increased 287 per cent. between 1890 and 1900, but there was a decrease of 3.4 per cent. in the value of products for wooden ship and boat building during the same period. Sixteen and two-tenths per cent. of the total tonnage built in the United States during that year was constructed on the Great Lakes. The Delaware River district is far in the lead in the shipbuilding industry. The Chesapeake Bay is also important. These two regions employ nearly one-half the capital invested in the industry in the United States.

Cars—Steam Railroad. The manufacture of cars has developed rapidly to meet the demands of the growing railroad traffic. According to the census of 1900, 1296 establishments came under the class "cars and general shop construction, and repairs by steam railroad companies," with 173,652 wage-earners employed, and products aggregating a value of $218,238,277. Under the heading "cars, steam railroad, not including operations of railroad companies," there were 65 establishments, employing 33,453 wage-earners, and having a product valued at $90,510,180. Between 1890 and 1900 the value of the products of the former class increased 68.6 per cent. and of the latter 29.1 per cent. The industry, particularly the former class, is widely distributed over the country, but is of greatest importance in the region of heaviest railroad traffic, or where supplies of lumber and iron are most convenient. Pennsylvania is far in the lead, with New York and Illinois following, although Indiana reported the largest value of products for car companies not including railroad companies. In recent years there has been a marked increase in the weight, strength, size, and convenience of cars. (See paragraph *Railroads.*) Steel is now extensively used to replace or to strengthen wood in car construction. A steel car company of Pittsburg uses over 1600 tons of steel a day, and is the largest single consumer of steel in the world.

Locomotives. During the census year 1900 there were 28 establishments solely or chiefly manufacturing locomotives. At these works 2774 locomotives were built, representing an aggregate value of $27,121,063—an increase in number of 15.2 per cent., and in value of 37.3 per cent. over 1890. In addition, 272 locomotives, valued at $3,276,393, were constructed at 26 railroad repair shops. There is a constant increase in the size, weight, and steam-generating capacity of locomotives constructed. Over one-half of the total number are built in Pennsylvania, Philadelphia having the largest locomotive works in the world. About half of the remainder are manufactured in New York. Since 1894 there has been a rapidly increasing number of locomotives exported (525 in 1900), quickness of delivery, efficiency, and price all being in favor of the American locomotive. The manufacture of traction engines and of motor vehicles has become very important. In 1900, 6132 of the former and 4192 of the latter were manufactured.

Carriages and Wagons. The manufacture of carriages and wagons exceeds in value of products the manufacture of agricultural implements. In the early part of the nineteenth century transportation was still mainly by horseback, and the value of the carriages and wagons manufactured in 1810 was only $1,421,573. In 1900 the corresponding figure had grown to $121,537,276, and the capital invested was nearly as great. There were in that year 7,632 establishments, employing 62,540 wage-earners. In recent years three factors have tended to limit the use and consequently the manufacture of carriages, namely, the bicycle, the electric railway, and the automobile. Ease of access to the supply of hard-wood timber has been an important factor in determining the localization of the industry. The Central States produced (1900) 55.6 per cent. of the total product. Ohio, New York, Indiana, and Michigan, in the order named, lead in the value of product, Indiana having the largest capital invested.

Bicycles and Tricycles. The manufacture of bicycles has developed mainly since 1890. The number of establishments increased from 27 in 1890 to 312 in 1900, and the value of products from $2,568,326 in the former year to $31,915,908 in the latter. During the middle of that decade the production greatly exceeded that figure. Since 1890 the United States has led the world in the quality and quantity of bicycles produced, and now exports to all countries. Up to 1900 the Patent Office had granted 7,573 patents for cycles and their component parts—the great majority of them since 1890. The Central States produced 58.5 per cent. of the total product, Illinois and Ohio being in the lead.

Agricultural Implements. The manufacture of agricultural implements has developed rapidly since 1850. The total value of products in that year was $6,842,611, and in 1900, $101,207,428. This growth is due primarily to the increasing demand of the American farmer. Nearly two-thirds of the increase in value of products ($11,243,763) between 1890 and 1900 was due to the rapid increase of exports of agricultural implements during that decade. In 1900 Illinois produced over two-fifths of the total output. It occupied first place in the number of cultivators, harrows, plows, harvesters, and combined harvesters and binders, horse hayrakes, and mowers manufactured, which number includes most of the more elaborate, complicated, and valuable machines. Wisconsin manufactured about one-half the threshers. See under AGRICULTURE.

MUSICAL INSTRUMENTS AND MATERIALS. In 1900 there were 621 establishments manufacturing musical instruments. There were 23,765 wage-earners, and the total product was valued at $44,514,463. The industries consist mainly in the manufacture of pianos, the total value of the manufactured pianos having increased from $5,260,907 in 1860 to $35,428,225 in 1900. For a half century practically all the pianos and most of the other musical instruments used in the United States have been of domestic make. Their manufacture here has been favored by the abundance of wood suitable for sounding boards, as well as for piano cases. Up to the year 1866, 97 per cent. of all the pianos made in the United States were square pianos. In 1900 97.4 per cent. of the pianos were upright. New York, Chicago, and Boston are the chief centres of the industry.

ALCOHOLIC AND MALT LIQUORS. The production of liquors in the United States is about equal to the home consumption. Little (chiefly wine) is imported. In 1900 the value of malt liquors was reported at $237,269,713, distilled liquors at $96,798,443, and vinous liquors at $6,547,310. The first and last estimates included the revenue tax, but only a part of this was included in the estimate for distilled liquors. Malt liquors are of the greater importance by far, the product having increased steadily in amount from 2,006,625 barrels in 1863 to 39,330,849 barrels in 1900. The manufacture of distilled spirits fluctuates enormously from year to year, with only a slight tendency to increase, there being a marked contrast with malt liquors in respect to both steadiness and increase. In 1900 the output amounted to 109,245,187 gallons, which was the largest for any year since 1893. Corn is the principal material used in the production of both, but barley is also extensively used in the manufacture of malt liquors, particularly at Milwaukee, and rye in the manufacture of distilled liquors. The manufacture of both is well distributed over the country. New York, Pennsylvania, Illinois, Wisconsin, and Ohio lead in the value of malt products, while Kentucky and Indiana are well in the lead in the production of distilled liquors. The manufacture of commercial wine did not begin until near 1860, and the principal development has been made since 1890. The product is still very small compared with that of many other countries. It was 39,600,000 gallons in 1901. The industry is localized in the grape-growing regions, California being far in the lead, with Ohio and New York next in importance. The capital invested in the manufacture of alcoholic and malt liquors ($457,674,087 in 1900) is much greater than the combined capital of the flour and grist milling and slaughtering and meat-packing industries. The total number of establishments in 1900 was 2835, and the number of wage-earners employed 44,417.

TOBACCO. The value of the manufactured tobacco products in 1900 was over four-fifths the value of alcoholic liquors, but the value of the capital invested in the former is less than two-sevenths that in the latter. The amount of the manufactures is adjusted to the home demand, there being but little manufactured tobacco imported and almost none exported. The increase in the value of chewing and smoking tobacco and snuff from $21,820,535 in 1860 to $103,754,362 in 1900, and the increase in the value of cigars and cigarettes during the same period from $9,068,778 to $160,223,152, show a remarkable growth, especially in the latter class of products. In consequence of the competition of the cheap German-made cigars, but few cheap cigars were made in this country prior to the tariff acts between 1860 and 1865. The manufacture of cigarettes began still later, but developed so rapidly that in 1897 it actually exceeded in number the cigars made in that year. Almost the entire cigarette product is manufactured by machinery in large establishments. Of the entire product 94 per cent. is made in New York City, Richmond, Va., Durham, N. C., and Rochester, N. Y. Recent inventions have also made it possible to manufacture cigars by machinery, but this method has not yet come into general use. The hand method makes necessary the employment of a large number of workmen. In 1900 there were 142,277 persons employed in tobacco manufacture, or over three times as many as in the flour and grist milling industry.

PRINTING AND PUBLISHING. The value of products accredited to newspapers and periodicals in 1900 was $222,983,569; to book and job products, $121,799,096; and to music, $2,272,385. The wage-earners employed numbered respectively 94,604, 67,610, and 778. The increased use of labor-saving machinery in printing is evidenced by the fact that while the capital invested increased, between 1890 and 1900, 52.4 per cent. and the value of products increased 24 per cent., the number of wage-earners increased only 10 per cent. The publication of books and magazines is confined mainly to a few of the largest cities. The publication of daily papers is much more widely distributed. The publication of weekly papers is still much more extensively distributed, the weekly being as a rule the only newspaper taken in rural communities. In almost every incorporated town there is a weekly. The publishing houses in America have profited greatly, since 1890, from the reduced price of paper, due to its manufacture from wood pulp. See the articles on NEWSPAPER; PERIODICAL; PRINTING.

TIN AND TERNE PLATE. The manufacture of tin and terne plate is one of the newest industries in the country, having developed wholly since 1890. In 1900 there were 22 establishments devoted entirely to tin terne dipping, 35 others that combined with this the manufacture of black plate, and 9 others that were restricted to the making of black plate. The total value of the product was $61,912,619, of which $31,892,011 was accredited to tin terne dipping. There were 14,826 wage-earners engaged in the industry. Pennsylvania, Ohio, and Indiana lead.

WOOD PULP AND PAPER. The utilization of the forest resources of the country for the manufacture of paper has developed mainly since 1890. In the $70,530,236 which represented the total cost of products in 1900, wood pulp was the principal item, and the cost of rags, old paper, and manila stock, which 50 years before were the only materials used for paper-making, was only $13,902,092. Spruce constituted 76 per cent. of all wood used in the manufacture of wood pulp, poplar being the only other variety extensively used. The wood-pulp industry is generally located near the source of supply of wood and where water power is available. New England, New York, Pennsylvania, and Wisconsin represent the bulk of the industry. Water power in 1900 constituted two-thirds of the total power used by mills for grinding the wood and for the beating and washing machines, while merely steam power is used for the paper machines. New York leads in the production of newspaper and wrapping paper. Massachusetts is the largest consumer of rags from which are produced writing and other fine papers. The Middle West still consumes large quantities of straw in the manufacture of paper, Indiana being well in the lead. The total value of products for the paper and pulp industry increased from $78,937,184 in 1890 to $127,326,162 in 1900. In the latter year 49,646 wage-earners were employed in 763 establishments.

Glass. The glass industry has made a decided growth during every decade since 1850, and the value of products has increased over eleven-fold since that time. In 1900 there were 355 glass manufacturing establishments, 52,818 wage-earners being employed. The value of products was estimated at $56,539,712. Natural gas is the most desirable fuel for use in this industry, and the recent development of the industry has been mainly in the gas fields. In 1900 Pennsylvania produced 38.9 per cent. of the total product, Indiana 26.1 per cent., and Ohio 8.1 per cent. An excellent glass sand is found in southern New Jersey, and this is the only important glass manufacturing region on the Atlantic coast.

Chemicals. The American chemical-manufacturing industry has never possessed the advantage of having a large number of highly skilled chemical specialists employed in its service. In 1900 only 276 chemists were employed in the establishments covered by the census. Moreover, the laws of the United States give the foreigner the monopoly of a patent without requiring that the protected article shall be made where the patent is issued. The United States therefore is seriously handicapped in competition with the Germans. Transportation costs, however, have favored the home manufacturer of heavy chemicals, and their production has accordingly increased rapidly. The following table shows the growth of the industry in 1890-1900:

	No. of establishments	Capital 1900	Average No. wage-earners	Products, value of, 1900	Reclassified products, value of, 1900	Reclassified products, value of, 1890
Chemicals	459	$89,091,430	19,054	$62,676,730	$78,414,840	$55,269,377*
Dyestuffs	77	7,839,034	1,648	7,350,748	7,767,226	8,857,084
Essential oils	70	612,657	199	850,093	859,401	....
Explosives	97	19,465,846	4,502	17,125,418	16,950,976	10,993,131
Fertilizers	422	60,685,753	11,581	44,657,385	45,911,382	35,519,841
Paints and varnishes	615	60,834,921	9,782	69,922,022	71,313,392	52,908,252
Total	1,740	$238,529,641	46,766	$202,582,396	$221,217,217	$163,547,685

*Includes essential oils.

The manufacture of fertilizers is mainly confined to the Atlantic Coast States. The phosphate mines of some of the Southern States supply a large part of the raw materials used in their manufacture. The manufacture of paints and varnishes, explosives and chemicals, is well distributed over the country, New York, Pennsylvania, and New Jersey being especially prominent in the production of chemicals.

Turpentine and Resin. The pine forests of the Southern States—particularly Georgia and Florida—are valuable as a source of supply of turpentine, resin, and related products. According to the census estimates, the value of the combined product increased from $8,077,379 in 1890 to $20,344,888 in 1900. In the latter year there were 1503 establishments engaged in the industry. The average number of wage-earners employed was 41,864.

Clay Products. Clay suitable for industrial utilization is found in almost every section of the country. The period 1880-1890 was one of remarkable growth in the production of clay products, the value of products having gained 114.8 per cent. during that period. The corresponding figure for the following decade was 64 per cent., the value in 1900 being $95,533,862. There were in that year 105,693 wage-earners employed in 6423 establishments. Of the total output, $78,336,447 represented the value of the brick, tile, and terra-cotta products, about one-half of which was accredited to common brick. Brick is manufactured in almost every part of the country in quantities sufficient to meet the local demands. The pottery products were valued at $17,197,415. This industry is chiefly in two localities, one in New Jersey and the other in eastern Ohio.

Rubber Boots and Shoes. Since the granting of the Goodyear patent in 1844 the manufacture of rubber boots and shoes has developed into a large industry. The value of the product increased from $9,705,724 in 1880 to $41,089,819 in 1900, the number of establishments from 9 to 22, and the number of wage-earners from 4662 to 14,391. The industry is mainly confined to Massachusetts, Connecticut, and Rhode Island.

Leather and Its Finished Products. See table of production under Leather.

In recent years there has been a rapid centralization of the tanning industry. This is due partly to the radical changes which have been made since 1880 in the processes and machinery of manufacture, giving large plants an economic advantage, and partly to the combination of sole-leather tanneries with those producing upper leather. During the decade 1890-1900 the capital invested increased 77.4 per cent. Hemlock and oak bark still furnish the great bulk of the material upon which the manufacturers of leather rely for their tannin. Advantages in securing this supply is one of the factors which determine the location of tanneries. This accounts for the enormous recent development of the industry in Wisconsin and some other States. Pennsylvania has twice the production of any other State, Massachusetts, New Jersey, and Wisconsin ranking next in order.

One of the most distinct triumphs of American industry has been made in the manufacture of boots and shoes. Probably no other industry has been so completely revolutionized. Previous to 1845 the industry was strictly a hand process, to-day the shoe factory provides a perfect system of continuous manufacture, involving, in some instances, more than 100 operations. Beginning with the leather-rolling machine, there followed rapidly the wax-thread sewing machine, the peg-making machine, and peg-driving machine, and other machines, of which the most important was the McKay sewing machine, which has perhaps done more to revolutionize the manufacture of shoes than any other single machine. Important inventions are continuously being added to the list. As a result there has been a decided centralization of the industry, the number of establishments having decreased from 2082 in 1890 to 1600 in 1900, and a decided increase in the number of wage-earners relative to the value of products. In 1900 the number of wage-earners was only about one-half greater than in 1850, whereas the value of products was nearly 6 times as great in the later as in the earlier year. There is also an increase in the number of women and children employed. Of the 142,000 factory hands in 1900, 47,186 were women and 4521 children. American shoes are exported in large quantities.

Until well along in the nineteenth century the industry was confined almost wholly to eastern Massachusetts, and that State produced over three-sevenths of the total product in 1900. For a number of years, however, the industry has been rapidly developing in other regions, and almost the entire gain for the decade 1890-1900 was made outside Massachusetts, there being a decided decrease of capital reported for that State. The largest increase was made in Ohio and Missouri, but New York and New Hampshire still rank second and third respectively.

The manufacture of saddlery and harness, particularly the latter, is widely distributed, being usually carried on by small establishments intended to supply the local demand. In the decade 1890-1900 there was a gain in the number of establishments amounting to 63.1 per cent. There is a greater centralization in the manufacture of pocketbooks, trunks, and valises. The manufacture of leather gloves and mittens employed 14,436 persons in 1900, of whom 9754 were women. The value of the product for that year was $17,048,656.

SLAUGHTERING AND MEAT-PACKING. In 1850 slaughtering and meat-packing was of little importance as a specialized industry, the value of the product for that year being only $11,981,642. Before 1890, however, the industry had become the most important of the industries manufacturing food products, and in 1900 was far in the lead, with a total value of products estimated at $785,562,433. There was a proportional increase in the capital invested, which amounted in 1900 to $189,198,264, this being less than the total capital invested in flour and grist milling. In the same year there were 68,534 persons employed. A number of factors have conspired to bring about this most remarkable expansion of the industry. The growth in stock-raising and the increase of the population are, of course, important considerations, but the development of the industry has been out of all proportion to either of these. Formerly much of the slaughtering was done by the stock-raiser himself, and the local supply sufficed in most communities. But as large centres of population, developed at a distance from the greater stock-raising regions, created a need for the packing and preserving of meats, a greater specialization of the industry, better facilities of communication, and the devising of processes of preservation and especially of refrigeration made this possible. The refrigerator car, first used in 1869, marked an epoch in the industry, since it made possible the shipment of fresh beef. Refrigeration made possible the continuation of the industry throughout the year, and shipments to foreign countries. (For meat exports, see section *Commerce*.) The exportation of fresh beef began in 1876. About the same time labor-saving devices were adopted and every part of the animal began to be utilized. The decade 1870-80 witnessed the first rapid specialization and centralization of the industry. During that period the value of products increased 300.3 per cent., while the number of establishments increased only 13.5 per cent. In the decade 1890-1900, although the value of products increased 39.9 per cent., the number of establishments decreased from 1118 to 921. The industry has tended to localize near the producing regions at points which have the greatest advantages of transportation. About 1850 the Ohio Valley was the great producing region, and the river towns, with Cincinnati and Louisville in the lead, were the centres of slaughtering and meat-packing. With the subsequent development of stock-raising in Illinois, Iowa, and other Upper Mississippi Valley States, together with the unequaled transportation advantages of Chicago, that city has attained an importance in slaughtering and meat-packing that is unapproached by any other city in the world. The value of products of 1890 was 36.3 per cent., and in 1900 32.7 per cent. of the total for the United States. The relative decrease is the result of the development of the industry in other centres, nearer to the producing region, especially Kansas City, South Omaha, Saint Joseph, Saint Louis, and elsewhere in the Southwest and Northwest. The packing of meats is almost wholly carried on west of the Alleghanies, but New York and other Atlantic Coast centres slaughter extensively for the local market. The value of the hogs slaughtered is considerably in excess of the value of beeves slaughtered. About five-sixths of the beef is sold fresh, while only about two-sevenths of the pork is sold in this form.

TRANSPORTATION—RAILWAYS. The great industrial progress after 1850 was made possible largely by railways. The construction of railways in the United States began toward the close of the decade 1820-30. Their introduction had been preceded by the inauguration of a vast system of canals, the Erie Canal, which was to remain long the principal artery of transportation between the East and West, having been opened in 1825. The growth of the railway system was extremely rapid from the beginning. The mileage increased from 23 in 1830 to 2818 in 1840 and 9021 in 1850. Over much of the country railways preceded industries, and certain industrial developments, such as those of iron and coal and of agriculture in the West could not have taken place on any great scale, without railway advantages. The growth of American railways, in which, it is estimated, from one-seventh to one-fifth of the country's capital is now invested, is shown in the following table (the mileage given being exclusive of elevated city passenger lines):

DIVISIONS OF STATES	1850	1860	1870	1880	1890	1895	1899	1900	1901
New England	2,507	3,660	4,494	5,977	6,831.9	7,199.52	7,447.69	7,501.48	7,518.24
Middle Atlantic	3,105	6,353	10,577	15,147	20,038.11	21,642.11	22,206.55	22,384.85	22,479.02
Northern Central	1,276	9,583	14,701	25,109	36,976.45	39,448.26	40,849.86	41,138.38	41,961.58
South Atlantic	1,717	3,463	6,481	8,474	17,300.59	20,034.23	21,232.40	21,917.42	22,285.50
Gulf and Mississippi Valley	416	3,727	5,106	6,995	13,342.66	14,459.03	15,717.67	16,211.42	16,643.42
Southwestern	....	1,162	4,625	14,085	32,887.95	34,909.83	36,926.57	37,529.55	39,242.62
Northwestern	....	655	5,004	12,347	27,294.36	29,476.00	31,227.55	32,164.95	32,640.75
Pacific	....	23	1,934	5,128	12,031.34	13,945.96	15,209.29	15,485.54	16,016.17
Total United States	9.021	30,626	52,922	93,262	166,703.36	181,114.94	190,817.58	194,333.59	198,787.30

The rate of growth has greatly fluctuated. Checked by the Civil War, the mileage nearly doubled between 1865 and 1873. From the latter year to 1879 construction was reduced, but it then revived and, with a short interruption in 1884-85, advanced rapidly until 1893, and again continued after 1898. The year 1887 exceeded all others, with 12,876 miles. Prior to 1850 construction was mainly in the Atlantic Coast States, but in 1850-60 noteworthy gains were made in the North Central States and in the South. In 1852 rail connection was established between Chicago and the Atlantic Coast, and in 1869 between the Atlantic and Pacific coasts. In 1870-80 there were important gains in the Upper Mississippi Valley and in eastern Texas, which was the first Southern State to show activity in railway construction after the war. In 1880-90 the Southern States doubled their mileage. Since 1895 (in which year there was the least construction after the Civil War, 1650 miles) the most rapid progress has been between the Gulf of Mexico and the Kansas and Missouri rivers. The greatest railway density is in the region north of the Ohio and Potomac rivers. New Jersey leads with 30 miles of line for each 100 square miles of area.

Among the factors that hastened railway development were the business rivalry between cities or sections, subsidies in one form or another, and the small cost of right of way. State grants in aid (many of them land grants) were common until 1861, when the Federal Government began to make land grants directly to the companies. The first line reaching the Pacific received grants of 33,000,000 acres in addition to a large loan based upon mileage and difficulty of construction. The total Congressional land grants between 1850 and 1871 amounted to 155,000,000 acres, but of these only 97,976,637 acres were patented up to 1902.

In general American railways have been constructed more cheaply than British or Western European, but improvements have been made as warranted by traffic. Thus there is great inequality in the condition of American roads. In 1900 there were 192,556 miles of single track, 12,151 miles of second track, 1094 miles of third track, and 829 miles of fourth track, exclusive of yard tracks and sidings.

The tendency toward railway consolidation appeared soon after 1850. Keen competition did not come until after the Civil War, notably in 1869, when the Pennsylvania Railroad and the New York Central made their connections with Chicago. The development of the 'parallel' lines, or two or more railways connecting the same points, so intensified competition that the companies were forced to seek among themselves some relief. Thus arose, between 1870 and 1880, the 'pools,' or agreements between companies in regard to the distribution of traffic or the benefits of traffic. The prohibition of pools by the Interstate Commerce Act of 1887 renewed competition, to escape which the railway companies came to secret understandings, and 'traffic associations' were formed to fix a 'fair proportion' of the traffic for each railroad involved. In 1897 this form of coöperation was declared illegal by the United States Supreme Court. Thereafter agreements between companies as to rates and the distribution of traffic benefits were more informal, but, according to the Interstate Commerce Commission, the court decisions have had "no practical effect upon the railway operations of the country;" while, in respect to the organization of railways, the inconveniences in the way of 'mutual understandings' accelerated consolidation, notably after 1898. Thus in 1902 more than two-thirds of the total mileage of the United States was included in eight groups of railway interests. See the articles CANAL; EXPRESS; INTERSTATE COMMERCE ACT; POST-OFFICE; RAILWAYS; STEAM NAVIGATION; STREET RAILWAYS; TELEGRAPH; TELEPHONE; TRANSPORTATION.

FOREIGN COMMERCE. The United States does not hold so high a rank in respect to the magnitude of its foreign trade as it does in that of agriculture, manufactures, mining, and transportation. Until near the end of the nineteenth century the foreign trade of the United Kingdom was twice as great, while the foreign trade of Germany still exceeds that of the United States by a considerable margin. The commerce of the United Kingdom ranges from 3 to 4 times as great per capita as does that of the United States. As in the other industries, the chief development has occurred since the middle of the nineteenth century. There was a period, however, in the early years of the nation when the commerce (including re-exports) was greater per capita than it has since been. Through the navigation laws (see paragraphs on *History*), England sought to place limitations on the production and trade of the American Colonies. But through a lack of the means for enforcing the laws and the tacit recognition of a policy of 'salutary neglect,' the laws were evaded throughout the greater part of the Colonial period. The majority of Colonial merchants were smugglers, and an extensive non-English trade developed, the most important being with the West Indies. The total foreign trade of the thirteen Colonies is estimated to have increased from a value of $12,000,000 in 1750 to $30,000,000 in 1771, the exports amounting respectively to $2,800,000 and $11,000,000. In 1763 England's attitude toward the Colonies was radically changed; the navigation laws were modified and a rigid enforcement of them was begun in order to collect a greater revenue. This new policy helped greatly to precipitate the Revolution. After the war Great Britain subjected the newly independent States to the trade restrictions of the old navigation laws, much to the injury of the States, which were helpless under the Articles of Confederation. The situation hastened the formation and adoption of the new Constitution, under which Congress immediately began retaliatory measures. Discriminating duties were placed upon goods not imported in American vessels. Reciprocal commercial privileges had been secured in the case of some but not all of the European countries, and with the coming of the Napoleonic wars, which created a special demand for breadstuffs, Europe was glad to avail itself of the advantages of American commerce. Our foreign trade jumped from $43,000,000 in 1791 to $247,000,000 in 1807. Of the latter amount $108,500,000 represented exports, of which over half were re-exports. America had become, in proportion to population, the leading commercial nation of the world. The embargo and non-intercourse acts and the War of 1812 greatly reduced the volume of American commerce. In the first two years after the war (1815-1816) there was a rapid revival of trade, and the imports exceeded those of any earlier year; but after 1818 there was a steady decline in commerce until 1830, when the American imports amounted to $62,000,000 and the exports to $71,000,000. It is noteworthy that the rapid development of the country west of the Appalachians had prior to this time added scarcely anything to the commerce of the country. So great were the difficulties of transportation that that section was rendered economically almost independent. The South was not so severely handicapped, especially with regard to exporting cotton, the many navigable streams affording a means of conveying the cotton to the coast. After 1830 trade increased rapidly until 1836, when the American exports amounted to $124,000,000 and the imports to $177,000,000. This was the result in a large measure of the improvements of steam navigation and of canal construction (which afforded a profitable trade with the interior), and of the rapid increase in the production and shipments of cotton. After the panic of 1837 the foreign trade was again backward for a period of ten years. In 1846 the foreign trade was no greater than in 1816, after a period of thirty years. The year 1847 was the beginning of a new era in the foreign trade of the United States. Since that year the trade has rapidly expanded, subject to fluctuation, however, during the Civil War period and the panics of 1873 and 1893. The value of the imports and exports in 1902 was ten times that of 1846, while the population in the latter year was only about four times as great. The following statement of the general trade by decades is fairly indicative of its growth:

YEAR	Imports	Exports
1850	$173,509,526	$144,375,726
1860	353,616,119	333,576,057
1870	433,958,408	392,771,768
1880	667,954,747	835,638,658
1890	789,310,409	857,328,684
1900	849,941,184	1,394,483,082
1902	903,320,948	1,381,719,401
1903*	1,072,128,364	1,453,090,034

*Includes trade with Alaska, Hawaii, and Porto Rico.

A number of factors aided in the development of commerce about the middle of the century. Among these were the enormous production of gold in California and the repeal of the Corn Laws in Great Britain. But greatest were the rapid development of the interior and the radical improvements in transportation through the construction of railroads and the improvement of steam navigation. It was at about this time, moreover, that machinery began to play an important part in the agricultural and other industries—a movement which is carried to such an extent that the per capita production of American laborers is greater than that in any other country. In consequence there has been a large surplus of products for foreign shipment, and an increasing ability to purchase those products which are not produced at home. From the foregoing table it may be seen that there has been a change from an excess of imports to an excess of exports. This change occurred about 1875, since which year the exports have exceeded the imports, except in the years 1888, 1889, and 1893. The excess of exports in the earlier years of that period was due to the enormous increase in the shipment of raw products, particularly farm products. Exports of these have grown less rapidly in recent years, and the excess of exports since 1896 is largely due to the sudden increase of exports of manufactured products. The imports of manufactured goods decreased from 40 per cent. of the total imports in 1860 to 15 per cent. in 1900. Exports of manufactured goods meanwhile increased slowly from 12.76 per cent. of the total exports in 1860 to 21.14 per cent. in 1894, then advanced rapidly to 31.65 per cent. in 1900, having since fallen a little under that amount. In 1895 the value of exported manufactures was $183,595,743 and in 1902, $403,641,401. The nature of American exports, therefore, is determined by the great abundance of raw products and the advantage thus given, together with the use of machinery in producing machine-made products economically. It also is influenced by the fact that the Western European peoples do not produce enough to supply the whole market, thereby creating a demand for the American surplus products. The American exports consist, therefore, of raw or slightly manufactured products sent to Europe and manufactured products sent to all parts of the world. The imports into the United States consist of raw products which cannot be produced in this country—or which are produced in insufficient quantities—and products which can be produced more economically in other regions. The latter comprise mainly food products and materials for use in manufacturing. A considerable portion, however, consists in manufactures in which cheaply paid European and Oriental hand-labor enters largely, and with which highly paid American labor cannot compete. It also consists of products of highly skilled labor, skill which accrues with the long establishment of an industry and which Americans have not yet acquired. The following table shows the growth of the export trade:

Domestic Exports 1800-1903.

YEARS	Agriculture		Manufactures		Mining		Forest		Fisheries		Miscellaneous		Total exports
	Dollars	Per cent.	Dollars	Per cent.	Dollars	Per cent.	Dollars	Per cent.	Dollars	Per cent.	Dollars	Per cent.	Dollars
1800	25,590,534	90.37	2,493,755	7.83	....	......	2,228,863	7.00	1,098,511	3.45	429,240	1.35	31,840,903
1850	108,605,713	80.51	17,580,456	13.03	167,090	0.12	4,590,747	3.40	2,824,818	2.10	1,131,409	.84	134,900,233
1860	256,560,972	81.13	40,345,892	12.76	999,465	.31	10,299,959	3.26	4,156,480	1.31	3,879,655	5.23	316,242,423
1870	361,188,483	79.35	68,279,764	15.00	5,026,111	1.10	14,897,963	3.27	2,835,508	.62	2,980,512	.66	455,208,341
1880	685,961,091	83.25	102,856,015	12.48	5,863,232	.71	17,321,268	2.11	5,255,402	.64	6,689,345	.81	823,946,353
1890	629,820,808	74.51	151,102,376	17.87	22,297,755	2.64	29,473,084	3.49	7,425,385	.88	5,141,420	.61	845,293,828
1895	553,210,026	69.73	183,595,743	23.14	18,509,814	2.33	28,576,235	3.61	5,328,807	.67	4,171,974	.52	793,392,599
1900	835,858,123	60.98	433,851,756	31.65	37,843,742	2.76	52,218,112	3.81	6,326,620	.46	4,665,218	.34	1,370,763,571
1902	851,465,622	62.83	403,641,401	29.77	39,216,112	2.90	48,188,661	3.55	7,705,065	.57	5,265,000	.38	1,355,481,861
1903	873.285,142	62.72	406,187,207	29.32	38,844,759	2.79	57,830,778	4.15	7,755,232	.56	6,328,519	.46	1,392,231,637

It is noteworthy that after a decade in which no progress was made in the exports of agricultural products (1880-1890), they have again rapidly advanced. The agricultural group includes a number of products usually classed as manufactured, such as flour, meats, etc. Of the agricultural exports, those intended as food are in the aggregate far in the lead. The three principal exports of food in the fiscal year 1903, with their values, were as follows: breadstuffs, $221,242,285; meat and dairy products, $179,839,714; and animals, $34,781,193. Cotton is the largest single item of export, and ranks second to the large group of breadstuffs. The most important items among the breadstuffs are wheat and flour, the average exports of which for the period 1867-72 were 35,500,000 bushels, or 15.53 per cent. of the total production. The exports then rose until the period 1879-83, when the average was 157,566,000 bushels, or 34.91 per cent. of the total production. For the next ten years the exports were much less, absolutely and relatively, but increased during the period 1894-99 to an average of 170,098,000 bushels, or 34.63 per cent. European countries have always entertained a prejudice against corn as a food, but this prejudice seems to have weakened in recent years. The exportation of corn, including corn meal, increased from an average of 14,200,000 bushels in the period 1867-72 to an average of 127.400,000 bushels in the period 1894-99. The exports of the earlier period constituted 1.54 per cent. of the total production, and in the latter 6.56 per cent. Thus corn bids fair soon to become a rival of wheat as an export, in value as well as in volume. The greater part of the exportation in meats consists of hog products, amounting in the year 1903 to $112,110,602, as against $38,470,958 for beef products. The exports of hog products increased rapidly with the development of the slaughtering industry, the total value having increased from $15,309,647 in 1870 to $86,687,858 in 1878, after which they fluctuated about that figure and did not show any tendency to rise until 1898. The exports of bacon in 1903 were valued at $22,178,525, hams at $25,712,633, and lard at $50,854,504, the latter having made a large gain since 1898. Pork is shipped mainly in the salted or pickled form. Exports of beef did not attain any great growth until after the recent facilities for chilling and transporting meats had been introduced. With these improvements there has been a change from salted to fresh beef in the shipments, the latter variety constituting nearly three-fourths of the total beef shipment in 1903. In that year there were over $20,000,000 worth of 'other meat' products exported, over one-half of which was oleomargarine. The value of dairy products exported for that year was only $4,775,582. The exports of live animals consist chiefly of cattle. Their exportation did not take firm hold until 1879. In the year 1890 there was a striking advance in the shipment of cattle, but since that year there have been no decided tendencies toward increase or decrease. The value of exports of cattle in 1903 was $29,848,936. The Anglo-Boer War greatly increased the exportation of horses and mules, the exports of the former in 1902 being valued at $10,048,046.

The exports of cotton in 1903 amounted to 3,543,043,022 pounds (value $316,180,429), which was about two and one-half times the quantity exported in 1876. For most of the intervening years, the per cent. of the total crop exported has been between sixty-five and seventy, and there is no tendency to change the ratio. Among other agricultural products exported, the most important are tobacco, valued in 1903 at $35,250,893;

YEAR ENDING JUNE 30	Iron and steel manufactures	Copper manufactures	Agricultural implements	Wood manufactures	Mineral oils refined	Chemicals, drugs, dyes, etc,	Leather and manufactures of leather	Cotton manufactures	Paraffin and paraffin wax	Paper and manufactures of paper
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
1870	13,483,163	504,741	1,068,476	2,613,715	30,431,668	3,118,984	678,331	3,787,282	374	514,592
1880	14,716,524	793,455	2,245,742	3,975,694	34,291,418	4,174,070	6,760,186	10,467,651	391,566	1,201,143
1890	25,542 208	2,349,392	3,859,184	6,509,645	44,658,854	5,424,279	12,438,847	9,999,277	2,408,709	1,226,686
1895	32,000,989	14,468,703	5,413,075	6,249,807	41,498,372	8,130,334	15,614,407	13,789,810	3,569,614	2,185,257
1900	121,913,548	57,852,960	16,099,149	11,232,838	68,247,588	12,132,373	27,293,010	24,003,087	8,602,723	6,215,833
1902	98,552,562	41,218,373	16,286,740	11,617,690	66,218,004	12,141,011	29,798,323	32,108,362	8,858,844	7,312,030
1903	96,642,467	39,667,196	21,006,622	13,071,251	60,923,634	13,697,601	31,617,389	32,216,304	9,411,294	7,180,014

oil cake and oil-cake meal, $19,743,711; and cotton-seed oil, $14,211,244. From the table it will be seen that there have been significant increases in the exports of mining and of forest products, but not enough to affect greatly the percentage which they constitute of the total. The largest item in the group of minerals exported is coal, while boards and naval stores are the largest items in the exports of forest products. The preceding table shows the growth in the exportation of the ten principal articles of domestic manufacture, which together form about 80 per cent. of the total manufactures exported.

The exports of iron and steel include a large list of articles, chief of which are locks, hinges, and other builders' hardware, electrical machinery, wire, pipes, and fittings, steel rails, sewing machines, locomotive engines, and structural ironwork and steel. About five-sixths of the total value of mineral oils exported is represented by illuminating oils. The extraordinary growth in the exports of cotton manufactures has taken place mainly since 1893, and is the result of the increased use of electricity, in connection with which most of the product is utilized. One-half of the exports of cotton manufactures is represented by uncolored cloths. The most rapid growth in the exportation of leather and its manufactures in recent years has been in upper leather, and in boots and shoes. In 1895, 822,412 pairs of boots and shoes were exported, and in 1902, 3,966,766 pairs. Nearly one-half of the value of exported agricultural implements is represented by mowers and reapers. The following table shows the growth of the importation of merchandise into the United States for consumption; the percentage figures indicate the proportion of the specified classes to the total imports:

YEAR	Articles manufactured wholly or partially for use as materials in mechanic arts		Articles manufactured ready for consumption		Articles of voluntary use, luxuries, etc.		Manufactures of all classes		Food and live animals		Crude articles for domestic industries	
	Dollars	Per cent.	Dollars	Per cent.	Dollars	Per cent.	Dollars	Per cent.	Dollars	Per cent.	Dollars	Per cent
1870.........	53,658,296	12.59	119,298,235	27.98	47,266,822	11.09	217,689,681	51.06	139,213,092	32.65	66,909,565	15.69
1880.........	73,186,963	11.66	130,004,643	20.72	65,141,826	10.38	263,293,201	41.95	199,165,963	31.72	160,055,876	25.52
1890.........	84,700,568	10.94	154,469,354	19.96	107,468,732	13.91	328,830,609	42.50	248,600,646	32.13	178,435,512	23.06
1895.........	83,768,478	11.46	140,773,811	19.25	92,714,887	12.68	301,918,566	41.29	226,422,171	30.97	187,482,743	25.64
1900.........	80,575,042	9.70	130,577,155	15.72	103,908,719	12.51	297,820,500	35.86	216,107,303	26.02	299,351,033	36.04
1902.........	86,645,277	9.63	151,410,397	16.83	128,184,041	14.24	344,816,408	38.32	205,047,442	22.79	328,506,597	36.51

The table reveals the effect of the establishment of manufactures in the United States; in fact, imports of manufactures have increased absolutely but little in recent years, and for a long period of years have tended to decrease relatively, while at the same time the importation of crude articles for domestic industries has increased both absolutely and relatively. The importation of materials for manufacturing ($415,151,874 in 1902) greatly exceeds the imports of manufactures, and even the exports of manufactures. The importation of food and live animals has begun to decline absolutely and relatively. The bulk of the food group is sugar and coffee, amounting in 1902 to $55,061,097 and $70,982,155, respectively, and constituting the two largest items of importation into the United States. The only other large food item in imports is fruit and nuts, the value in 1902 being $21,480,525. The largest items in the group of 'crude articles' imported in 1902, with their respective values, were hides and skins, $58,250,834; silk manufactures, $42,631,615; rubber and gutta percha, crude, $27,094,622; fibres, vegetables and textile grasses, $31,526,674; copper manufactures, $24,865,301; tin in bars, etc., $19,463,736; chemicals, drugs, and dyes, $19,818,689; and wool, hair of the camel, goat, alpaca, etc., $18,466,122. The principal item in the group headed "partially or wholly manufactured, etc." was chemicals, drugs, and dyes, not elsewhere specified, valued in 1902 at $35,286,164. Of imported articles ready for consumption and luxuries, the most important was cotton goods, $44,460,126, of which laces, edgings, etc., constituted over one-half; this was followed by manufactures of fibres, $39,036,364; silk, $32,640,242; iron and steel manufactures, $27,180,247; diamonds and jewelry, $25,990,570; and manufactures of wool, camel's hair, etc., $17,384,463. As compared with 1901 there were large increases in the imports of cotton goods, manufactures of fibres, and jewelry. Iron and silk remained about the same, while manufactures of wool, camel's hair, etc., decreased over one-half.

The bulk of the foreign trade of the United States is by sea and with non-contiguous countries. In 1903 the imports by way of the Atlantic ports constituted 80.06 per cent. of the total imports and the exports 63.6 per cent. of the total exports. The Government reports show, however, that from 1893 to 1903 the percentage of gain was greater for the Pacific ports than for the Atlantic. During that period the Atlantic ports showed an increase of 14 per cent. in imports and 46 per cent. in exports, while the Pacific ports showed gains of 17 per cent. in imports and 87 per cent. in exports. The imports by way of the Gulf ports for the same period showed an increase of but 1 per cent. and the exports an increase of only 6 per cent. Of the foreign trade of the United States during the fiscal year 1903, 64.5 per cent. was with the Continent of Europe, and the bulk of this was with the four Western European countries, the United Kingdom, Germany, France, and the Netherlands. The protective tariff of some of the European countries greatly restricts our exports to them, as in the case of France, and in the case of some almost prohibits our exports, as Austria-Hungary. The United Kingdom accepts our exports free of duty, and constitutes by far the greatest market of the world for American products. In 1903 the exports to the United Kingdom amounted to $524,691,638 as against $504,896,090 for the remainder of Europe. If with the United Kingdom are included the other parts of the British Empire, it is found that the American exports to the Empire constitute more than half of the entire American export trade. In the import trade of the United States, however, Europe, especially the United Kingdom, is of much less importance, as can be seen in the table on page 86, showing the foreign trade with the principal countries of the world.

In the case of a number of countries outside of Europe the balance of trade is against the United States. The following table shows what part the United States played in the total foreign trade of the different continents of the world in 1897:

	Imports from U. S. Per cent. of total imports	Exports to the U. S. Per cent. of total exports
Europe	12.32	8.03
N'th America (except U. S.)	42.90	34.23
South America	11.01	29.79
Africa	4.22	30.00
Asia	4.51	7.52
Australia	6.70	10.00

The corresponding percentage of imports from the United States to the United Kingdom varied within the compass 26.5 per cent., and 34 per cent. during the period 1888 to 1898, while the exports to the United States constituted from 21 to 14 per cent. of its foreign exports. The imports of Germany from the United States rose from 7.9 per cent. of its total imports in 1889 to 14.1 per cent. in 1897, its exports to the United States meanwhile varying from 9.1 per cent. to 12.5 per cent. of its total exports. The largest Asiatic customer of the United States is Japan, which the United States supplied in 1898 with 14.2 per cent. of its total imports, taking 29.1 per cent. of its exports. The favorable one-sided trade with Europe is explained by the fact that Europe requires the great bulk of the American surplus products for food for its people and raw materials for its manufactures, while, on the other hand, Europe has little that the United States desires, besides manufactures, and in these the United States is becoming more and more independent. The unfavorable one-sided trade with South America and some other countries, mostly tropical, has a partial explanation in the fact that they are the great producers of the raw products which are for climatic or other reasons insufficiently produced in the United States; nor do they need the raw products of the United States, and have not yet advanced to an industrial stage requiring much of our manufactured products. The latter part of the explanation is not altogether satisfactory, since those countries import large quantities of manufactured products from Europe. The condition of the trade of the United States with South America is by far the most unsatisfactory aspect of our foreign commerce. Much of the blame for the small exports of the United States to South America has been credited to American shipping and to American capitalists and merchants. Many European lines carry on trade with South America, but only a few United States lines (see section *Shipping*); and the freight rates of these are much higher than those of European lines. Flour has been shipped to Europe and thence reshipped to the West Indies cheaper than it could have been sent by direct shipment. American capitalists have found profitable investment at home, and have not been induced to take many risks in South America. American merchants refuse to give so long a credit period as the Europeans do, and have not studied closely the nature of the wants of that region, nor have they contrived methods to deliver goods in a style most suitable to the tastes of the people, as have their European competitors. The trade of the United States with Mexico and Central America, on the contrary, is developing rapidly. In 1897 73.64 per cent. of the Mexican exports were sent to the United States, and 49.29 per cent. of the Mexican imports were received from the United States. The corresponding figures for Central America were respectively 36.72 per cent. and 36.71 per cent. The West Indian trade with the United States is less satisfactory, the corresponding per cent. being 26.49 per cent. and 19.82 per cent. For the trade relations with Porto Rico, Philippines, Hawaii, etc., see under section *Colonies*.

In the United States trade with Great Britain in recent years there has been a rapid increase in our exports, while the imports have actually declined. (See table.) The United Kingdom is the largest market for the United States for food products, manufacturers' materials, and manufactured products. Raw cotton is the largest single item in its imports, being valued in 1903 at $124,789,603. It is, however, exceeded by the combined imports of animals and animal products, and is rivaled by the aggregate imports of breadstuffs. The United Kingdom annually takes from one-half to two-thirds of the total United States exports of wheat and flour, the value of wheat imports in 1903 being $36,139,752, and flour $37,837,512. The United Kingdom's imports of American corn the same year were valued at $17,081,693. In 1903 the United Kingdom took live cattle to the value of $26,597,390 out of a total shipment valued at $29,848,936. Canada and in recent years Argentina compete with the United States in this trade, but the United States still supplies the United Kingdom with from three-fifths to two-thirds of its imports of live cattle. The United States also supplies the United Kingdom with over two-thirds of its imports of fresh beef, Australia being the chief competitor. The United States is the United Kingdom's chief source of supply for bacon and hams. The latter country annually receives over two-thirds of the United States exports of these products and about one-third of its exports of lard. Of the total exports of manufactured products in 1902, nearly one-half went to Europe, and one-half of these went to the United Kingdom. The value of this class of exports to the United Kingdom increased from $40,000,000 in 1892 to $100,000,000 in 1902. The articles exported are remarkably comprehensive in their scope. The prominent items include leather, machinery, copper work, wood manufactures, petroleum, and paraffin. One hundred locomotives have been exported in a single year, besides large numbers of printing presses and typesetting machines. The chief imports of the United States from the United Kingdom and their values in 1902 were as follows: Cotton goods, $16,376,611; manufactured fibres, $21,077,326; iron and steel manufactures, $15,040,085; and woolen goods, $7,473,587. With

IMPORTS AND EXPORTS OF DOMESTIC AND FOREIGN MERCHANDISE. YEAR ENDING JUNE 30

COUNTRIES	Imports		Exports	
	1893	1903	1893	1903
EUROPE				
United Kingdom	$182,859,769	$191,666,506	$421,134,551	$524,691,688
Germany	96,210,203	119,837,908	83,578,988	193,555,495
France	76,076,215	91,060,702	46,619,138	77,542,436
Italy	26,250,241	36,368,860	13,019,539	35,022,660
Netherlands	17,448,948	22,710,673	38,505,198	78,245,419
Switzerland	16,010,728	21,183,378	7,391	205,647
Belgium	11,166,196	22,766,830	26,740,434	47,073,160
Austria-Hungary	10,054,501	10,578,702	571,037	7,209,855
Russia, Baltic and White Seas	8,031,479	7,731,441	2,035,581	13,399,370
Russia, Black Sea	2,703,617	1,508,341	266,242	2,723,258
Spain	2,594,553	8,474,528	13,460,063	17,696,984
Sweden and Norway	4,176,384	4,905,234	4,084,704	10,160,874
Turkey in Europe	2,215,464	5,672,578	45,889	496,785
Portugal	2,689,731	3,488,185	5,727,334	3,652,194
Greece	1,283,557	1,326,935	130,461	330,544
Denmark	235,855	600,193	5,270,434	16,144,985
Rumania	....	6,554	48,798	256,927
Greenland, Iceland, etc	110,613	100,606	2,800	508
Gibraltar	181,220	6,471	434,226	427,005
Azores and Madeira Islands	27,011	16,588	293,887	369,405
Malta, Gozo, etc	....	20,043	....	453,529
Servia	23,808	25,263	....	....
Total Europe	$458,450,093	$550,056,518	$661,976,710	$1,029,587,728
NORTH AMERICA				
West Indies:				
Cuba	$78,706,506	$62,341,942	$24,157,698	$21,769,572
British	16,028,592	13,454,557	8,044,846	10,137,065
Santo Domingo	2,396,315	2,833,676	1,143,479	1,390,967
Porto Rico	4,008,623	10,909,147	2,510,607	11,976,134
Haiti	736,021	1,107,734	5,472,040	2,383,424
Danish	547,626	734,020	604,323	633,710
Dutch	271,594	406,249	752,703	977,559
French	8,340	19,538	1,818,955	1,611,003
Total West Indies	$102,703,617	$91,806,863	$44,504,651	$50,699,423
Alaska	....	$9,266,504	....	$10,188,220
British North America:				
Quebec, Ontario, etc	$29,186,239	$37,942,258	$41,300,151	$109,828,167
British Columbia	2,884,510	6,342,937	1,832,079	6,005,070
Nova Scotia, New Brunswick, etc	5,706,714	10,375,215	3,662,101	7,639,179
New Foundland and Labrador	408,879	868,238	1,834,177	2,509,415
Total British North America	$38,186,342	$55,528,648	$48,628,508	$125,981,831
Mexico	$33,555,099	$41,254,542	$19,568,634	$42,227,786
Central American States:				
Guatemala	$2,554,710	$2,400,063	$1,763,862	$1,128,045
Costa Rica	2,309,358	3,731,523	1,210,740	1,858,604
Nicaragua	1,400,236	1,862,217	937,859	1,399,696
Honduras	684,912	1,373,131	471,695	956,193
Salvador	1,355,730	891,987	1,138,430	797,253
Total Central American States	$8,304,946	$10,258,921	$5,522,586	$6,139,791
Bermuda	$759,846	$592,107	$962,116	$1,327,626
British Honduras	155,171	376,967	405,168	868,578
Miquelon, Langley, etc	67,691	18,668	197,226	191,150
Total North America	$182,732,712	$209,103,220	$119,788,889	$237,804,405
SOUTH AMERICA				
Brazil	$76,222,138	$67,216,348	$12,388,124	$10,738,748
Chile	3,995,441	9,377,318	2,980,831	4,038,875
Argentina	5,239,095	9,463,832	4,979,696	11,430,496
Venezuela	3,625,118	5,312,954	4,207,661	1,878,202
Guianas:				
British	$5,029,178	$3,351,656	$2,000,675	$1,936,524
Dutch	1,079,710	874,454	373,359	555,398
French	35,965	215,811	113,353	351,262
Total Guianas	$6,144,853	$4,441,921	$2,487,387	$2,843,184
Peru	$819,168	$2,703,643	$636,721	$2,971,411
Colombia	3,572,918	4,184,149	3,155,777	4,293,295
Uruguay	1,623,380	2,981,632	960,606	1,505,100
Ecuador	960,228	1,726,851	817,425	1,353,162
Bolivia	5,476	1,500	24,849	49,107
Paraguay	....	2,887	....	13,021
Total South America	$102,207,815	$107,413,080	$32,639,077	$41,114,601

Countries	Imports		Exports	
	1893	1903	1893	1903
ASIA				
East Indies:				
British	$25,968,554	$49,774,589	$3,152,760	$4,795,411
Dutch	8,696,588	16,277,606	1,183,605	1,194,510
Portuguese	....	28	....	78
French	....	10	156,020	131,692
Total East Indies	$34,665,142	$66,052,233	$4,492,385	$6,121,691
Japan	$27,454,220	$44,142,562	$3,195,494	$20,924,862
Chinese Empire	20,636,535	26,769,612	3,900,457	18,603,369
Turkey in Asia	3,533,197	4,897,428	132,786	276,247
Aden	2,471,937	2,328,654	....	1,508,999
Hong Kong	878,078	1,355,444	4,216,602	8,780,741
All other Asia	75,276	212,268	139,039	77,004
Korea	79	....	....	171,400
China:				
British	....	22,355	....	1,670
French	....	....	....	4,300
German	....	....	....	....
Russian	....	1,655	....	681,756
Russia, Asiatic	381,919	28,230	145,591	802,428
Total Asia	$90,096,383	$145,810,441	$16,222,354	$57,954,467
OCEANIA				
Hawaii	$9,146,767	$26,201,175	$2,827,663	$10,787,666
British Australasia	7,266,808	6,969,017	7,921,228	32,748,580
British Oceania	....	2,087,812	....	98,669
Philippine Islands	9,159,857	11,372,584	154,378	4,038,909
French Oceania	423,946	579,457	296,208	398,169
German Oceania	....	25,442	....	120,041
All other	....	10,049	....	3,668
Total Oceania	$25,997,378	$47,245,536	$11,199,477	$48,195,702
AFRICA				
German Africa	....	$29,526	....	$ 6,313
Italian Africa	....	2,584	....	....
Turkey in Africa:				
Egypt	$3,438,925	10,661,978	128,687	740,375
Tripoli	....	133,524	....	....
British Africa	716,376	971,908	3,688,999	33,788,629
French Africa	309,327	450,690	529,921	410,097
Canary Islands	39,523	42,547	209,989	815,463
Spanish Africa	....	20,404	....	2,266
Liberia	26,002	2,747	26,302	29,086
Portuguese Africa	28,144	....	200,075	2,324,216
Madagascar	218,196	10,450	642,207	19,278
All other Africa	1,080,539	173,261	412,507	297,408
Total Africa	$5,857,032	$12,499,619	$5,837,687	$38,433,131
All other countries	$59,509	....	....	....
Grand total	$866,400,922	$1,072,128,364	$847,665,194	$1,453,090,034
RECAPITULATION				
Europe	$458,450,093	$550,056,518	$661,976,710	$1,029,587,728
North America	183,732,712	209,103,220	119,788,889	237,804,405
South America	102,207,815	107,413,030	32,639,077	41,114,601
Asia	90,096,383	145,810,441	16,222,354	57,954,467
Oceania	25,997,378	47,245,536	11,199,477	48,195,702
Africa	5,857,032	12,499,619	5,838,687	38,433,131
All other countries	59,509	....	....	....

Germany, the second greatest customer of the United States, the balance of trade is growing in favor of the United States. The largest export of the United States to that empire is also cotton, valued in 1903 at $84,824,284. Germany depends upon the United States for its supply of lard, the imports of which in 1903 were valued at $15,448,598. Imports of other varieties of pork products have been greatly limited through adverse legislation. Germany is becoming an important market for American breadstuffs. The manufactured products supplied Germany by the United States increased from less than $10,000,000 in 1882 to $54,000,000 in 1902. The chief imports into the United States from Germany consist of chemicals, drugs, etc., valued in 1902 at $16,166,775; cotton goods, $11,071,974; and iron and steel products, $6,161,651. The French tariffs have thrown the balance of trade against the United States. The principal exports of the United States to France are cotton, copper products, wheat, and petroleum. The United States receives a large part of its silk and elaborately wrought goods from France.

Shipping, Foreign. The United States is far in advance of all other nations in the magnitude of its domestic shipping, but in its foreign shipping, when the vastness of its foreign trade is considered, it holds a very low rank. Indeed, American foreign shipping presents a most marked contrast to all other groups of industry in the United States. Whereas, as has been seen above, other industries have had a most remarkable development since the middle of the nineteenth century, American foreign shipping has since that time suffered an extraordinary decadence. Until about 1860 there was no other industry more flourishing. Shipbuilding and shipping dates from the very beginning of the colonial period, and together with fishing was the most important industry of the New England colonies. The navigation laws of the mother country tended, on the whole, to foster colonial shipping. The first Congress under the present Constitution, in order to provide and protect American shipping, placed discriminating duties on goods imported under foreign flags, and tonnage taxes upon the vessels which bore it. The long period of European wars gave American shipping as neutral vessels an advantage in the foreign carrying trade, and the aggregate registered tonnage increased from 123,893 tons, carrying 23.6 per cent. of the American foreign trade, in 1789, to 597,777 tons in 1797, and 981,019 tons in 1810, carrying 91.5 per cent. of the American foreign trade. The tonnage then declined somewhat for a long period, but began to revive about 1840, and in 1847 amounted to 1,047,454 tons, carrying 81.1 per cent. of the American foreign trade, and continuing to increase until 1861, when the tonnage amounted to 2,496,894 tons, carrying 65.2 per cent. of the American foreign trade. A large part of the tonnage, however, was engaged in non-American trade, and it is estimated that the aggregate American tonnage was 50 per cent. greater than that necessary to carry the American trade. If to this tonnage were added that engaged in the coastwise trade in fishing and interior shipping, raising the aggregate to 5,539,813 tons, it is found that it is almost as great as the total tonnage of Great Britain and its dependencies (5,895,369 tons) in the same year. The States had an advantage over Great Britain in that they possessed abundant supplies of timber—the chief material used in ship construction. At the same time they had departed from British models and had developed a type of ship that was safer and speedier than those of their foreign competitors, so that the demand for them was great, and the freight rates were in their favor. Great Britain sought to free itself from this handicap by changing from sail to steam navigation, a policy encouraged by the Government through the granting of subsidies to steamship lines. The United States Government a few years later (1845) began a similar policy by an act intended to give mail contracts to steamships, and, in 1847, by authorizing the construction of seven merchant steamers for mail purposes. The tonnage of steam vessels then increased rapidly from 16,000 tons in 1848 to 62,390 in 1851, which was almost equal to that of the United Kingdom in the same year. The United States reduced its mail subsidies, and after the total steam tonnage had reached the maximum of 115,045 tons in 1855 it decreased until after the Civil War. A more efficient method of the British in removing their handicap was to change from wood to iron, and later to steel, as the principal material used in ship construction. Iron and steel vessels could be built larger and otherwise contribute to making possible cheaper freights. The British had iron in abundance, whereas the United States had not produced it in large quantities, and the tariff prevented its importation. The decline in American shipping had actually begun before the war. During the war period Confederate warships drove most of the American shipping from the seas, and one-fourth of the total tonnage was sold. The war, on the other hand, gave an impetus to British shipbuilding and shipping. The United States tonnage was reduced to 1,486,749 tons in 1864, carrying 27.5 per cent. of the foreign trade. After standing at about that figure until 1879, it began to decline, until in 1898, when it was only 726,213 tons, carrying 9.3 per cent. of the foreign trade, and in 1902, 873,235 tons, carrying 8.8 per cent. of the foreign trade. The American steam tonnage registered in the foreign trade increased from 224,100 tons in 1894 to 398,000 tons in 1902. The following table shows the share that was carried under the American flag in 1899 of the foreign sea trade of the United States.

COUNTRIES	Imports	Exports
Europe	4.36	1.27
North America	36.91	51.72
South America	12.27	19.30
Asia	7.70	11.16
Oceania	59.16	31.70
Africa	3.14	8.29
Total	12.36	6.70

The following table shows the number of United States and foreign vessels plying regularly between ports of the United States and ports to the south:

COUNTRIES	U. S.	Foreign
West Indies	26	67
Mexico and Central America	27	43
South America on Caribbean Sea	4	25
South America on Atlantic	0	110
South America on Pacific	9	8
Total	52	251

A number of causes are held responsible for the decadence of American shipping since the war. No doubt the fact that the development of the great interior of the country was more attractive to capital had its effect. The American registration laws have since the first Congress prohibited the registration of foreign-built ships, and the tariff against steel, hemp, etc., prevented the American importation of shipbuilding material, both of which provisions have been accused of playing a part in the decadence of our shipping. It is now claimed that the material for construction can be obtained in America cheaper than the British builders can get it, but that there is a greater cost both in the construction of the ships and in the sailing of them, because labor is much more highly paid in the United States than it is abroad. The fact that foreign countries grant heavy subsidies to aid the maintenance of shipping, while the United States has not maintained such a policy, has made the competition an uneven one, and, since the recent development of public interest concerning the serious condition of our foreign shipping, the idea of establishing some form of subsidy by the United States as a solution of the shipping problem has won great popularity. American capital has meanwhile begun to participate largely in the foreign trade, through investments in ships which continue to sail under foreign flags. From 1894 to 1902 there was an increase from 200,000 tons to over 1,000,-

000 tons of foreign shipping in which American capital has held large interests. An American corporation has been established, which is the largest and most completely equipped steamship company, but only sixteen of its 136 steamers are entitled to the American flag. In the formation of this company—the International Mercantile Marine Company—the following companies were purchased:

COMPANIES	Steamers	Tonnage
Leyland Line	49	295,133
White Star Line	26	266,140
International Navigation Co.	24	180,639
Atlantic Transport Line	23	182,860
Dominion Line	14	110,112
Total	136	1,034,884

Shipping, Coastwise and Interior. Since 1789 the American navigation laws have practically, and since 1817 absolutely, prohibited any but American vessels from participating in the coasting trade of the United States. Therefore the enormous domestic trade of the United States —the seacoast, lake, and river trade—has always been monopolized by American ship-owners and seamen. The facilities offered by the waterways of the United States greatly favor a large domestic shipping trade. There are 5200 miles of the United States frontier bordering on the oceans and the Gulf of Mexico, and an additional 2100 miles on lake and river. Furthermore, there is no other country in which rivers afford so great access to the interior as the United States. It is estimated that the United States has 18,000 miles of navigable riverway. On the Atlantic coast there are a large number of rivers, from the Saint Croix in Maine to the Saint John's in Florida, that are navigable from 50 to 200 miles inland; and there is no very considerable stretch of the coast that is not able to participate in the coastwise trade. The Gulf coast region is similarly favored with navigable rivers and with ports. The Mississippi River system gives water communication with the vast portion of the interior of the country. The Pacific coast is less favored with navigable rivers or with port sites, but the inlets at San Francisco, Portland, and Puget Sound have tributary navigable rivers, and are superior ports. (For river and harbor improvements, see Harbor.) No other nation has a domestic seaboard or lake trade comparable with the American, or a river trade that equals that of the United States. In 1898 the United States had 3,959,702 tons engaged in domestic seaboard trade; while the United Kingdom owned only 846,008 tons that were engaged in its own coastwise trade. In the accompanying table it will be seen that the development of the coasting trade has made good the loss sustained in the tonnage engaged in the foreign trade and in fisheries.

YEARS	Foreign trade		Coasting trade		Whale and sea fisheries	Total
	Steam	Total	Steam	Total		
1861	102,608	2,496,894	774,596	2,704,544	338,375	5,539,813
1871	180,914	1,363,652	906,723	2,764,600	154,355	4,282,607
1881	152,769	1,297,035	1,112,232	2,646,011	114,688	4,057,734
1891	235,070	988,719	1,776,269	3,609,876	86,164	4,684,759
1901	426,259	875,595	2,491,231	4,582,645	61,978	5,524,218
1902	455,017	873,235	2,718,049	4,858,714	65,953	5,797,902

In 1902, 2,347,977 tons of the sail vessels (including canal boats and barges) were of wood, and 273,051 tons of iron and steel. The steam vessels comprised 1,270,046 tons constructed of wood and 1,906,824 of iron and steel. The distribution of the shipping tonnage in 1901 is shown in the following table:

DIVISIONS	Sailing vessels		Steam vessels		Canal boats		Barges		Total	
	No.	Tons	No.	Tons	No.	Tons	No.	Tons	No.	Tons
Atlantic and Gulf	11,291	1,243,659	3,708	1,268,041	249	31,520	1,792	435,656	17,040	2,978,876
Porto Rico	35	4,459	7	1,721	......	....	....	....	42	6,180
Pacific	952	354,007	996	351,219	......	....	544	36,599	2,492	741,825
Hawaii	33	20,939	28	11,447	......	....	....	....	61	32,386
Northern lakes	726	318,032	1,795	1,377,872	454	47,888	197	72,719	3,172	1,816,511
Western rivers	36	782	1,193	166,574	......	....	237	54,768	1,466	222,124
Total, 1901	13,073	1,941,878	7,727	3,176,874	703	79,408	2,770	599,742	24,273	5,797,902

There are no statistics showing the amount of cargo carried in the coastwise trade, as there are in the foreign trade, and its magnitude is not known. The most extensive coast trade centres in New York, largely with Boston on the one side, and Philadelphia on the other. San Francisco is the largest centre of the coastwise trade on the Pacific coast, but Seattle plays an important part in the coasting trade with Alaska. In 1900 products to the value of $5,052,051 were shipped from New York to San Francisco via the Isthmus of Panama, and products to the value of $1,765,729 were shipped from San Francisco to New York by the same route. The shipping facilities afforded by the Great Lakes are of inestimable value. See Great Lakes.

Shipping on the Mississippi System. Prior to the Civil War the Mississippi River system played a much more important part in the development of the interior of the country than did the Great Lakes. While the freight tonnage carried upon it is greater than ever before, the nature of the traffic has greatly changed, and the competition of the railroads has affected the river shipping much more than it has that of the lakes. The river was but little navigated for purposes of commerce prior to 1778. For many years the river was of importance to its tributary region chiefly as a means of marketing the surplus products of the newly settled region, since freight could not be profitably transported up stream. The methods used to transport the freight down stream were of the crudest kind. The most common carrier was the flat boat, rudely constructed from timber and without any other propelling force than the current of the river. After it had carried its load to the New Orleans market it was broken up for lumber or deserted. In 1812 the first steamboat was placed upon the river, and with the improvements that rapidly followed in steam navigation, the up-stream traffic also became large. In 1820 the upward movement of freight on the Mississippi amounted to about 100,000 tons, of which 33,300 tons were carried by steamers, and the remainder by barges, etc. In 1845, 2050 steamboats and 346 keel and flat boats arrived at Saint Louis, of which 250 were from New Orleans, 406 from the Ohio, including the Cumberland and Tennessee rivers, 298 from the Illinois River, 643 from the Mississippi above the Missouri, 249 from the Missouri River, and 204 from other ports. The arrivals at Saint Paul increased from 41 in 1844 to 846 in 1856. The years 1840 to 1859 constituted the palmy days of Mississippi navigation. Since then, over the greater part of the Mississippi Valley, the railroad has obtained most of the passenger traffic and most of the freight, except bulky products, chiefly coal and lumber. In 1900 the coal carried amounted to 8,539,224 tons, its movement being almost wholly upon the Ohio and its tributaries. The lumber and forest product carried in that year amounted to 9,300,641 tons, which were well distributed between the different tributaries and the main stream. In recent years the bulk of the traffic has been carried on barges towed by steamers.

Banking. See Bank; Banking.

Government—National. The outline of the national government is found in the Constitution framed in 1787 (see Constitution) and various acts of Congress passed in pursuance thereof. In structure and character it is a representative, federal, coördinated, elective, congressional government. Its representative character consists in the fact that the organization of the State is separate and distinct from that of the Government. It is federal in that it is part of a dual system under a common sovereignty. The distribution of the legislative, executive, and judicial powers of the central Government, among separate and distinct organs, contributes the feature of coördination. The popular choice of the executive and law-making branches makes the Government substantially elective, while the independence of the executive as over against the legislative makes the system congressional rather than ministerial in method of action. In distributing the powers of government the framers of the Constitution followed Colonial and English precedent, and confided to separate and distinct organs the exercise of those functions which were legislative in character, those which were executive, and those which were judicial. The investment of the President with the power to recommend to the legislative department the enactment of laws, the right of a qualified veto on its acts and resolutions, and the right of the lower branch of the legislature to impeach and the right of the upper branch to try all officers of the United States for certain offenses, are well-known exceptions to the general principle of the separation of powers. The same may be said of the power confided to the upper branch of the legislature to participate with the executive in the appointment of officers and the negotiation of treaties with foreign countries.

For the Constitution, see Constitution of the United States; Constitutional Law; Federal Government.

For the legislative branch, see Congress; Parliamentary Law; Legislature; Legislation; Representation; Senate; Speaker; Committee; Quorum, etc.

For the executive branch, see President; Electoral College; Cabinet; State, Department of; Treasury, Department of, etc.

For the judicial branch, see Supreme Court of the United States; Court.

Congress. The origin of the national legislature is to be found in the so-called Second Continental Congress of 1775—a revolutionary body called to deliberate upon the state of public affairs growing out of the dispute with Great Britain, and which, with the acquiescence of the people, assumed plenary powers of government and undertook the management of the war. Although its powers were undefined (there being no written constitution), the Congress exercised many of the usual functions of sovereign governments, among which may be mentioned the organization of a diplomatic service and the conclusion of treaties with foreign States; the regulation of commerce; the raising and equipment of armies; the establishment of a post-office; the creation of a national currency, etc. Delegates were usually appointed by popular conventions or legislatures, the Congress was organized in one chamber, and the States enjoyed equality of representation. The Articles of Confederation ratified in 1781 changed the basis of the Congress from a revolutionary assembly to a constitutional body, and undertook to define its powers and regulate its constitution. The principle of equality of representation and the unicameral form of organization were, however, continued; besides, its efficiency as a national legislature was impaired by other unwise provisions. It did not possess the power of taxation, nor did its commands operate upon individuals, but rather upon States which could not be coerced. A few years' experience showed that it was unequal to the task of a national legislature, and when the constitutional convention of 1787 came to deliberate upon the structure and powers of Congress it was practically unanimous in favor of the bicameral organization and of vesting Congress with more adequate powers. The troublesome question of representation was settled by an arrangement which protected the small States by giving them equality of representation in one chamber, and the large States by proportional representation in the other.

Congress was given adequate power over the source of the national revenue, besides other powers inherent in a national legislature. All its powers were enumerated by the Constitution, while a number of express prohibitions were inserted in behalf of individual liberty. Lest an express enumeration of its powers might operate to deprive it of discretion in choosing the appropriate means of carrying into execution the powers granted, a so-called 'elastic clause' was inserted empowering Congress to pass all laws deemed necessary and proper to carry out the powers expressed. Compared with the vast range of powers left with the States the few powers conferred upon Congress seem quite insignificant, and this disparity seems all the more noticeable when compared with the omnipotence of the British Parliament. But the apparently narrow powers vested in Congress have been rather broadly construed by the Supreme Court throughout the entire period of our national history. With the sanction of the court, sometimes under the stress of emergency, but more frequently in time of peace, Congress has steadily extended its powers in every direction, exercising functions which were probably never intended by the framers of the Constitution to be assumed by it. Thus under the simple power to lay and collect taxes (doubtless for revenue only) Congress has employed its power to destroy State bank currency, to encourage certain industries and destroy others, and to restrict commercial intercourse. In pursuance of the power to coin money and pay debts it has established national banks, issued bills of credit, and given the legal-tender quality to its treasury notes. Under the power to establish post offices and post roads it has made a Government monopoly of the entire postal service, established a money-order system, and provided for free delivery of mail in all cities and in many rural communities. Under the power to regulate foreign and interstate commerce it has regulated not only traffic, but telegraphic intercourse and navigation on inland rivers and canals. This power has been employed also for the purposes of prohibition, reciprocity, retaliation, and revenue. It has included the laying of embargoes, the enactment of non-intercourse and non-importation and quarantine laws, the dredging of harbors, the erection of lighthouses, beacons, buoys, etc. Likewise Congress, without express authority, has acquired foreign territory, erected it into States, and governed its inhabitants without their consent. It has made large grants of land to aid in the construction of railroads, passed laws to regulate and control Federal elections, governed rebellious States through military agency, conferred suffrage upon the negroes, and undertaken to secure for them equality of treatment in public places. During the controversy over Reconstruction it encroached seriously upon the sphere of the executive and the courts declined to interfere in the latter's behalf.

In reviewing the first century of the history of Congress and its place in our scheme of government, several criticisms are worthy of note. These are the invariable practice of choosing members from local districts, the short tenures of Representatives, the large and unwieldy size of the Lower House, the long interregnum between the time of the election and the organization of the Congress, the shortness of the second session, and the exclusion of the Cabinet from seats in either House.

State Government. The Constitution of the United States provides that all powers not delegated to the United States nor prohibited by it to the States are reserved to the States, respectively, or to the people. Those powers absolutely prohibited to the States are the conclusion of treaties, alliances, or confederations among themselves; the granting of letters of marque and reprisal; the coining of money; the issue of bills of credit; the making of anything but gold and silver a tender in payment of debts; the enactment of *ex post facto* laws, bills of attainder, or laws impairing the obligation of contracts; and granting of titles of nobility. Those prohibited except with the consent of Congress are the levying of duties on imports or exports, except such as may be absolutely necessary for executing inspection laws; the laying of tonnage duties; keeping troops or ships of war in time of peace; entering into agreements or compacts with other States or foreign powers, or engaging in war unless actually invaded or when the danger is such as not to admit of delay.

Upon examination it will be seen that the relation of the citizen to the State Government is far more close than with the National Government. Nearly the whole domain of civil and religious liberty, education, suffrage, domestic relations, marriage, business transactions, property, professions, trades, contract relations, administration of the criminal law, and many other social and business relationships come within the sphere of the State Government. The fundamental law of each State is embodied in a written constitution drawn up by a constituent convention and ratified in most cases by the electorate at the polls. The earlier constitutions were brief instruments containing little more than the law for the organization of the Government and the necessary safeguards for the protection of civil liberty, but the later ones are bulky documents containing a vast amount of matter which should properly appear in the statutes. In each of the States the legislative power is vested in the Legislature, consisting of a Senate and a House of Representatives, though in six States the latter chamber is styled 'the Assembly' and in three 'the House of Delegates.' Both Houses are chosen by popular vote and by the same electorate, although there are variations as to the mode of choice and tenure. Usually the districts from which Senators are chosen are larger than those from which Representatives are elected, and as a consequence the Lower House is a more numerous body. The Senates range in size from 9 members in Delaware to 51 in Illinois. Delaware has also the smallest House of Representatives, consisting of 21 members, while New Hampshire has the largest, with 321 members. The relative size of the two Houses in New York is 32 and 128 members, respectively, in Pennsylvania 50 and 201, in Massachusetts 40 and 240. The tenure of State Senators is usually longer than that of Representatives. In a majority of the States it is four years, the usual term of a Representative being two years. In many of the States provision is made for partial renewal of the Senate, usually by halves every second year. In a few States the qualifications for eligibility to the Senate are higher than those of the Lower House. The franchise for the election of the Legislature and of all elective State officers is regulated by the State constitutions and is universal manhood suffrage, except that in Massachusetts, Connecticut, and some of the Southern States educational tests are required, while in Wyoming, Utah, and Colorado women enjoy the suffrage equally with men. (For further details, see SUFFRAGE and REPRE-

SENTATION.) In all the States members of the Legislature receive salaries, which are the same for members of both Houses. The amount ranges from one dollar a day and mileage at 8 cents a mile in Rhode Island to $1,500 a year and mileage at ten cents a mile in New York. In most of the States the Constitution provides for biennial sessions of the Legislature. In Massachusetts, Connecticut, Rhode Island, New York, New Jersey, and South Carolina annual sessions are required. In most of the States the length of the session is left to the discretion of the Legislature, in others it is limited by constitutional provision. The powers of the Legislature relative to organization, procedure, adjournment privileges, etc., are similar to those of Congress. The executive power in each State is vested in the Governor, popularly elected for a term ranging from one year in Rhode Island to four years in nineteen States. In a majority of the States—32 in number—there is a Lieutenant-Governor, who succeeds to the Governorship in case of a vacancy. The Governor's salary ranges from $1000 a year in New Hampshire, Rhode Island, and Vermont to $10,000 in New York and Pennsylvania. In a few States he is ineligible to succeed himself. His duties and powers include the execution of the laws, the furnishing of the Legislature with information at the beginning of its session, the calling of it together in extraordinary session, the appointment of certain officers, usually with the consent of the Senate, the granting of reprieves and pardons, the veto of legislative measures except in four States (see VETO), and the command of the militia. In several of the States where there has been a traditional fear of the executive power, the Governor's prerogatives are very narrow—he has no veto power and but little power of appointment. To aid the Governor in the administration there are in every State a number of executive departments, at the head of which are officers usually chosen at the same time, in the same manner, and for the same term as himself. These are the Secretary of State, the Treasurer, the Attorney-General, the Auditor or Comptroller, and the Superintendent of Public Instruction, whose duties are sufficiently indicated by their titles. Besides, there are frequently such officers as commissioners of railroads and of canals, insurance, agriculture, labor, immigration, charities, etc. In most States where such officers exist they are popularly elected, but in a few States they are chosen by the Legislature or appointed by the Governor. The position of the heads of the State executive departments is in no sense similar to that of the President's Cabinet. The Governor has little or no power of direction over them and their responsibility is to their constituencies.

In each State the judicial power is vested in a Supreme Court or Court of Appeal, one or more superior courts known by different names, and a series of local courts of various kinds. In several States the Supreme Court is such only in name, there being a court of last resort above it and usually known as Court of Appeals or Court of Errors and Appeals. This is the case in New York, New Jersey, and Kentucky. Texas has two Supreme Courts, one for civil and the other for criminal cases. The size of the Supreme Courts ranges from three justices in eighteen States to nine in one State. The salaries of members of the State Supreme Courts range from $2000 in Delaware to $8000 in Pennsylvania. Next below the Supreme Court are the superior courts, sometimes called circuit courts, having jurisdiction over a group of counties with the power to hear appeals from the lower courts. Usually there is also a county court, which is known by different names and which has a wide original jurisdiction in both civil and criminal matters and appellate jurisdiction over the decisions of the justices of the peace. These justices of the peace have original jurisdiction in minor civil and criminal cases, with power to impose fines, to commit to prison for short periods, and to bind over accused persons to await the action of the grand jury. In the towns and cities there is usually a separate class of municipal courts. (See MUNICIPAL GOVERNMENT.) There are also probate and chancery courts in some States. Formerly the State judges were generally appointed by the Governor or chosen by the Legislature, but now in a great majority of the States they are popularly elected. In six States the Supreme Justices are still elected by the Legislature; in eight they are appointed by the Governor with the consent of the Council or Senate. The early rule was good-behavior tenure, but now that rule prevails only in Massachusetts, Rhode Island, New Hampshire, and Delaware. Elsewhere the term varies from two years in Vermont to twenty-one in Pennsylvania.

LOCAL GOVERNMENT. Three general types of local government prevail in the United States. They are the town system in New England, the county system in the South, and the mixed system in New York, Pennsylvania, New Jersey, and a number of the North Central States. In the town system the sovereign local authority is the town meeting, or general assembly of all the qualified voters of the town. A regular annual session of this assembly is held in the spring, and extra sessions are held throughout the year as necessity requires. At the annual meeting, which is presided over by a 'moderator,' the town officers are elected, the local budget passed, and other matters of local interest decided upon. The principal town officers are a number of selectmen ranging from three to nine, who are the general managers of the town affairs; the town clerk, who is the keeper of the records; the treasurer; the tax assessors; the tax collector; the school committee, and a variety of minor officers such as constables, overseers of the poor, surveyors, fence-viewers, etc. Where the pure town system prevails the county plays but little part in local administration, and in some States like Rhode Island there are, strictly speaking, no county officers, the county being merely a judicial district without corporate personality.

In the Southern States, where the county type of local government prevails, conditions are reversed. There the county is the political unit, and the administration of all local matters, except educational and municipal affairs, is intrusted to county officers. The chief county authority is the board of county commissioners or supervisors, each member of which represents one of the magisterial districts into which the county is divided. There is no authority which corresponds to the New England town meeting.

Besides the commissioners, the chief county officers are the sheriff, the clerk, the commissioner of education, the coroner, the assessor, and sometimes a tax collector, although the collection of the taxes is a duty generally imposed upon the sheriff. The subdivisions of the county in some States are known as precincts, in others as townships; in Delaware, as hundreds; in Georgia, as militia districts; in Louisiana (where the counties are called parishes), as wards; in Maryland, as election districts; in Mississippi, as supervisor's districts, etc. In the Southern States they are mere judicial or election districts. In each is usually to be found one or more justices of the peace and their ministerial officers or constables, but the districts are in no sense political corporations.

The mixed system which originated in New York and Pennsylvania is a compromise between the two types described above. Here both the town and county elements exist, but are combined in different ratios. In New York the chief local authority is the board of supervisors, consisting of a representative chosen from each town in the county. In Pennsylvania it is a board of three commissioners elected from the county at large. The New York supervisor presides over the town administration, while the Pennsylvania commissioner is in no sense a township officer. In the mixed type, the town or township is a body corporate and politic. Each has its clerk, assessor, collector, commissioner of highways, justices of the peace, constable, etc. In New York there is an annual town meeting at which local officers are elected and matters of poor relief, taxes, schools, etc., attended to. In the pure Pennsylvania form the town meeting does not exist, town affairs being managed by a corps of officers elected by the people of the town. The New York, or supervisor type of local government, has been adopted in Michigan, Illinois, Wisconsin, Nebraska, New Jersey, and elsewhere. The Pennsylvania, or commissioner system, has been transplanted to Ohio, Indiana, Iowa, Kansas, and Missouri, and in a modified form to Minnesota and the Dakotas. For local government in the towns and cities, see MUNICIPAL GOVERNMENT.

FINANCES. The finances of the United States are characterized by rapid increase in magnitude of fiscal operations, and by the great facility with which revenues are secured, resulting in a general tendency for revenue to outstrip expenditures. While the Federal Government possesses the constitutional right to levy both direct and indirect taxes, the requirement that the former shall be apportioned among the States in proportion to population, and the popular hostility to direct taxation, have in effect practically confined the Federal Government to the field of indirect taxation. The principal sources of revenue are customs duties, which yielded in 1902, $254,444,708, and internal revenue (excise taxes) yielding $271,880,122. The principal sources of the internal revenue were: Spirits, $121,138,013; fermented liquors, $71,988,902; tobacco, $51,937,925. Receipts from the postal service amounting (1902) to $121,848,047 figure in the total revenues, which for 1902 were $684,326,280.

The most important items of expenditure are pensions, the post office, the army, the navy, and interest on the public debt. In 1902 the sum paid out in pensions was $138,488,560; the cost of the postal service was $125,896,531; the total of expenditures made by the War Department was $114,657,246; of the Navy Department $68,302,025. It must be remembered that part of the expenses of the War Department should not logically fall under that head, as, for example, expenses for improvement of rivers and harbors. The total of expenditures for 1902 was $593,038,903.

The interest-bearing debt of the United States was $931,070,340 on July 1, 1902. The debt which bears no interest, including United States notes, ($346,681,000) and certificates against gold and silver deposited in the treasury, etc., amounted to $1,226,259,245. Only a relatively small part of the non-interest bearing debt is to be regarded as net debt, since far the greater part is covered by cash in the treasury.

BUDGET. See the article BUDGET.

HISTORY. Down to the adoption of the Federal Constitution the finances of the Central Government were in an extremely chaotic condition. In 1775 the Continental Congress undertook to establish a Continental army and navy, but no power had been delegated to Congress to raise revenue by taxation to meet the attendant expenditures. Congress was therefore forced to rely upon the issue of bills of credit, the proceeds of loans, foreign and domestic, and requisitions upon the various States, which the latter could honor or not as they saw fit. From 1775 to 1783 it is estimated that the income of the Continental Treasury, estimated in specie, amounted to $65,863,825, of which about $37,800,000 was secured through the issue of bills of credit, $19,416,000 through loans, and $5,795,000 through requisitions upon the States. National credit sank so low that in 1781 the Continental bills of credit had fallen to one per cent. of their face value. It was practically impossible, during the greater part of the Revolutionary period, for Congress to borrow money at home or abroad; the foreign loans from France and Spain were rather in the nature of subsidies than of real loans.

Under the Articles of Confederation, the financial position of the Central Government was but little stronger. It was provided that the expenses of the National Government should be defrayed by taxes apportioned to the States in proportion to the value of land and improvements. Congress had power to emit bills of credit and to contract loans; but since the States levied the apportioned taxes according to their own discretion, there was no certainty that such loans could be repaid when due. By 1786 the credit of the Government had fallen so low that it was practically impossible to secure loans, while the proceeds of the apportioned taxes did not meet the running expenses of government. Efforts to amend the articles so as to make possible a national tax proved unavailing, owing to the provision that unanimous consent of the States should be necessary for amendment.

From this state of affairs the country was rescued by the adoption of the Federal Constitution, which gave Congress wide powers of taxation. By the act of July 4, 1789, import duties were levied; in the following year the national debt was reorganized and augmented by the assumption of the State debts incurred in the War for Independence. In 1791 the first national bank was organized to aid in placing the governmental finances on a sound footing. (See BANK, BANKING.) As the tariff of 1789 did not furnish revenue enough to meet current expenses, including the interest on the public debt, Congress in 1791 laid an excise tax upon spirits, which was further extended in 1794 to cover a considerable number of articles. In 1798 a direct tax was levied upon lands, dwelling houses, and slaves. Both the excise and the direct taxes were unpopular and unproductive, yielding in all only $1,582,000 in 1801. The customs duties, on the other hand, increased from $4,399,000 in 1791 to $10,751,000 in 1801.

From 1801 to 1811 revenue largely exceeded expenditures, in spite of the repeal of the excise taxes in 1802. The national debt was reduced from $83,000,000 to $45,200,000. With the outbreak of the War of 1812, customs duties fell off with the ruin of commerce, while military expenditures made a heavy drain upon the national resources. Excise duties were repugnant to the principles of the Republican Party, then in power; accordingly it was necessary to finance the war chiefly by means of loans and the issue of treasury notes. Up to the end of 1814 $41,010,000 was borrowed; by February, 1815, $36,680,000 in treasury notes had been issued, of which, however, part was issued to pay off earlier issues, the largest amount outstanding being $17,619,000 in 1816. In 1813 a direct tax of $3,000,000 was levied, and in 1814 excise taxes were again imposed. These taxes were repealed in 1817 with the increase in customs revenue attendant upon the renewal of foreign commercial relations. From 1816 to 1835 revenue exceeded expenditures so far as practically to extinguish the national debt in the latter year. In 1836 and 1837 a surplus accumulated, which was distributed to the States in the guise of a loan in 1837, about $28,000,000 being disposed of in this way. An important item in the revenues of 1834-37 was the proceeds from the sale of public lands. From 1810 to 1830 the sales of public lands had yielded an annual income ranging from one to two millions; in 1834 the yield was about $15,000,000; 1835, $14,767,000; 1836, $24,877,000; 1837, $6,776,000.

The following table gives the receipts and expenditures for typical years from the adoption of the Constitution down to the Civil War:

YEARS	Total ordinary receipts	Expenditures
1792	$3,669,000	$8,269,000
1801	12,935,000	9,393,000
1811	14,422,000	8,178,000
1814	9,800,000	34,720,000
1816	47,677,000	31,196,000
1821	14,573,000	15,842,000
1831	28,526,000	15,237,000
1841	16,860,000	26,482,000
1850	43,592,000	40,948,000
1860	56,054,000	63,201,000

The years 1837-43 showed a series of deficits owing to decline in revenue through commercial depression, and increase in expenditures due chiefly to greater expense in managing Indian affairs and the undertaking of internal improvements. It became necessary to resort again to the issue of treasury notes and the sale of bonds. An increase in tariff rates in 1842 restored the balance and created a surplus, which was turned into a deficit by the expenses of the Mexican War. Between 1846 and 1851 the national debt increased from $15,550,00 to $68,304,000. By 1857 the debt had been reduced to $28,700,000. A new series of deficits began with 1858, which increased the indebtedness about $50,000,000 by 1860, when the Morrill tariff act restoring higher duties supplied revenue in excess of expenditures.

For finances of the Civil War and the subsequent period, see DEBT, PUBLIC; FINANCE; SPECIE PAYMENTS, SUSPENSION OF; etc.

MONEY. By an act of March 4, 1900, the gold dollar weighing 25.8 grains was made the standard of value of the monetary system. The gold coins in common use, however, are the five, ten, and twenty dollar pieces. Silver dollars, half dollars, etc., are also coined and accepted as convenient mediums of exchange. Silver and gold certificates are issued by the Government, for the repayment of which a fund of $150,000,000 in gold has been established. For further particulars, see articles on MONEY, COINAGE, etc.

WEIGHTS AND MEASURES. The United States system of weights and measures is fully discussed in the general article on WEIGHTS AND MEASURES.

ARMY. The first step toward the establishment of a military force under the control of the Continental Congress was taken June 15, 1775, when that body resolved that a general be appointed to command all the Continental forces raised or to be raised for the defense of American liberty, and unanimously elected George Washington.

One year later (June 13, 1776) the Continental Congress created a 'Board of War,' the germ of the modern War Department. The Revolution was a great war school for the crude but patriotic bands that rallied under Washington's standard, and the Regular Army of to-day rests upon the foundation then laid, after European methods. Thus the United States articles of war are copied from the British military code; the principles of discipline, drill, and accountability for property survive as they were prescribed by the aide-de-camp of Frederick the Great—Baron Steuben; while the French volunteer Baron du Portail became the first Chief of Engineers.

In September, 1776, the Continental Congress appointed a committee to confer with the general officers of the army with the view of creating a system of instruction which would furnish officers educated in the theory of military art and science. This was the origin of the Military Academy at West Point, which institution, however, was not formally established until 1802.

Notwithstanding Washington's wise counsel, that provision should be made for a permanent and well-equipped army, the close of the Revolution saw the seasoned veterans return to their farms and other civil avocations, and Congress, swayed by the arguments that "Standing armies in time of peace are inconsistent with the principles of republican government and dangerous to the liberties of a free people," that "the United States being remote from nations having peace establishments and by being always in a state of defense, on the plan of the confederation, which provides that every State shall always keep up a well regulated and disciplined militia," directed the discharge of "the troops now (May 26, 1784) in the service of the United States, except twenty-five privates to guard the stores at Fort Pitt and fifty-five to guard the stores at West Point and other magazines with a proportionable number of officers," no officer to remain in service above the rank of captain.

War with a civilized power was no sooner ended than the need of provision against Indian hostilities became apparent; the Articles of Confederation framed for protection against the greater danger were found ineffective in dealing with the lesser evil. The recommendations of Congress fell upon deaf ears; each State was busy with its own immediate affairs and the Continental legislature was compelled (June 3, 1784) to augment its nucleus of 80 enlisted men by the enrollment and equipment of a small regiment of foot soldiers; later (October 20, 1786), a battalion of artillery was added, and so by degrees the nucleus of a national force was formed which in 1788 amounted to 595 men, commanded by Lieutenant-Colonel and Brevet Brigadier-General Josiah Harmer.

The establishment of a permanent land force for the national defense, otherwise known as the 'Regular Army,' legally dates from March, 1789, a few weeks before the inauguration of Washington as President under the Federal Constitution. The troops then in service already mentioned, and which now became the 'Regiment of Infantry' and 'Battalion of Artillery,' eventually (1791) became known as the First Regiment of Infantry (Lieutenant-Colonel Harmer) and the Battalion of Artillery (Major Doughty), respectively.

GENERALS COMMANDING THE ARMY OF THE UNITED STATES FROM THE FOUNDING OF THE REPUBLIC

	From	To
George Washington*	1775	1783
Henry Knox*	1783	1784
Josiah Harmer‡	1788	1791
Arthur St. Clair*	1791	1796
James Wilkinson*	1796	1798
George Washington†	1798	1799
James Wilkinson‡	1800	1812
Henry Dearborn*	1812	1815
Jacob Brown*	1815	1828
Alexander Macomb*	1828	1841
Winfield Scott*	1841	1861
George B. McClellan*	1861	1862
Henry W. Halleck*	1862	1864
Ulysses S. Grant†	1864	1869
William T. Sherman†	1869	1883
Philip H. Sheridan†	1883	1888
John M. Schofield§	1888	1895
Nelson A. Miles§	1895	1903
S. B. M. Young§	1903	1903

*Major-general. †General. ‡Brigadier-general. Josiah Harmer was a lieutenant-colonel commandant and brigadier-general by brevet. § Lieutenant-general.

For more than one hundred years after that date, the army served as the strong right arm of the Government: now engaged in holding back the Indians from border settlements; exploring unknown wilds and planting the flag for the honor and glory of the young nation; protecting the hardy settler and the advance guard of science; standing between the peace-loving citizen and the murderous mob; and in five wars forming the back-bone of the great forces called out to meet the emergencies. Withal, the Regular Army performed these varied duties quietly but effectually. It produced Grant, Lee, Sherman, Sheridan, Thomas, Jackson, and a host of able commanders of less renown, but yet distinguished on the roll of fame. The conspicuous traits of the American regular are his individuality, fertility of resource, and unswerving loyalty to his Government; the officers especially exhibiting, since the Spanish-American War, an unexampled capacity for the administration of civil affairs, assuming at a moment's notice duties ranging in importance from those of Governor-General and Judge of the Supreme Court to collector of customs and chief of police, and discharging them with marked ability and fidelity.

THE STAFF. Next to the training and equipment of the line and the selection of competent leaders, the question of a general staff early received the attention of the Board of War. The value of the services of the foreign officers who as volunteers organized, drilled, and inspected the army and aided materially in achieving the success of the American operations had deeply impressed Washington, who upon the eve (1798) of his resuming the command of the army thus addressed the Secretary of War: "In forming an army, if a judicious choice is not made of the principal officers, and above all, of the general staff, it can never be rectified thereafter. The character then of the army would be lost in the superstructure. The reputation of the commander-in-chief would sink with it and the country be involved in inextricable expense."

The first general staff officers appointed by Washington upon assuming command at Cambridge (1775), were an adjutant-general (Horatio Gates), a quartermaster-general (Thomas Mifflin), and a commissary-general (Joseph Trumbull). Under them from time to time during the war were temporarily appointed officers of the line as assistants. As far back as 1777, the Continental Congress had "Resolved, * * that it is essential to the promotion of discipline in the American army and to the reformation of the various abuses which prevail in the various departments that an appointment be made of inspectors general, agreeable to the practice of the best disciplined European armies." The first practical result of this action was shown in the selection of Baron Steuben, who may justly be considered the originator of much that is admirable in the staff system of the United States army. Although he had held the rank of lieutenant-general in the Prussian Army, he did not hesitate to serve at first as a volunteer, pending his appointment as inspector-general with rank of major-general (May 5, 1778).

At the close of the war Baron Steuben resigned his commission, receiving the thanks of Congress "for the great zeal and abilities he has discovered in the discharge of the several duties of his office," together with the gift of a 'gold-hilted sword.' Toward the close of his life Steuben prepared a manual of "Regulations for the order and discipline of the troops of the United States," and for governing the militia (Portsmouth, N. H., 1794), still a model of its kind.

Although, from time to time during the American Revolution, suitable persons were appointed to perform staff duties, yet the existing staff departments date their permanent establishment as follows: Adjutant-general's, March 3, 1813; inspector-general's, March 3, 1813; judge advocate-general's (Bureau of Military Justice, 1864), July 5, 1884; quartermaster's, March 28, 1812; subsistence, April 14, 1818; medical, April 14, 1818; pay, April 24, 1816; engineers, March 11, 1779 (present 'corps of'), March 3, 1863; ordnance, May 14, 1812; signal (corps), March 3, 1863. The *Journal of the Continental Congress*, Washington's orders, and the Revised Statutes teem with interesting historical and biographical data relating to these staff departments for which space here is denied. Out of the crude measures of a great crisis has grown a governmental system which, if not perfect, has through its personnel accomplished wonders. The names of Steuben, Trumbull, Rush, Morgan, Bernard, Townsend, Meigs, Ingalls, Myer, Fry, and Weston are those of a few of the men who, in spite of imperfections of organization, of official dry-rot, and a false sense of security from perils that at times threaten the most favored nations, were equal to the emergency of war, and achieved great distinction in their several departments.

STATISTICS OF THE UNITED STATES ARMY, 1789-1902

	Strength of Army	
1789	1 reg't infantry, 1 bat. artillery............	840
1792	Indian border wars,..............................	5,120
1794	Peace establishment..............................	3,629
1801	" "	5,144
1807	" "	3,278
1810	" "	7,154
1812	War with Great Britain........................	11,831
1815	" " " "	9,413
1817–1821	Peace establishment..............................	9,980
1822–1832	" "	6,184
1833–1837	" "	7,198
1838–1842	Florida War..	12,259
1843–1846	Peace establishment..............................	8,613
1847	Mexican War..	17,812
1848	" "	30,890
1849–1855	Peace establishment..............................	10,320
1856–1861	" "	12,931
1862	Civil War..	39,273
1863–1866	" "	43,332
1867	Peace establishment..............................	54,641
1868–1869	" "	52,922
1870	" "	37,313
1871	" "	35,353
1872–1874	" "	32,264
1875–1879	" "	27,489
1891	" "	27,390
1896	" "	26,955
1898	" "	63,000
1902	" "	100,000

IMPORTANT CAMPAIGNS AND EXPEDITIONS
in which the Army has taken part.

1790-95	War with Northwestern Indians.
1794	Whisky Insurrection (Pa.).
1806	Sabine expedition (La.).
1811-13	War with Western Indians.
1812	Seminole disturbances (Fla.).
1812-15	War with Great Britain.
1813-14	Creek Indian war (Ala.).
1817-18	Seminole War (Fla.).
1823	Blackfeet Indian campaign.
1827	Winnebago Indian expedition.
1832	Black Hawk War.
1835-42	Seminole War (Fla.).
1836-37	Creek Indian disturbances (Ala.).
1836-39	Cherokee disturbances.
1838-39	New York frontier disturbances.
1846-48	Mexican War.
1848	Cayuse Indian war (Ore.).
1849-61	Navajo Indian troubles (N. M.).
1849-61	Indian disturbances (Tex.).
1850	Pitt River expedition (Cal.).
1851-52	Yuma expedition (Cal.).
1851-56	Snake, Sioux, Yakima, Cheyenne, and Arapahoe Indian war.
1855-57	Seminole War (Fla.).
1857	Gila expedition (N. M.).
1857-58	Utah expedition.
1858	Puget Sound and other Indian troubles.
1858-59	Wichita (Ind. Ter.), Colorado River (Cal.), Pecos and Antelope Hills (Tex.), and Bear River (Utah) expeditions.
1859-60	Cortina troubles on Texas-Mexican border.
1860	Kiowa-Comanche (Ind. Ter.) and Carson Valley (Utah) expeditions.
1860-61	Navajo expedition (N. M.).
1861-86	Apache Indian war (Ariz. and N. M.).
1861-65	Civil War.
1862-67	Sioux War (Minn. and Dak.).
1863-69	Indian war (Kan., Neb., Colo., and Ind. Ter.).
1865-68	War with Northwestern Indians.
1865-66	Fenian raid (N. Y. and Canada).
1867-81	Campaigns against Indians and Mexican border disturbances.
1868-69	Canadian River expedition (N. M.).
1871	Yellowstone expedition.
1872-73	Modoc War.
1873	Yellowstone expedition.
1874-75	Indian campaign (Ind. Ter.), Sioux (Wyo. and Neb.), Black Hills (Dak.), and Big Horn (Wyo.) expeditions.
1875	Expedition against Indians (Nev.).
1876	Powder River expedition (Wyo. Ter.).
1876-77	Big Horn and Yellowstone expeditions (Wyo. and Mont.).
1876-79	War with Northern Indians.
1877	Labor strikes (Pa. and Md.).
1877	Nez Perces campaign.
1878	Bannock and Piute campaigns (Nev. and Ida.), and Ute Indian expedition (Colo.).
1879-84	Disturbances in Ind. and Okla. Ter., and Ute Indian campaign (Colo. and Utah).
1885	Chinese mining and labor troubles (Wyo. Ter.)
1890-91	Sioux Indian troubles (So. Dak.).
1891-93	Garcia troubles (Texas-Mexican border).
1892	Miners' disturbances (Idaho).
1894	Labor disturbances (Ill.), and labor strikes (Ill. to Pacific coast).
1898	War with Spain.
1899-1902	Philippine insurrection.
1900	China relief expedition.

MODERN ESTABLISHMENT. The war with Spain (1898) called public attention to some of the imperfections of the American military administration, and discussion of the shortcomings brought about a plan of reorganization unprecedented in the history of the Army. The Philippine insurrection, requiring the occupation of the archipelago at one time by a force of 65,000 men (regulars and volunteers), became in its turn an object lesson in the formation of a permanent military establishment suited to the new conditions. The regular force of 1897, expanded by Congress the following year to 63,000, was in 1899 reinforced by 35,000 volunteers, exceptionally efficient, as nearly all had seen service in Cuba and the Philippines, and were organized into regiments commanded by selected regular officers. During two years following these troops were incessantly engaged in fighting the Filipinos under the unfavorable conditions of climate, terrain, and the treacherous character of the enemy.

Official figures of the Adjutant-General's office show that from February 4, 1899, to April 30, 1902, there were 2,561 engagements, and in no case did United States troops surrender or retreat leaving their dead and wounded in the possession of the enemy. Up to July 16, 1902, 4,135 officers and 123,803 men were landed in the Philippines, 1,135 officers and 23,000 men having been sent there more than once. The average strength during the period named was 40,000. The casualties were: Killed and died of wounds, 69 officers and 936 enlisted men; deaths from disease, 47 officers and 2,535 men; deaths from accident, 6 officers and 125 men; drowned, 6 officers and 257 enlisted men; deaths by suicide, 10 officers and 72 enlisted men; murdered, 1 officer and 91 enlisted men. Total deaths, 139 officers and 4,016 enlisted men; wounded, 190 officers and 2,707 enlisted men, a total of 2,897.

Besides the service in the Philippines, the regular contingent there was drawn upon for the China Relief Expedition to the extent of 2,000 men. During the short campaign—July-August, 1900—the American casualties numbered 32 killed and 77 wounded. For the first time since the Revolution the United States Army fought side by side with European troops, and the professional benefit derived from the asssociation was well worth the cost. In certain respects the practical excellence of the American troops was conceded.

On February 2, 1901, Congress authorized a permanent increase of the Army (discretionary with the President except artillery) not to exceed 100,000 men, including 12,000 native troops for service in Porto Rico and the Philippines. This force consisted of 15 regiments of cavalry, 30 of infantry, one of engineers, a corps of artillery, and the staff departments. In June of that year all volunteers were mustered out. In July, 1902, the President, in the exercise of the discretion vested in him by law, the United States having recognized the independence of Cuba and having placed the greater part of the Philippine Islands under civil government, materially reduced the army to the aggregate strength shown in the following table:

ORGANIZATION OF THE UNITED STATES ARMY, JULY, 1902

	Lieut.-general	Major-generals	Brig.-generals	Com. officers	Non-com. staff officers	Non.-com. officers	Bands	Privates	Total commissioned	Total enlisted	Aggregate
General officers	1	6	15	....	....	....	....	....	22	....	22
Adjutant-general's department	...	1	...	27	....	....	....	....	28	....	28
Inspector-general's department	...	...	1	16	....	....	....	....	17	....	17
Judge adv.-general's department	...	...	1	11	....	....	....	....	12	....	12
Quartermaster's department	...	...	1	96	150	....	....	....	97	150	247
Subsistence department	...	...	1	43	200	....	....	....	44	200	244
Medical department	...	...	1	320	500	....	....	2,100	321	2,600	2,921
Pay department	...	...	1	52	....	....	....	....	53	....	53
Corps of Engineers	...	...	1	159	8	288	28	992	160	1,316	1,476
Ordnance department	...	...	1	71	....	....	....	....	72	....	72
Signal Corps	...	...	1	34	....	350	....	460	35	810	845
Record and Pension Office	...	...	1	1	....	....	....	....	2	....	2
Chaplains	...	...	...	62	....	....	....	....	62	....	62
15 regiments cavalry	...	...	...	750	120	2,880	420	10,620	750	14,040	14,790
Veterinarians	...	...	...	....	....	....	....	....	....	....	30
126 companies coast artillery	...	...	...	531	48	2,772	280	10,962	531	14,062	14,593
30 batteries field artillery	...	...	...	120	....	630	....	3,050	120	3,680	3,800
30 regiments infantry	...	...	...	1,500	240	6,480	840	22,320	1,500	29,880	31,380
Military Academy	...	...	...	....	....	....	....	....	....	342	342
Enlisted men unattached to Reg's, etc.	...	...	...	....	....	....	....	....	....	800	800
Indian scouts	...	...	...	....	....	....	....	....	....	75	75
Philippine scouts	...	...	...	....	....	....	....	....	....	....	....
Porto Rico provisional reg. of infantry	...	...	...	31	6	184	....	648	31	866	897
Grand aggregate	1	7	25	3,824	1,272	13,584	1,568	51,152	3,857	68,821	72,708

The most radical change in the organization was that of the artillery. For many years, nominally it was regimental, but practically the unit for administration and operation was the battery. The system of coast defense lacked cohesion, consisting simply of a number of independent posts commanded by officers, who, having reached the rank of field officer after thirty or forty years' service, as light battery commanders in the Civil War, or with infantry garrisons in peace, were content to rest on their laurels. Under the influence of Secretary of War Root, the seven regiments of artillery (after a long struggle, professional and political) were merged into a corps, supervised by a chief (selected from the fourteen colonels), with his station at the headquarters of the Army, and consisting of 126 companies of coast artillery and 30 batteries of field artillery. These were grouped within a number of artillery districts, and each district placed under command of a competent field officer.

RELATIVE STRENGTH OF ARMY TO POPULATION*

Year	Officers	Men	Total	Per cent.
1790	57	1216	1273	$\frac{3}{100}$ of 1
1800	318	4118	4436	$\frac{8}{100}$ of 1
1810	774	9147	9921	$\frac{14}{100}$ of 1
1820	712	8230	8292	$\frac{8}{100}$ of 1
1830	627	5324	5951	$\frac{5}{100}$ of 1
1840	733	9837	10570	$\frac{8}{100}$ of 1
1850	948	9815	10763	$\frac{5}{100}$ of 1
1860	1108	12259	16367	$\frac{5}{100}$ of 1
1870	2541	34534	37075	$\frac{10}{100}$ of 1
1880	2152	24357	26509	$\frac{5}{100}$ of 1
1890	2168	24921	27089	$\frac{4}{100}$ of 1
1900	2500	65000	67500	$\frac{8}{100}$ of 1

*Records, Adjutant-General's Office.

At the same time, a plan of instruction for young officers was devised—an elaboration of the post-graduate schools existing at the opening of the war with Spain—and the following institutions were created: A War College at Washington, a General Service and Staff College at Fort Leavenworth, a Cavalry and Light Artillery School at Fort Riley, an Engineer School at Washington Barracks and a School of Submarine Defense at Fort Totten, N. Y. A large appropriation was made in 1902 for permanent camp grounds and the erection of additional barracks and quarters at certain military posts, at which large garrisons may be concentrated. See ARMIES; ARMY ORGANIZATION; and other military topics where matters pertaining to the United States Army are discussed. For militia, see section under the various States.

NAVY. The first definite provision for a naval establishment was the act of Congress of October 13, 1775, which authorized the building of one vessel of 10 guns and another of 14 guns to be equipped as national cruisers. At the same time a law was passed establishing a marine committee consisting of John Adams (later replaced by Christopher Gadsden), John Langdon, and Silas Deane. This Congressional committee was later enlarged to thirteen and given charge of all matters pertaining to the navy.

On October 30th two more vessels were authorized, one of 20 and the other of 36 guns; while on December 13th the construction of thirteen ships was provided for. On November 10th an act for the 'public defense' authorized the raising of two battalions of marines and established rules for the "government of the American Navy." The marines authorized were in reality sailors, for the act provided "that particular care be taken that no persons be appointed to offices, or enlisted into said battalions, but such as are good seamen, or so acquainted with maritime affairs as to be able to serve to advantage by sea when required." It is probable, therefore, that Congress designed by the act to provide crews for such vessels as they were able to equip and to enlist and keep the men together until their services could be made available.

As the vessels authorized to be built could not be completed for some time, a number of merchantmen were purchased and armed. These improvised men-of-war, hastily and poorly equipped and armed, and in many cases very badly officered and manned, constituted the first American naval force, of which, by act of Congress of December 22, 1775, Ezekiel Hopkins was made commander-in-chief.

The vessels of the improvised navy were directed to cruise along the coast and intercept transports laden with munitions of war for the British army and navy. On February 17, 1776, a squadron under Commander-in-Chief Hopkins consisting of the *Alfred*, *Columbus*, *Cabot*, *Andrea Doria*, *Providence*, *Wasp*, *Fly*, and *Hornet* put to sea bound for the West Indies. The *Fly* and *Hornet* parted company with the fleet on the night of the 18th, but the remainder kept together, and in March captured the British naval station on the island of New Providence, Bahamas, obtaining a quantity of military and naval stores, including nearly 100 cannon, which were much needed for arming the new ships. The squadron left on March 17th, having on board the royal Governor and some other prisoners. When off Long Island, Hopkins captured a British bomb-brig of 8 guns and a tender of 6 guns and had a running fight with H. B. M. S. *Glasgow* of 20 tons, which made a very good defense and eventually, by good management, escaped. In October, 1776, Congress passed a vote of censure upon Commodore Hopkins for not performing the duties upon which he was sent. He was dropped from the service on January 2, 1777, and no other officer has since been given the title of commander-in-chief of the Navy.

On March 23, 1776, letters of marque and reprisal were granted against Great Britain, and numerous privateers were fitted out. On June 25th a marine corps (q.v.) was established consisting of one major, nine captains, ten first lieutenants, and seven second lieutenants.

After the Declaration of Independence Congress began the building up of the navy with increased vigor, and on October 3d it ordered another frigate and two cutters, and on November 9th an act was passed authorizing the construction of three 74-gun ships, five more frigates, a sloop-of-war, and a packet; and these were to be supplemented by another frigate and another sloop-of-war ordered in January, 1777. But the plans of Congress were quite beyond the capacity of the Colonies either to build, equip, or man. One 74 was laid down at Portsmouth, N. H., and completed in 1781—too late to be of service. Her armament was reduced to 56 guns, and during the next year she was presented to the King of France to replace the 74-gun ship *Magnifique*, which was lost in Boston Harbor. Many of the vessels built never got to sea, and the real work performed by the navy during the Revolution was done by a dozen vessels, most of which were small.

On November 15, 1776, Congress established the relative rank between officers of the army and navy as follows: Admirals to rank with generals, vice-admirals with lieutenant-generals, rear-admirals with major-generals, commodores with brigadier-generals, captains of ships of 40 guns and upward with colonels, captains of ships of 20 to 40 guns with lieutenant-colonels, captains of ships of 10 to 20 guns with majors, lieutenants with captains, and officers of marines with officers holding similar commissions in the land service. Notwithstanding this act, no rank higher than that of captain was created by law until 1862, though the title of admiral (q.v.) was given to John Paul Jones in the official correspondence of the State Department in 1792, a short time previous to his death.

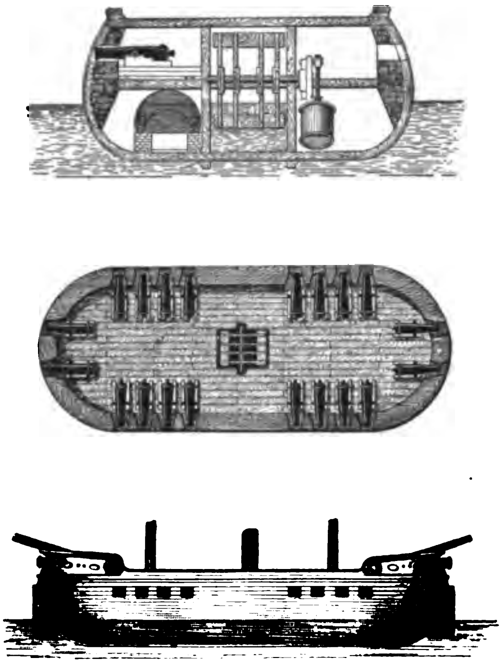
From the close of the Revolution until 1795 the country was practically without a navy, largely from lack of money to support one. The cause of its reëstablishment was the depredations of the Barbary pirates. On March 3, 1794, President Washington sent a message to Congress communicating the facts in regard to the Algerian outrages, and Congress promptly passed an act, which was approved on March 27th, authorizing the purchase or construction of six frigates. It was provided that no vessel should mount less than 32 guns. An additional provision was that all proceedings under the act should cease in case the Algerian difficulty should be settled. Measures were immediately taken for the construction of the vessels, which consisted of the *Constitution* (q.v.), *President*, and *United States* of 44 guns, and the *Chesapeake* (q.v.), *Constellation*, and *Congress* of 38.

In November, 1795, a treaty was signed with the Dey of Algiers, and all work on the vessels was suspended. The President immediately called the attention of Congress to the subject, and an act was passed without delay ordering the completion and equipment of two of the 44's and one of the 38's. The treaty of peace with the Dey of Algiers cost nearly a million dollars, the price of three frigates, and the President, in his annual address to Congress in December, 1796, strongly recommended laws for the gradual increase of the navy. The outrageous proceedings of the French cruisers on the United States coast did what no representations of the Government could achieve, and in April, 1798, Congress grudgingly authorized the President to build, purchase, or hire twelve vessels, none of which was to exceed 22 guns, and see that they were regularly manned and equipped. This act was passed on April 27th, and on the 30th a regular Navy Department was created separate from the Department of War, of which it had previously formed a part. Benjamin Stoddart of Georgetown, D. C., was the first Secretary, and he entered on his duties in June. On June 11th a new marine corps was established, and during the year a number of additional small vessels were authorized.

The quasi-war with France soon terminated with credit to the newly born service; nevertheless, it is probable that Congress was so deeply imbued with false ideas of economy that the navy would have been reduced to comparative uselessness had not the Barbary powers repeated their acts of aggression. At the close of the operations against Tripoli, which were highly creditable to the navy, the service was in excellent condition. The spirit of economy shown by our Government now took a new turn. President Jefferson, whose knowledge of military affairs was very slight and of naval affairs practically *nil*, brought forth his gunboat policy. While this system was being developed the incident of the *Chesapeake* and *Leopard* occurred and saved the navy from absolute disorganization, though that incident itself was discreditable to the country and the naval service. Neither the aggressions of England and France nor the danger of war with Spain were sufficient, however, to cause Congress to appropriate money for ships of the line, and the navy at the beginning of the War of 1812 was possessed of nothing larger than a frigate, while the price of several line-of-battle ships had been squandered in building more than 200 worthless gunboats. The operations of the War of 1812 were so extensive and important that they cannot here even be separately mentioned. Suffice it to say that the navy achieved world-wide renown and won the respect of the country.

Immediately after the close of the war with Great Britain a squadron under the command of Commodore Decatur was sent to punish the Barbary powers, particularly Algiers, for wanton aggressions upon our commerce during the war, which prevented action being taken at the time. In sixty days after his arrival in the Mediterranean Decatur had captured the principal vessels of the Algerian navy and had forced treaties on Algiers and Tunis which compelled these faithless pirates to a recognition of maritime right.

In considering the operations of the War of 1812 it is interesting to speculate upon what might have occurred had the war lasted another year. In 1813 Robert Fulton submitted to President Madison plans for a sea-going steam battery. His plans were accepted, and in March, 1814, Congress authorized the building of one or more of such batteries for the defense of the coast. Fulton died in February, 1815, but the *Demologos* (Voice of the People) was completed in the following spring and had successful trials in June. On July 4, 1815, she made a trip to sea and back, steaming 53 miles in eight hours and twenty minutes. Her length was 156 feet, beam 56 feet, depth 20 feet, and she measured 2475 tons, or more than a line-of-battle ship and 1000 tons more than the *Constitution*, although her cost, $320,000, was only $17,000 more than the first cost of the latter. Her sides were 5 feet thick and impenetrable to any guns carried by British ships, while her battery consisted of 20 guns, which were heavier than any then afloat. A furnace was fitted for heating shot, and there were pumps for throwing cold or hot water on the enemy's deck. The propelling apparatus of the *Demologos* consisted of a single paddle-wheel in the centre of the ship, operating in a channel extending the length of the ship below the gun deck and dividing the under-water body into two parts, which were held together by the upper works and transverse frames at the bottom. Had this vessel got to sea before the conclusion of hostilities and met the warships of the enemy it is tolerably certain that she would have destroyed the heaviest squadrons with ease and caused a revolution in naval affairs. As it was, however, her powers remained unproved and the natural conservatism of the naval authorities, accustomed to the use of sails, caused her to be looked upon as an interesting experiment of no great practical value. She was, therefore, tied up alongside the wharf at the Brooklyn Navy Yard and used as a receiving ship. On June 4, 1829, her magazine blew up, killing 24 persons and injuring 19.



THE DEMOLOGOS.

The successful performance of the *Demologos* (or *Fulton*, as she was afterwards called in honor of her designer) led Congress in 1816 to authorize the construction of another steam battery. But the conservative officers at the head of affairs in the navy could not understand the importance of steam-propelled ships, and it was not until 1835 that measures were taken to carry out the provisions of the law. In the meantime a number of ships of the line were built, about a dozen in all, and some of them took part later in the Mexican War. In 1835 the Secretary of the Navy, acting upon better advice, directed the Board of Commissioners to proceed at once to the construction of a steam man-of-war. In 1837 the vessel was completed and tried, a speed of 12 knots being realized. Her propelling power consisted of side paddle-wheels and engines on the upper deck. Several other paddle-wheel vessels were built in the next few years, one of which was the iron steamer *Michigan*, which is still in service on the Great Lakes—the first iron vessel in the navy, and also the first one afloat on the Lakes. In 1842-43 the screw steamer *Princeton* (of about 1000 tons) was built and fitted with machinery designed by John Ericsson. She was the first war vessel in any navy to be fitted with screw propulsion, and likewise the first to have all her machinery and boilers below the water-line and to have blowing fans for forcing the draught under the boilers. A Congressional committee, after considering the advantages of the submerged propeller and iron hulls, recommended in 1846 that thirteen screw steamers of iron be immediately constructed. When authority for the construction of four war steamers was granted in the following year, a board of prominent naval officers recommended that three of the four should have paddle-wheels. The fourth was the *San Jacinto;* and it as well as the others was built of wood. In 1854 Congress ordered the building of "six first-class steam frigates to be provided with screw propellers." These vessels were the celebrated ships of the *Merrimac, Niagara,* and *Wabash* class. They were of fine model for their day, and should have had good speed, but instead of having full steam and auxiliary sail power they had full sail power and only auxiliary engines. They were followed, however, in 1857 by the steam frigates of the *Hartford* class, in which the engine power was relatively considerably increased.

The operations of the navy in the Civil War soon showed the true importance of steam and the uselessness, or worse than uselessness, of sails. Even after the close of the war the practice of giving full sail power to our cruising men-of-war was continued from mistaken ideas of economy; though during the war the rigged ships had been very generally stripped of yards and upper masts. The practice died hard, and it was not until 1887 that a full sail rig was abandoned for cruising vessels. The ill-fated *Maine* was the last ship for general service to be designed to carry a heavy square rig, but this was changed to military masts before her completion.

The importance of possessing armored vessels was realized as soon as the Civil War commenced, and on both sides an investigation of the subject of armored ships was begun at once. The Confederates started work first, but the superior resources of the North enabled the first really armored ships to be completed on practically the same day. Both *Monitor* and *Merrimac* (Virginia) were fatally defective in details, but many of the defects were corrected in later vessels of the same types. See SHIP, ARMORED.

After the close of the Civil War the navy again sank into decadence, the enormous expenses entailed by the war causing Congress to cut down appropriations in every direction. The personnel of the regular service was increased just after the end of the struggle, but it was cut down later, the last cut being in 1882, just as new construction was about to commence. During the interval 1866-82 only a few vessels were authorized—five monitors of 4000 to 6000 tons and about a dozen wooden cruisers, only one of which (the *Trenton*) was over 2000 tons. Old vessels were repaired and kept going, but nothing new was attempted, the wooden cruisers mentioned being out of date when put in service. So that, in 1880, the United States Navy, with its antiquated ships and no less antiquated ordnance, was the laughing-stock of the world and in power below that of several of the small republics of South America. Finally, in 1881, a board was appointed by the Secretary of the Navy to consider the needs of the service. This board recommended the building of sixty-eight vessels of various types.

Congress appropriated for two and at its next session increased the number to four, but reduced the size. The first of these acts was passed August 5, 1882, and in addition to the provision for the two ships made a sweeping cut in the number of officers which blocked promotion for ten years and subsequently caused endless trouble through the deficiencies in the numbers produced by it. Five monitors were started early in the 'seventies,' but work on them had long since ceased when it was revived by the act of 1882 which appropriated 400,000 toward their completion. In the next session $1,000,000 additional was appropriated, but the succeeding Congress withdrew all unexpended balances of this. From this time on each Congress made some addition to the navy. In 1886 the *Maine* and *Texas* were provided for and in 1890 three battleships of the *Oregon* type. In deference to the very general prejudice which existed against the high-sided, broadside battleships of European navies, these ships were given rather low freeboard and were called 'coast-line battleships.' But the *Iowa*, which was next built, was frankly described as a seagoing battleship, the unreasoning prejudice in favor of the nearly useless low free-board monitor having been much modified.

The war with Spain caused increased attention to be given to naval affairs, not only because the navy had done well, but because the people were beginning to appreciate the importance of a powerful navy to a country which must be attacked from the sea and reach its enemies through its naval strength. They learned not only this, but that true naval defense lies not in passive protection of harbors by forts and harbor-defense ships, but in pursuing the enemy's naval forces at sea and destroying them. The realization of these things caused the navy to be considerably expanded; more heavy battleships, armored cruisers, and torpedo boats were authorized; and the enlisted force, which had been nearly doubled since 1882, was now greatly increased. In

1899, for the first time in nearly twenty years, Congress passed legislation of importance concerning the officers. Nearly all corps were slightly increased and the line and engineer corps were combined. This was practicable, as nearly all officers of both corps had been educated at the Naval Academy, and, while the line officers had received considerable instruction in steam engineering, the engineers had received some training in line officers' duties. The desirability of the 'amalgamation' of the corps is yet to be determined.

The organization of the Department of the Navy is described under NAVY, DEPARTMENT OF THE.

The active list of officers of the navy in May, 1902, consisted of 1299 commissioned officers, 868 cadets, mates, and warrant officers, and 200 officers of marines. The retired list consisted of 475 commissioned officers (many of whom are performing active duty on shore), 116 warrant officers (a few of whom are employed on active duty), and 27 marine officers. The enlisted force authorized was 22,500 petty officers and men, 2500 naval apprentices, and 6000 marines. The commissioned officers included 874 officers of the line (which includes engineers), 190 of the medical corps, 136 of the pay corps, 41 constructors, 21 civil engineers, 24 chaplains, 12 professors of mathematics, and 1 secretary to the admiral. There were 124 naval cadets at sea, 301 cadets at the Naval Academy, 95 boatswains, 91 gunners, 69 carpenters, 9 sailmakers, 148 warrant machinists, 25 pharmacists, and 6 mates.

The enlisted force of the navy is divided into five branches—seaman, artificer, special, messman, and marine. The first three have assimilated ratings which are classified in each branch under the heads of: (a) chief petty officers; (b) petty officers, first class; (c) petty officers, second class; (d) petty officers, third class; (e) seamen, first class; seamen, second class; seamen, third class. The chief petty officers of the seaman branch are chief master-at-arms (pay per month, $65), chief boatswain's mate ($50), chief gunner's mate ($50), chief gun-captain ($50), chief quartermaster ($50); in the artificer branch there are chief machinist ($70), chief electrician ($60), chief carpenter's mate ($50); in the special branch, chief commissary steward ($70), chief yeoman ($60), hospital steward ($60), commissary steward ($60), bandmaster ($52). Petty officers of the first class consist of boatswain's mates, first class, master-at-arms, first class, machinists, first class, etc., with rates of pay from $36 to $60 per month. Petty officers of the second class consist of master-at-arms, second class, machinist, second class, etc., with pay ranging from $35 to $40. Petty officers of the third class consist of master-at-arms, third class, etc., pay $30 per month in all cases. The seamen, first class, consist of seamen gunners ($26), seamen ($24), apprentices, first class ($21), firemen, first class ($35), and musicians, first class ($32). The seamen, second class, consist of ordinary seamen ($19), apprentices, second class ($15), firemen, second class ($30), shipwrights ($25), musicians, second class ($30), buglers ($30), hospital apprentices ($20). The seamen, third class, consist of landsmen ($16), apprentices, third class ($9), and coal passers ($22). In the messmen branch, officers' stewards are paid $24 to $45 and their cooks $20 to $40. Ship's cooks (for the crew) are paid $25 to $55 and bakers $35 to $45. Officers' mess attendants are paid $16 to $24. In the enlisted force of the marine corps, sergeant-majors are paid $34 to $42; other sergeants, $18 to $42; drum major, $25 to $33; corporals, $15 to $23; drummers, trumpeters, and privates, $13 to $21; leader of the band, $125 to $175; second leader of the band, $75 to $83; musicians, first class, $60; musicians, second class, $50. All men not petty officers are given an outfit of clothing upon enlisting for the first time and marines of all ratings are given an ample allowance of clothing throughout their enlistment. The mess expenses of enlisted men are met by an allowance of a ration of 30 cents a day in addition to the rates of pay.

Officers of the navy who have creditable records are retired at the age of 62 years on three-fourths the pay received at date of retirement. Officers retired for disability or incapacity may receive three-fourths pay, half pay, or furlough pay (about one-third full pay). Marine officers, as well as army officers, are retired for age at 64 years. Enlisted men are pensioned for disability or retired after thirty years' service on three-fourths the highest rate of pay received.

The vessels of the United States navy in 1902 were 305 in number, the more important of which are grouped together in the tabular statement in the article NAVIES.

The United States possesses a number of naval stations, both at home and in its outlying territories and possessions. Of these, 6 are navy yards of the first class, located at New York, Norfolk, Mare Island (near San Francisco), Boston, Philadelphia, and Port Orchard (Puget Sound); 3 navy yards of the second class, located at Portsmouth (N. H.), Pensacola (Fla.), and New Orleans (La.); 4 of the third class, located at Port Royal (S. C.), Charleston (S. C.)—this will be an important yard when completed—San Juan (Porto Rico), Cavité (P. I.); 3 of the fourth class located at Key West, Pollok (Mindanao, P. I.), and Isabela Basilan, P. I.); 2 training stations, located at Newport and Yerba Buena Island (San Francisco Bay); 1 naval academy at Annapolis; 1 torpedo station, at Newport; 1 gun factory at Washington; 1 ordnance proving ground, at Indian Head (near Washington); 5 coaling stations located at New London, Tortugas (near Key West), Hawaii (navy yard to be established), Guam, and Tutuila (Samoa).

COLONIES. The following figures for area and population are based upon the census of 1900 and Government estimates:

COLONIES	Area	Population
Hawaii	6,740	153,727
Philippine Islands	127,853	6,975,073
Porto Rico	3,676	953,243
Guam	195	9,000
Tutuila	54	3,800
Total for the colonies	138,518	8,094,843

The following table shows the trade relations between the United States and what are now its principal dependent territories, for the fiscal years 1893 and 1903:

COLONIES	Exports to		Imports from	
	1893	1903	1893	1903
Hawaii	$2,717,338	$10,787,666	$9,146,767	$26,201,175
Philippine Islands	154,378	4,028,677	9,159,857	11,372,584
Porto Rico	2,510,607	11,976,134	4,006,623	10,909,147
Totals	$5,382,323	$26,792,477	$22,315,247	$48,482,906

For details on commerce, government, history, etc., see HAWAII, PHILIPPINE ISLANDS, and PORTO RICO.

POPULATION. The population of the United States constitutes over one-half that of the Western Hemisphere and greatly exceeds that of any European country except Russia. The rapidity of the growth of the population is without parallel among civilized nations. In 1900 it was over fourteen times greater than in 1800. During the same period the population of the United Kingdom and the German Empire increased about two and one-half times each, while that of France increased by less than half. The growth of the population also has been remarkably steady. Except in the war decade, 1860-70, the increase in each decade since 1790 has been greater than in the decade preceding.

The following table shows the growth of the population by sections—the North as compared with the South and the East with the West:

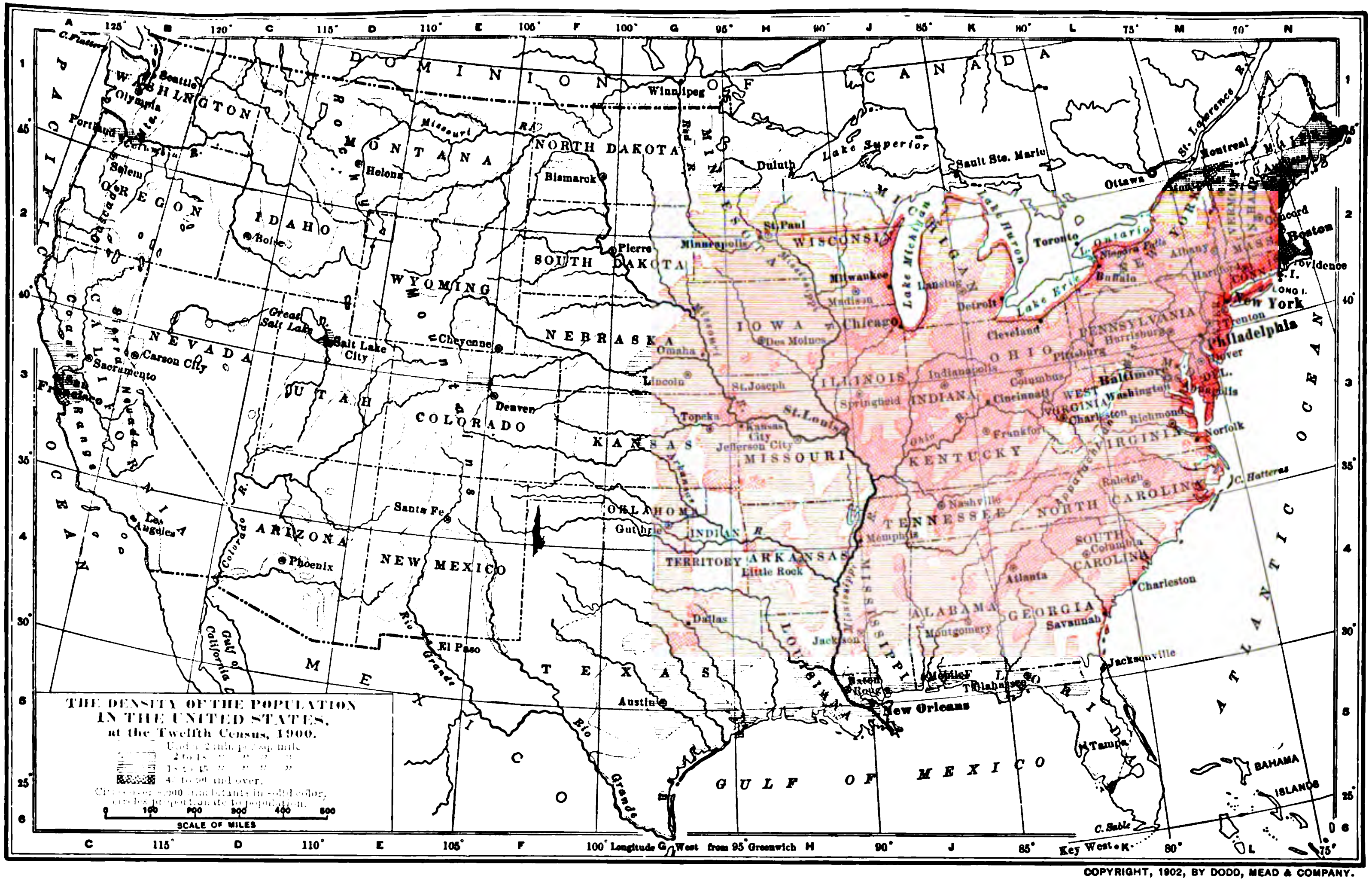
CENSUS	POPULATION			
	North Atlantic and North Central divisions	South Atlantic and South Central divisions	East of the Mississippi River	West of the Mississippi River
1900	47,379,699	24,523,527	55,023,513	20,971,062
1890	39,763,824	19,830,813	46,160,075	16,462,175
1880	31,871,518	16,516,568	38,896,423	11,259,360
1860	19,690,984	11,133,361	26,906,846	4,536,475
1840	10,112,624	6,950,729	16,186,554	876,799
1820	5,219,221	4,419,232	9,404,187	234,266
1800	2,686,582	2,621,961	5,308,483	....

It will be seen that the North has, until recent years, grown much more rapidly in population than the South. The more rapid growth of the South in the last decade was largely due to the development in the southwest. The gain in the region east of the Mississippi has been remarkably regular. The percentage of gain west of the Mississippi was formerly enormous, but is rapidly falling to that of the region east of the Mississippi. The percentage of gain of the former region in 1890-1900 was 25 and in the latter 19.2.

A considerable part of the country is losing in population. In the decade 1880-1890, 14.7 per cent. of the area of the North Atlantic and North Central States decreased in number of inhabitants, and in the following decade 19.5 per cent. of the same area represented a loss. In the South Atlantic and South Central States the percentage of area which lost population in the respective decades was 9.0 and 5.1. Of the region east of the Mississippi 17.8 per cent. lost population in the decade 1880-90, and 10.6 per cent. in the following decade. The corresponding percentages for the region west of the Mississippi were 10.1 and 11.1, respectively.

Estimates of the population prior to the first regular census place the figure at 200,000 in 1688 and 1,850,000 in 1770. At the time of the first census the population was almost wholly confined to the Atlantic coast region, the five most populous States being Virginia, Pennsylvania, North Carolina, Massachusetts, and New York, in the order named. The growth of the country has involved an enormous migration of peoples. This movement may be considered as twofold: first, an interstate migration of native Americans; second, foreign immigration.

INTERSTATE MIGRATION. In the early period of migration the direction of the movement was determined largely by the opportunities afforded by waterways and mountain passes, and, later, by the railroad accommodations. The waterway system of the United States was admirably adapted to aid in the settlement, and the part it played is not easily over-emphasized. Not only did many of the early settlers secure transportation to their new homes by rivers, but they used the rivers also as avenues of commerce, and new settlements almost universally began along watercourses. In the North the immigrants from New England and New York passed almost wholly through the Mohawk Valley, and western New York developed rapidly along the line of the Erie Canal. By this route the Lake region and the Northwest in general were peopled. Farther to the south a large number of settlers found passage west by way of the valley of the Potomac, and by the Ohio and its tributaries. The settlements made in the region tributary to the Ohio were first to the south and later to the north of that stream. In the Southeast the Savannah and other rivers in like manner aided in opening up the interior region. The influence of streams in the Mississippi Valley was very marked. Through the main stream from the south, and through the Ohio from the east, large numbers of immigrants passed to the centre of the valley and thus were enabled to reach other regions watered by the Mississippi system, until settlements lined the main and tributary streams. The railroads came at an opportune time and made possible and profitable the settlement of regions that would otherwise have remained unsettled for a much longer time. The gold discoveries in California drew large numbers of immigrants in spite of the difficulties of the route, but. generally speaking, the Pacific Coast and the Cordillera region awaited the construction of railroads. The movement of the population in the United States has been in the main westward, following the parallels of latitude. Almost every newly settled region, however, received representatives from all parts of the older settled regions, and there are a few very marked north and south movements. Thus, for instance, southern and central Indiana were filled largely with immigrants from North Carolina, Kentucky, and other Southern States. The early lead-miners and settlers in the adjacent corners of Wisconsin and Illinois on the Mississippi were Southerners. The recently settled Oklahoma and Indian Territory received large numbers



THE DENSITY OF THE POPULATION IN THE UNITED STATES, at the Twelfth Census, 1900.

COPYRIGHT, 1902, BY DODD, MEAD & COMPANY.

from both the North and the South. As the West became well settled the westward movement grew less important; whereas in 1880 11 per cent. of the population of the Central States were born in the Atlantic Coast States, in 1900 only 6 per cent. of the population in the former group of States were born in the latter group. Again, in 1880 13.5 of the population of the Western division of States were born in the Atlantic States; in 1900 the corresponding per cent. was only 9.5. The absolute number, however, had increased during the period. The increase was much more marked in the percentage of the Central States population which the Western division of States contained. The rate increased from 17.5 per cent. of the population in 1880 to 24.0 per cent. in 1900. In the latter year there were 954,974 whites and 336,879 negroes born in the Southern States who lived in the North and 1,021,450 persons born in the North who lived in the South. New York and Ohio have each experienced a net loss of between six and seven hundred thousand by interstate migration of native born. Texas has made a net gain of 629,000.

Negro Population. See Negro in America.

Urban Population. From 1875 to 1900 there developed a marked tendency for the population of the United States to segregate in cities. Better transportation and communication facilities have enabled trade to concentrate in the large centres, and the development of an extensive factory system has also tended in the same direction. At the same time the greater use of farm machinery has reduced the amount of labor necessary on the farm. The following table shows the absolute and relative increase in the different classes of urban and rural population. It is noteworthy that while the percentage of increase of the urban population was almost as great in the decade 1890-1900 as in the preceding decade, there was in every class of cities but one (the group 4000 to 8000) a very much less percentage of gain in the latter of the two decades:

Number and Population of Cities Classified by Size, and Population of Country Districts, 1880, 1890, and 1900

	Number of cities			Population			Per cent. of total population			Per cent. of increase of population	
	1900	1890	1880	1900	1890*	1880	1900	1890	1880	1890 to 1900	1880 to 1890
Cities having a population of 100,000 and over	38	28	20	14,208,347	9,697,960	6,241,240	18.7	15.5	12.4	46.5	55.4
25,000 to 100,000	122	96	57	5,509,965	4,291,608	2,394,284	7.3	6.8	4.8	28.4	79.2
8,000 to 25,000	385	321	210	5,273,887	4,255,057	2,753,137	6.9	6.8	5.5	23.9	54.6
4,000 to 8,000	612	447	328	3,380,193	2,449,299	1,796,241	4.4	3.9	3.6	38.0	36.4
2,500 to 4,000	704	598	473	2,211,019	1,865,443	1,485,964	2.9	3.0	3.0	18.5	25.5
Country districts				45,411,164	40,388,347	35,484,917	59.8	64.2	70.7	12.4	12.9
Continental U. S.				75,994,575	62,947,714	50,155,783	100.0	100.0	100.0	20.7	24.9
All cities	1,861	1,490	1,088	30,583,411	22,559,367	14,670,866	40.2	35.8	29.3	35.6	53.8

*Includes population of Indian Territory and Indian reservations.

The North Atlantic and the North Central States contain the great majority of the urban population. In 1900 the North Atlantic States had 16 and the North Central States 14 of the 38 cities having over 100,000 inhabitants each, while the former division had 54 and the latter 35 of the 122 cities with a population between 25,000 and 100,000.

The following table shows the population of cities having over 100,000 inhabitants in 1900, for the census years 1860, 1890, and 1900:

Population

City	1900	1890	1860
New York	3,437,202	1,515,301	813,669
Chicago	1,698,575	1,099,820	109,260
Philadelphia	1,293,697	1,046,964	565,529
Brooklyn	*	838,547	279,122
Saint Louis	575,238	451,770	160,773
Boston	560,892	448,477	177,840
Baltimore	508,957	434,439	212,418
Cleveland	381,768	261,353	43,417
Buffalo	352,387	255,664	81,129
San Francisco	342,782	298,997	56,802
Cincinnati	325,902	296,908	161,044
Pittsburg	321,616	238,617	49,221
New Orleans	287,104	242,039	168,675
Detroit	285,704	205,876	45,619
Milwaukee	285,315	204,468	45,246
Washington	278,718	230,392	61,122
Newark	246,070	181,830	71,941
Jersey City	206,433	163,003	29,226
Louisville	204,731	161,129	68,033
Minneapolis	202,718	164,738	2,564
Providence	175,597	132,146	50,666
Indianapolis	169,164	105,436	18,611
Kansas City, Mo	163,752	132,716	4,418
Saint Paul	163,065	133,156	10,401
Rochester	162,608	133,896	48,204
Denver	133,859	106,713	4,749
Toledo	131,822	81,434	13,768
Allegheny	129,896	105,287	28,702
Columbus	125,560	88,150	18,554
Worcester	118,421	84,655	24,960
Syracuse	108,374	88,143	28,119
New Haven	108,027	81,298	39,267
Paterson	105,171	78,347	19,586
Fall River	104,863	74,398	14,026
Saint Joseph	102,979	52,324	8,932
Omaha	102,555	140,452	1,883
Los Angeles	102,479	50,395	4,385
Memphis	102,320	64,495	22,623
Scranton	102,026	75,215	9,223

*The city of Brooklyn was consolidated with New York City in 1898.

Density. There were in 1900 25.6 persons to the square mile in the United States, as against about 600 persons in England, 270 persons in Germany, and about 53 persons in European Russia. The average density of population in the United States is greatly reduced because of the vast uninhabited areas in the western half of its territory. In some sections, such as Massachusetts or New Jersey, the density compares favorably with that of Western European countries, as shown in the following table:

POPULATION

STATES AND TERRITORIES	Land area sq. mi.	1850	1890[1]	1900[2]	Negroes 1900	Foreign born, 1900	Density per sq. mi. 1900
North Atlantic Division:							
Maine	29,895	583,169	661,086	694,466	1,319	93,330	23.2
New Hampshire	9,005	317,976	376,530	411,588	662	88,107	45.7
Vermont	9,135	314,120	332,422	343,641	826	44,747	37.6
Massachusetts	8,040	994,514	2,238,943	2,805,346	31,974	846,324	348.9
Rhode Island	1,053	147,545	345,506	428,556	9,092	134,519	407.0
Connecticut	4,845	370,792	746,258	908,420	15,226	238,210	187.5
New York	47,620	3,097,394	5,997,853	7,268,894	99,232	1,900,425	152.6
New Jersey	7,525	489,555	1,444,933	1,883,669	69,844	431,884	250.3
Pennsylvania	44,985	2,311,786	5,258,014	6,302,115	156,845	985,250	140.1
Total North Atlantic Division	162,103	8,626,851	17,401,545	21,046,695	385,020	4,762,796	129.8
South Atlantic Division:							
Delaware	1,960	91,532	168,493	184,735	30,697	13,810	94.3
Maryland	9,860	583,034	1,042,390	1,188,044	235,064	93,934	120.5
District of Columbia	60	51,687	230,392	278,718	86,702	20,119	4,645.3
Virginia	40,125	1,421,661	1,655,980	1,854,184	660,722	19,461	46.2
West Virginia	24,645	....	762,794	958,800	43,499	22,451	38.9
North Carolina	48,580	869,039	1,617,947	1,893,810	624,469	4,492	39.0
South Carolina	30,170	668,507	1,151,149	1,340,316	782,321	5,528	44.4
Georgia	58,980	906,185	1,837,353	2,216,331	1,034,813	12,403	37.6
Florida	54,240	87,445	391,422	528,542	230,730	23,832	9.7
Total South Atlantic Division	268,620	4,679,090	8,857,920	10,443,480	3,729,017	216,030	38.9
North Central Division:							
Ohio	40,760	1,980,329	3,672,316	4,157,545	96,901	458,734	102.0
Indiana	35,910	988,416	2,192,404	2,516,462	57,505	142,121	70.1
Illinois	56,000	851,470	3,826,351	4,821,550	85,078	966,747	86.1
Michigan	57,430	397,654	2,093,889	2,420,982	15,816	541,653	42.2
Wisconsin	54,450	305,391	1,686,880	2,069,042	2,542	515,971	38.0
Minnesota	79,205	6,077	1,301,826	1,751,394	4,959	505,318	22.1
Iowa	55,475	192,214	1,911,896	2,231,853	12,693	305,920	40.2
Missouri	68,735	682,044	2,679,184	3,106,665	161,234	216,379	45.2
North Dakota	70,195	....	182,719	319,146	286	113,091	4.5
South Dakota	76,850	....	328,808	401,570	465	88,508	5.2
Nebraska	76,840	....	1,058,910	1,066,300	6,269	177,347	13.9
Kansas	81,700	....	1,427,096	1,470,495	52,003	126,685	18.0
Total North Central Division	753,550	5,403,595	22,362,279	26,333,004	495,751	4,158,474	34.9
South Central Division:							
Kentucky	40,000	982,405	1,858,635	2,147,174	284,706	50,249	53.7
Tennessee	41,750	1,002,717	1,767,518	2,020,616	480,243	17,746	48.4
Alabama	51,540	771,623	1,513,017	1,828,697	827,307	14,592	35.5
Mississippi	46,340	606,526	1,289,600	1,551,270	907,630	7,981	33.5
Louisiana	45,420	517,762	1,118,587	1,381,625	650,804	52,903	30.4
Texas	262,290	212,592	2,235,523	3,048,710	620,722	179,357	11.6
Indian Territory	38,830	....	180,182	392,060	36,853	4,858	12.6
Oklahoma	31,000	....	61,834	398,331	18,831	15,680	10.3
Arkansas	53,045	209,897	1,128,179	1,311,564	366,856	14,289	24.7
Total South Central Division	610,215	4,303,522	11,153,075	14,080,047	4,193,952	357,655	23.1
Western Division:							
Montana	145,310	....	132,159	243,329	1,523	67,067	1.7
Wyoming	97,575	....	60,705	92,531	940	17,415	0.9
Colorado	103,645	....	412,198	539,700	8,570	91,155	5.2
New Mexico	122,460	61,547	153,593	195,310	1,610	13,625	1.6
Arizona	112,920	....	59,620	122,931	1,848	24,233	1.1
Utah	82,190	11,380	207,905	276,749	672	53,777	3.4
Nevada	109,740	....	45,761	42,335	134	10,093	0.4
Idaho	84,290	....	84,385	161,772	293	24,604	1.9
Washington	66,880	....	349,390	518,103	2,514	111,364	7.7
Oregon	94,560	13,294	313,767	413,536	1,105	65,748	4.4
California	156,172	92,597	1,208,130	1,485,053	11,045	367,240	9.5
Total Western Division	1,175,742	178,818	3,027,613	4,091,349	30,254	846,321	3.5
Total United States (proper)	2,970,038	23,191,876	62,622,250	76,303,387	8,840,789	10,460,085	25.6
Alaska	590,884	....	....	63,592	....	....	....
Total	3,560,922	....	....	76,366,979	....	....	....
Colonies	138,518	....	....	8,094,843	....	....	....
Grand Total	3,699,440	....	....	84,461,822	....	....	....

1890[1] figures do not include Indians and others on reservations.
1900[2] figures include 91,219 persons in military and naval service.

SEX. The population contrasts with that of most European countries in that the males outnumber the females. The excess is greatly increased because of the greater number of male than of female immigrants.

In the North Atlantic and the South Atlantic States the sexes are almost equal in number. In some of these States, such as Massachusetts, the females are much in excess of the males, amounting in the State named to 51.3 per cent. of the total population. This is in part due to the large immigration of girls for work in the factories of that State, and in part to the emigration of men to the West. There is no State in the other divisions of States in which the females are equal in number to the males, and in the three States Montana, Wyoming, and Nevada the females are less than 40 per cent. of the total, while in Alaska they constitute only 27.9 per cent. of the total population. The following table shows the proportion of the sexes by nativity and color in 1900:

NATIVITY AND COLOR	Males	Females
Native white—native parents	20,934,099	20,119,318
Native white—foreign parents	7,869,089	7,818,233
Foreign white	5,545,819	4,704,230
Negro	4,393,221	4,447,568
Chinese	111,054	7,996
Japanese	71,400	14,600
Indian	134,560	132,200
Total	39,059,242	37,244,145

OCCUPATIONS. The agricultural industry still continues well in the lead with respect to the number of persons engaged. There has been, however, a marked relative decrease since 1880, as will be seen in the table below. In the period 1880-1900 there was a larger absolute gain in the number engaged in trade and transportation, and in manufacturing and mechanical pursuits, respectively, than there was in agriculture. The increase in trade and transportation has been especially noteworthy. The number of females engaged in occupations more than doubled in the twenty-year period. The percentage of females engaged in domestic personal service decreased, while there was a large gain in the percentage engaged in trade and transportation. The following table shows the number and percentage of persons engaged in the different occupations in 1880 and 1900. The group 'manufacturing and mechanical pursuits' includes those engaged in fishing (16,177 in 1900), and mining and quarrying (581,221), in addition to the number engaged in those pursuits (6,436,594). The number engaged in mining and quarrying much more than doubled between 1880 and 1900.

census group 'foreign white,' constituting 12.2 per cent. of the total number of persons in this class. Only 0.6 per cent. of the native whites of foreign parents could not speak English. There were 38.2 per cent. of the Chinese, 61.6 per cent. of the Japanese, and 42.3 per cent. of the Indians who could not speak English.

IMMIGRATION. For a general discussion of immigration and its problems, see article on IMMIGRATION. The statistics given here are based upon the report of the Commissioner-General of Immigration for the fiscal year ending June 30, 1903.

The number of immigrants for 1903 (857,046) exceeded that of any previous year by 105,043, and represented an increase over 1902 of 190,517. Italy and Austria-Hungary, it will be seen, contributed more than one-half of the total from Europe. The aliens debarred during the year numbered 8769, or 1.2 per cent., a percentage greater than for any preceding year, with the exception of 1898 and 1899. Paupers and contract laborers constituted the greater part of the number rejected.

The following table shows the principal races represented, and the number each contributed to the sum total of steerage immigrants:

Italian (north and south)	233,546
Polish	82,343
Scandinavian	79,347
Hebrew	76,203
German	71,782
Irish	35,366
Slovak	34,427
Croatian and Slavonian	32,907
English	28,451
Magyar	27,124
All others	155,550
Total	857,046

Of the total number (857,046) 102,431 were less than fourteen years of age; 714,053 were between the ages of fourteen and forty-five; while 40,562 were forty-five years of age and upward. Of all the immigrants 3341 could read but not write, and 185,667 could neither read nor write.

	Mainland			
	1900		1880	
	Number	Per cent.	Number	Per cent.
Both sexes; all occupations	29,074,117	100.0	17,392,099	100.0
Agricultural pursuits	10.381,765	35.7	7,713,875	44.3
Professional service	1,258,739	4.3	603,202	3.5
Domestic and personal service	5,580,657	19.2	3,423,815	19.7
Trade and transportation	4,766,964	16.4	1,866,481	10.7
Manufacturing and mechanical pursuits	7,085,992	24.4	3,784,726	21.8
Males; all occupations	23,754,205	100.0	14,744,942	100.0
Agricultural pursuits	9,404,429	39.6	7,119,365	48.3
Professional service	828,163	3.5	425,947	2.9
Domestic and personal service	3,485,208	14.7	2,242,309	15.2
Trade and transportation	4,263,617	17.9	1.803,629	12.2
Manufacturing and mechanical pursuits	5,772,788	24.3	3,153,692	21.4
Females; all occupations	5,319,912	100.0	2,647,157	100.0
Agricultural pursuits	977,336	18.4	594,510	22.5
Professional service	430,576	8.1	177,255	6.7
Domestic and personal service	2,095,449	39.4	1,181,506	44.6
Trade and transportation	503,347	9.4	62,852	2.4
Manufacturing and mechanical pursuits	1,313,204	24.7	631,034	23.8

LANGUAGE. In 1900 there were 1,403,212 persons over 10 years of age who could not speak English, considerably over half of them being females. The majority, 1,217,280, belonged to the

The following table shows the total number and sex of the immigrants and aliens who arrived during the fiscal year ending June 30, 1903, and the countries from which they came:

COUNTRIES	Sex of immigrants		Total immigrants (steerage)	Other alien passengers	Grand total
	Males	Females			
Austria-Hungary	147,984	58,027	206,011	3,282	209,293
Belgium	2,308	1,142	3,450	603	4,053
Denmark	4,554	2,604	7,158	654	7,812
France, including Corsica	3,513	2,065	5,578	4,243	9,821
German Empire	24,861	15,225	40,086	10,936	51,022
Greece	13,634	426	14,090	231	14,321
Italy, including Sicily and Sardinia	186,966	43,656	230,622	4,930	235,552
Netherlands	2,499	1,499	3,998	715	4,713
Norway	16,249	8,212	24,461	646	25,107
Portugal, including the Cape Verde Islands and the Azores	5,829	3,488	9,317	154	9,471
Rumania	5,313	3,997	9,310	201	9,511
Russian Empire (with Finland)	92,935	43,158	136,093	2,237	138,330
Servia, Bulgaria, and Montenegro	1,699	62	1,761	33	1,794
Spain, including Canary and Balearic Islands	1,733	347	2,080	1,139	3,219
Sweden	29,808	16,220	46,028	1,306	47,334
Switzerland	2,796	1,187	3,983	1,039	5,022
Turkey in Europe	1,453	76	1,529	108	1,637
United Kingdom:					
England	15,593	10,626	26,219	16,433	42,652
Ireland	15,966	19,344	35,310	3,165	38,475
Scotland	3,953	2,190	6,143	3,174	9,317
Wales	835	440	1,275	241	1,516
Europe not specified	3	2	5	....	5
Total Europe	580,484	234,023	814,507	55,470	869,977
China	2,167	42	2,209	108	2,317
Japan	15,909	4,059	19,968	195	20,163
India	79	15	94	95	189
Turkey in Asia	5,114	2,004	7,118	387	7,505
Elsewhere in Asia	507	70	577	2	579
Total Asia	23,776	6,190	29,966	787	30,753
Africa	121	55	176	197	373
Australia, Tasmania, and New Zealand	796	354	1,150	405	1,555
Philippine Islands	123	9	132	4	136
Pacific Islands not specified	58	9	67	9	76
British North America	728	330	1,058	2,370	3,428
British Honduras	54	27	81	98	179
Elsewhere in Central America	423	174	597	397	994
Mexico	416	112	528	476	1,004
South America	405	184	589	618	1,207
West Indies	5.743	2,427	8,170	3,436	11,606
All other countries	19	6	25	2	27
Total countries outside Europe and Asia	8,886	3,687	12,573	8,012	20,585
Grand total	613,146	243,900	857,046	64,269	921,315

Religion—The Colonial Period. The religious life of the United States has been profoundly affected by the fact that the period of the early settlement of this continent coincided with the great religious struggles in Europe of the seventeenth century. It was the reform within the Catholic Church, following the great Protestant schism, that started the Orders of that Church on their proselyting crusades, which from New Spain in the Southwest and New France in the North, extended into territory now embraced within the United States. The divisions among the Protestants themselves resulted in the planting of most of the English colonies, and determined that their future development should be along the line of multiplicity of sects, with extreme local independence. Puritanism, within and without the Established Church, was the prevailing influence among these colonists. In Virginia its influence was overthrown soon after the Cavalier immigration of the Cromwellian era. Maryland, settled under Catholic leadership, always retained a dominant Puritan element in its population. The same was true of the Carolinas, and later of Georgia, although, as in almost all the Southern colonies, the official class belonged to the Church of England. In New England for more than half a century the Puritans, outside of Rhode Island, constituted a veritable theocracy, in which citizenship was synonymous with church membership. Those settlers who passed from New England to the other colonies usually bore with them a modified form of Puritanism, which reappeared in the early Presbyterian development of the middle colonies, and in the Baptist development farther south. The religious influence of the early Dutch settlers of New York was never very strong, and before the colony passed into English control it was known as a most mixed sectarian centre. In New Jersey and Pennsylvania the Quaker element, although early abdicating political control, continued to be the leading social factor.

Throughout the colonial period the Puritans exercised almost undisputed religious sway in New England, while members of the Established Church nominally did the same for the Southern colonies. In the middle colonies no one sect acquired a hegemony. Here the diversified English sects were quickly joined by Huguenots from France, Palatines, Salzburgers, and Moravians from Germany, Covenanters from Scotland, and the Scotch-Irish Presbyterians. To a much more limited extent many of these immigrants settled in the Carolinas and Georgia, but their chief irruption into the South was by the way of the

Appalachian highlands. In this early sectarian diversity the middle colonies, more than those of any other section, were most typical of the succeeding development of the whole country. During the first century and a quarter of settlement there was naturally little of common religious experiences in the colonies. Some conscientious attempts were made to convert the Indians, of which the most important was the work of 'The President and Society for the Propagation of the Gospel in New England.' The 'Society for the Propagation of the Gospel in Foreign Parts,' a Church of England organization, founded in 1701, did an important work in the middle and southern colonies. The most important religious experience of the eighteenth century was the 'Great Awakening,' centring about 1740, which profoundly affected all of the colonies, led to an extension of church-building, the founding of Princeton College as the result of a great Presbyterian development in the middle colonies, and the firm establishment of Baptist preëminence in the South. Because of some unwise practices not wholly avoidable, dissensions were introduced among the existing sects, yet the movement as a whole was most beneficial, not merely because it stamped upon American church life a strong evangelistic and missionary character, but because it led the way to the later establishment of full religious toleration. The later part of the colonial period was characterized by the rapid development of Presbyterianism, the formal establishment of the Reformed and Lutheran churches among the Germans, and the beginning of Methodism—all within the middle and southern colonies. See CONGREGATIONALISM.

THE NATIONAL PERIOD. The Revolutionary War, although it ushered in an era of complete religious toleration, so far as State and nation were concerned, was not on the whole favorable to the development of the religious life of the newly created States. By the end of the century, when spiritual conditions were at their lowest ebb, the country experienced a second great revival, which if it lacked some of the fervid manifestations of the first, was much more productive of lasting results. As in the former case there came about a secession of some of the more radical elements from the existing denominations in the Middle States and the South, and in the severance of the Unitarians and Universalists from the traditional Congregational school in New England. Yet in the main the first three decades of the nineteenth century may be termed the 'era of good feeling' in a religious as well as a political sense. It was a period of great catholicity among the various denominations, with coöperation in foreign and home missionary work, in educational advancement, and in the work of Bible distribution. This was the period also when the Episcopal and Catholic churches began to develop along American lines and to assume an important position among American denominations; the latter being recruited most largely from foreign immigration, and the former from the other denominations. The great missionary movement toward foreign lands, the home missionary movement along the Western national border, the building of theological seminaries, the work among the negroes and Indians, protests against slavery, and the first movements in favor of total abstinence also date from this period. Early in the nineteenth century the last of the State aids in favor of New England Congregationalism was withdrawn.

The next thirty years (1830-1860) were characterized by a more intense denominational alignment, showing itself in a withdrawal of the separate churches from organizations for united effort, and in the creation of various denominational boards to carry on this work; in a new zeal for Church history along sectarian lines; in a general Protestant antipathy to the Catholic Church, which even displayed itself in the political world (see KNOW-NOTHING), and in the division of some of the great denominations along sectional lines, especially over the great slavery question. The religious element was especially helpful on both sides during the Civil War, and was much in evidence in the organization of associations for the care of soldiers at the front and also at the North for the education of the freedmen. Only one of the great denominations severed by the slavery issue has as yet been reunited, but there is a feeling of cordiality, and to some extent of coöperation, between the separate parts of these sects.

An important revival, just preceding the Civil War, had stirred deeply the evangelical sentiment of all the churches, and this was quickened by a succeeding revival between 1870 and 1880. The influence of these movements has been much in favor of a sincere and hearty coöperation of all denominations in favor of fundamental religious work. While there has been no tendency toward a dropping of creeds, ceremonial forms, or denominational tenets, there has been a distinct advance in essential Christian union. This tendency has been much strengthened by such organizations as the Evangelical Association, the Young Men's Christian Association, and the various young people's organizations that have sprung up during the last two decades. (See CHRISTIAN ENDEAVOR; EPWORTH LEAGUE; WESTMINSTER LEAGUE; YOUNG MEN'S CHRISTIAN ASSOCIATION.) An interesting feature of the religious development of the last half-century has been the growth of certain non-orthodox sects. See MORMONS; CHRISTIAN SCIENCE.

Owing to the fact that Church and State are entirely distinct in the United States, it is difficult to obtain accurate information concerning religious statistics. The only figures available are those derived from the annuals and year books published by the several denominations. The accompanying table is intended to show the status of the leading religious sects of the United States for the years 1890 and 1900, and thus furnish a means of determining their growth or decline during this period. The figures supplied by the Roman Catholic Church included as members all persons who had been baptized, irrespective of age, and in order to place this denomination on the same footing as the others, a deduction of 15 per cent. from these returns has been made, with the idea of excluding from the membership all children under ten years of age. It was impossible to get exact figures for the Mormons, Christian Scientists, and Unitarians, and an estimate based upon the most reliable authorities has been made. In the case of the Jews, the number of families rather than the individual membership must be given.

DENOMINATIONS	Ministers		Churches		Members		Gain
	1890	1900	1890	1900	1890	1900	Per cent.
Adventists:							
Seventh Day	284	372	995	1,470	28,991	55,316	91.0
Baptists:							
Regular (North)	6,085	7,415	7,907	9,374	800,450	973,820	21.5
Regular (South)	8,957	12,058	16,238	18,963	1,280,066	1,608,413	25.5
Regular (Colored)	5,468	14,351	12,533	15,654	1,348,989	1,864,600	38.0
Seventh Day	115	119	106	115	9,143	8,991	—1.5
Free Will	1,493	1,619	1,304	1,486	87,898	85,109	—3.0
Catholics, Roman	9,166	11,636	10,245	12,062	6,242,267	8,610,226	38.0
Christians	1,435	1,248	1,424	1,520	103,722	111,835	8.0
Christian Scientists	26	12,000	221	600	8,724	1,000,000	......
Congregationalists	5,058	5,614	4,868	5,604	512,771	629,874	23.0
Disciples of Christ	3,773	6,528	7,246	10,528	871,017	1,149,982	32.0
Dunkards:							
German Baptists	1,622	2,612	729	850	61,101	95,000	55.0
Episcopalians:							
Protestant Episcopalians	4,146	4,961	5,019	6,686	532,054	716,431	34.5
Evangelical Bodies:							
Evangelical Association	1,235	1,052	2,310	1,806	133,313	118,865	—11.0
Friends: Orthodox	1,113	1,279	794	820	80,655	91,868	14.0
German Evangelical Synod	680	909	870	1,129	187,432	203,574	8.5
Jews	200	301	533	570	130,496	211,627	......
Latter Day Saints:							
Mormons	543	1,700	425	796	144,352	300,000	110.0
Reorganized Church	1,500	2,200	431	600	21,773	45,500	109.0
Lutherans:							
All Divisions	4,591	6,710	8,595	11,123	1,231,072	1,665,878	35.0
Methodists:							
Methodist Episcopal	15,423	17,521	22,844	26,021	2,240,354	2,716,437	21.0
Methodist Episcopal (South)	4,801	6,041	12,688	14,244	1,209,976	1,457,864	20.5
Methodist Episcopal (African)	3,321	5,659	4,124	5,775	452,725	673,504	48.0
African Zion	1,545	3,125	1,587	2,906	349,788	536,271	5.3
Presbyterians:							
Presbyterians (North)	5,934	7,335	6,717	7,469	788,224	973,433	23.5
Cumberland Presbyterians	1,861	1,734	2,791	2,957	164,940	180,192	9.0
Presbyterians (South)	1,129	1,461	2,391	2,959	179,721	225,890	33.5
Reformed:							
Dutch	558	698	572	619	92,970	107,594	15.5
German	880	1,082	1,510	1,660	204,018	243,545	19.0
Salvation Army	....	2,689	329	753	8,742	40,000	350.0
United Brethren in Christ	2,267	1,897	3,731	4,229	202,474	243,841	20.0
Unitarians	515	550	421	459	67,749	71,000	5.0
Universalists	708	735	956	764	49,194	48,426	—1.5

The large increase in the number of Christian Scientists is especially noteworthy. The Seventh Day Adventists, Mormons, the Salvation Army, and German Baptists also show an appreciable gain. The strongest denominations numerically are the Roman Catholics, Methodists, Baptists, Presbyterians, and Lutherans, in the order named. Details and latest statistics regarding the various denominations may be found under their respective headings.

The distribution of the several sects has largely followed the historic lines of immigration. The Roman Catholics are numerically the strongest in more than half the States, including New England, the far Northwest, and the Pacific divisions; while the Methodists and Baptists are about equally divided in the States south of Mason and Dixon's line. Massachusetts is the leading State of the Congregationalists, New York of the Episcopalians, Pennsylvania of the Presbyterians, North Carolina of the Methodists, and Georgia of the Baptists. See the articles on the various denominations.

EDUCATION. This topic is fully treated under the following headings: NATIONAL EDUCATION, SYSTEMS OF; SCHOOLS; PUBLIC SCHOOLS; COMMON SCHOOLS; GRAMMAR SCHOOLS; EVENING SCHOOLS; UNIVERSITIES; etc.

CHARITIES. The National Government has no department concerned directly with charities, their control being in the hands of the State and municipal governments. Many private organizations and societies are also interested in the subject. See under the several State articles; also the articles on CHARITIES; PAUPERISM; CHARITIES AND CORRECTION, THE NATIONAL CONFERENCE OF; CHARITY ORGANIZATION SOCIETY; etc.

HISTORY. COLONIAL PERIOD. The territory included within the United States of America was originally occupied solely by numerous tribes of Indians. The Northeastern coast was probably visited about the year A.D. 1000 and subsequently by the Northmen (see VINELAND), and other navigators may in the following five centuries have sighted parts of the coast; but the existence of the American continent was unknown to the world at large until after Columbus's discovery in 1492. In 1497 John Cabot reached the coast of America, probably in the neighborhood of Cape Breton. The Portuguese Cortereal explored the coast southward from the Gulf of Saint Lawrence in 1500-01, and probably from as early a date as 1504 fishermen from Normandy and Brittany frequented the shores of Newfoundland. In 1513 Juan Ponce de Leon explored a portion of Florida in a romantic search for the fountain of youth; and in 1520 some Spanish vessels from Santo Domingo were driven upon the coast of Carolina. During the following year, through the conquests of Cortés (q.v.) and his followers, Mexico, including the territory later known as Texas, New Mexico, and California, became a province of Spain. In the same decade Verrazano explored the coast between North Carolina and Newfoundland and Narvaez made his disastrous expedition to Florida. Ferdinand de Soto in 1539-42 led a Spanish expedition from the coast of Florida westward, discovering the Mississippi River (April, 1541). Simultaneously with this expedition, Coronado's men explored a great part of what is now the Southwestern United States. A Spanish settlement was made at Saint Augustine, Florida, in 1565; and in 1584-85 Sir Walter Ralegh (q.v.) sent two expeditions to the coast of North Carolina, and attempted to form a settlement on Roanoke Island. None of the settlements attempted during the sixteenth century, however, except Saint Augustine, had any permanence; and it was not until the seventeenth century that the Europeans, and especially the English, devoted their enterprises to colonization rather than to exploration. King James in 1606 granted a charter to a large colonizing corporation which comprised two companies, the London Company, which received certain rights between 34° and 41° north latitude, and the Plymouth Company, which received certain rights between 38° and 45°. The London Company in 1607 founded Jamestown, Virginia, the first permanent English settlement within the limits of the present United States. Here in 1619 a representative assembly was called, the first in the New World. In 1607, also, two members of the Plymouth Company, Sir Ferdinand Gorges and Sir John Popham, sent out an expedition to the Kennebec, where the settlers experienced a severe winter, and in 1608 abandoned the undertaking. In 1620 certain dissenters who had secured a grant from the London Company landed by mistake farther northward and settled Plymouth. Between these two colonies the Dutch had already established themselves (1613) at New Amsterdam. Quebec was settled in 1608, and a large part of the country on the Great Lakes and on the Mississippi was explored by Nicolet (1634), by Marquette and Joliet (1673), and by La Salle (1682), and settlements were early made by the French at the outposts of Kaskaskia and Arkansas Post, and at Mobile and Vincennes. Thus the beginnings were made of two distinct movements of the incoming population, in the course of one of which the English were to occupy practically the entire Atlantic seaboard of the present United States, excluding Florida, while in the course of the other the French were to establish themselves at strategic points on the two great waterways. The colonizing work of the French was such as to make conspicuous the trading post, the military element, and the bureaucratic class, and to minimize the features of public development, of local political life, and of permanence in method and purpose. The English, on the other hand, brought with them their school, their Church, and their political forms, and founded colonies on lines which were adhered to throughout their later development. (The early history of the various colonies, the union of which formed the United States, will be found under the heads of the different States.) In some of the colonies representative governments were maintained, in which all officers, both executive and judicial, as well as the entire legislature, were chosen by the people. On the other hand, in the royal provinces, such as Virginia and New York, the chief judicial and executive officers, as well as members of the upper branch of the legislature, were appointees of the Crown, the general population sharing in the provincial government only through the choice of the members of the legislature. This distribution of privilege characterized also the proprietary provinces, such as Maryland, in which, however, appointments were made by the proprietors instead of by the Crown. Thus in the royal and proprietary provinces the ultimate authority was outside of the province, while in charter provinces all authority apparently was within each province, and there was in the scheme by which these provinces were organized no effective means of subordinating their political actions to the power of the central administration except through the alteration or abolition of their charters.

During the colonial period there were several instances of the tendency of the colonies, having very similar institutions and ideals, to act jointly as a confederate body. The first effort at a union of colonies was in 1643, when Massachusetts Bay, Plymouth, Connecticut, and New Haven formed, under the title of 'The United Colonies of New England,' a confederacy, which existed for nearly forty years, for mutual defense against the French, Dutch, and Indians. They also experienced the benefit of united action during the early Indian wars, and again in 1754, the year of the opening of the French and Indian War (q.v.). At that time also, the colonies being strongly advised by the Lords of Trade to unite for general defense, a formal plan for a permanent general government of all the English colonies was drawn up by Benjamin Franklin (q.v.) and presented at the Albany Convention (q.v.); but it was rejected by both the colonies and the Crown.

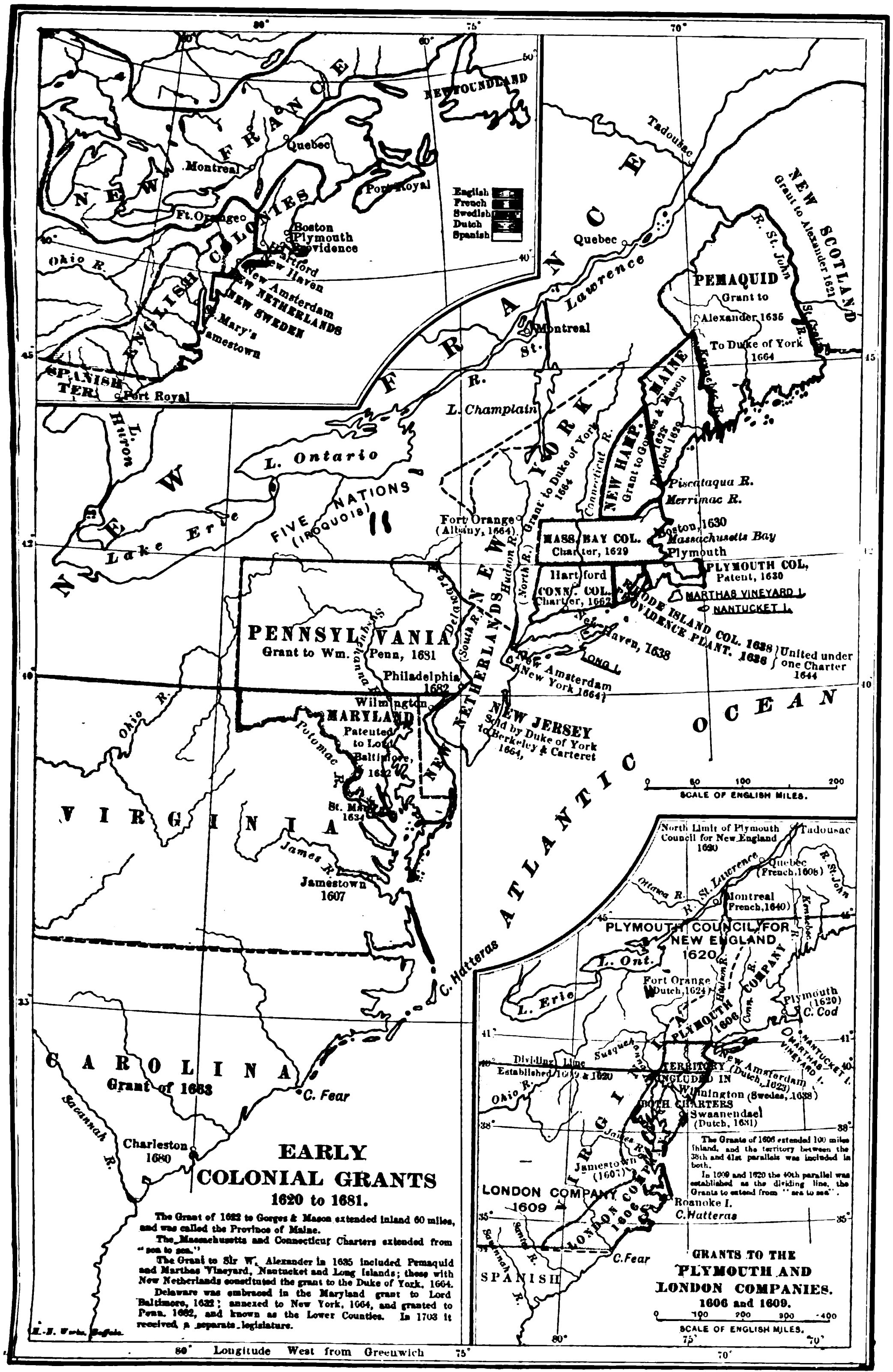
Although the several colonies were at no time organically connected, except through the King, the basis for union was early laid in the establishment of local governments in which the controlling principles were similar. There appeared also a substantial identity in forms and in practices of local government. This made it natural that occasionally during the colonial period there should appear marked tendencies toward union. In some respects, however, different types of population distinguished the several portions of settled territory, a fact due in some measure to the various classes of people in England from which the immigrants came. Thus during the period between 1620 and 1640 large numbers of dissenters withdrew from England, and the settlements in the north increased in number and population, the main colony of Massachusetts Bay being established in 1628-30, and numerous towns in the neighboring district being soon founded, while settlements were made (1635-36) at Hartford, Wethersfield, and Windsor, the three towns which originally constituted the colony of Connecticut, and for the administration of which was adopted in 1639 the first written constitution of representative government. In 1638 the colony of New Haven was established. In this period also the same body of population extended northward into what became New Hampshire, as well as into the northeastern portion of Massachusetts. On the other hand, a representative of the aristocratic class founded the colony of Maryland in 1634. During the period of the Commonwealth in England most of the immigrants were drawn from the Cavalier and Royalist classes, which were then out of power, and by this phase of migration Virginia and Maryland especially profited. Following the Restoration the increased power of the King in colonial politics was illustrated in the grant of the Carolinas to a body of proprietors, and of Pennsylvania to a single proprietor, while in the same period New York, acquired in 1664 by conquest from the Dutch, was organized as a royal province. The administration of New Jersey given over to a body of proprietors, and the various settlements in Rhode Island were organized by charter into a colony. Throughout this period there was a steady development of uniformity in the provincial governments. At the basis of it all lay the principles of a democratic or representative government, which were brought to America by the earliest colonists. A representative and popular government was established in Virginia as early as 1619, before the founding of the New England colonies, in which democratic institutions existed from the outset. Coincident with this growth of uniformity, and this preparation for unity in organization as well as in action, appeared indications of divergence in theory as to the proper position of the provinces within the English State. On the one hand, in the instances where even the executive was chosen within the province and where no provision was made for the approval of provincial laws by the King, there appeared substantially independent local autonomy, the prevalence of which type would create a thoroughly decentralized system of government. On the other hand, in the instances where the Governor and all important executive and judicial officers were appointees of the Crown, where the governor's council was chosen by the Crown, and where all provincial laws were subject to the approval of the Crown, there was created a strongly centralized form of imperial government. Both of these types of provincial administration appeared in the colonial period, although they were irreconcilable, and as one form of government recognized privileges which the colonists would not relinquish and which the home Government would not recognize as rights, and as the other form included powers which the colonists claimed were improperly exercised by the King, it was inevitable that the attempt forcibly to harmonize the two systems should create such friction as to foreshadow revolution. Originally, the colonies were regarded as within the King's exclusive jurisdiction, and it was not until the Protectorate and the reign of Charles II. that they were considered as organic portions of the Empire, so as to be governed by Parliament; then Navigation Laws (q.v.) were passed to give British ships a monopoly of commerce, certain articles produced in the colonies were required to be sent to England, and duties were levied on commodities sent from one colony to another. Protests were made against these assumptions: Massachusetts and other provinces asserted their rights of self-government and of exemption from Parliamentary control; and it was not until the English revolution of 1688 that settled and uniform relations with the several colonies were established, and the increased authority of Parliament, both within the realm and in the colonies, was fully recognized.

The effect of that revolution made more critical the underlying problem of the colonial situation, and gradually made conspicuous the issue whether in the colonies the legislative authority of Parliament was paramount. On the other hand, the revolution had a beneficent effect upon the colonies in terminating unrest and friction, which had characterized the administration of the later Stuarts. Even in Virginia the prevalent discontent had been given violent expression in Bacon's Rebellion (q.v.) in 1676, while in the Northern colonies the many contests over jurisdiction and rights and the arbitrary rule established by Andros (q.v.), who had been appointed Governor of all the colonies north of latitude 41° N., developed a general disaffection among the people to the home Government and culminated in the seizure of Andros and the overthrow of his administration (1689).

In 1713, by the Treaty of Utrecht, England, which had been importing slaves from Africa into its American and West Indian colonies, obtained a monopoly of the slave trade to Spanish America for thirty-three years, and as a result of this arrangement slavery was extended in, and to some extent forced upon, all the American colonies. See SLAVERY.

During much of the seventeenth and eighteenth centuries there was a general feeling of loyalty toward the mother country. The sons of the more wealthy colonists, especially in the South, were educated in England. English literature was widely read in the colonies; the colonies, though distinct, and differing in origin and character—Puritan in the East, largely Dutch Reformed in New York, Quaker in Pennsylvania, to a considerable extent Catholic in Maryland, and Anglican in Virginia—were yet united by language, blood, and institutions.

These influences toward harmony with the mother country served to obscure, to a considerable degree, the recurrent disputes over charter rights and trade privileges, which continued to prevail in the eighteenth century; and the tendency to union among the several colonies was strengthened by the outbreak of the French and Indian War (q.v.). This was the last in the series of conflicts (see KING WILLIAM'S WAR; QUEEN ANNE'S WAR; and KING GEORGE'S WAR; also see CANADA) which resulted from the respective territorial ambitions in North America of France and Great Britain, and left the latter in undisputed possession of Canada as well as of the territory lying between the Alleghanies and the Mississippi. As a result of the termination of this long continued struggle with the French, which was followed by the Pontiac conspiracy of 1763 (see PONTIAC), the colonies, which had naturally borne the brunt of the various conflicts in America, were relieved of much of their dependence upon the home Government, and were left freer than they had earlier been to look after what they conceived to be their rights and interests. On the other hand, the financial necessities resulting from that war led to measures by the home Government which aroused the colonists, strengthened their feelings of unity among themselves, and lessened their attachment to the English administration. Under such circumstances, the basis of intercolonial



EARLY COLONIAL GRANTS
1620 to 1681.

The Grant of 1622 to Gorges & Mason extended inland 60 miles, and was called the Province of Maine.

The Massachusetts and Connecticut Charters extended from "sea to sea."

The Grant to Sir W. Alexander in 1635 included Pemaquid and Marthas Vineyard, Nantucket and Long Islands; these with New Netherlands constituted the grant to the Duke of York, 1664.

Delaware was embraced in the Maryland grant to Lord Baltimore, 1632; annexed to New York, 1664, and granted to Penn, 1682, and known as the Lower Counties. In 1703 it received a separate legislature.

The Grants of 1606 extended 100 miles inland, and the territory between the 38th and 41st parallels was included in both.

In 1609 and 1620 the 40th parallel was established as the dividing line, the Grants to extend from "sea to sea".

GRANTS TO THE PLYMOUTH AND LONDON COMPANIES.
1606 and 1609.

COPYRIGHT, 1903, BY DODD, MEAD & COMPANY.

unity gave force to the expressions and acts of the home Government, as when in 1761 the enforcement of the Navigation Acts by general search-warrants (see ASSISTANCE, WRITS OF) caused strong resentment against the home Government, especially in New England, where the Admiralty attempted to enforce the law, many vessels being seized, and the colonial trade with the West Indies being seriously affected. In 1765 the passing of an act of Parliament (see STAMP ACT) for collecting a colonial revenue by requiring the use of stamps not only upon many business papers and legal documents, but also upon certain articles of ordinary use, caused general indignation, and led even to riots. Steps were promptly taken to unite against the common danger of an extension of the authority of Parliament; the famous Stamp Act Congress, in which nine colonies were represented, met at New York in September, 1765, and issued a statement of grievances and a declaration of rights. The stamps were destroyed or reshipped to England, and popular societies, called 'Sons of Liberty' (q.v.), were formed in the chief towns. In 1766 the Stamp Act was repealed, to the general relief of the colonists; but the principle of colonial taxation by Parliament was reaffirmed, and in 1767 duties were levied on glass, paper, printers' colors, and tea. This renewed attempt produced, in 1768, disturbances in Boston, where Governor Gage was furnished with a military force to preserve order and enforce the laws, and where thenceforth the relations between the House of Representatives and the royal Governor were especially strained, much bitter feeling among the people being caused by the so-called Boston massacre (q.v.) of March 5, 1770. In 1773 the duties were repealed, excepting 3d. a pound on tea, when the matter resolved itself into a question of principle, and from North to South the people became determined that this tax should not be paid. In Boston a crowd, disguised as Indians, threw a cargo into the harbor (December 16, 1773). As a penalty for such acts, Parliament passed, in 1774, a series of punitive statutes, including the so-called Charter Act, by which the popular element in the provincial government of Massachusetts was greatly reduced and by which the former independence and authority of town-meetings was strictly limited, and including also the Boston Port Bill (q.v.), by which the chief town of New England was to be no longer a port of entry. Boston was reduced to great distress, but received the active sympathy and encouragement of all the colonies.

The people of Massachusetts, relying upon the theory that their charter partook of the nature of a compact which could be altered or abrogated only by the consent of themselves and of the King, denied the right of Parliament to pass statutes in any way modifying their charter rights, and insisted that the course of the King and Parliament released the colonists from all obligations and reduced them, so far as government was concerned, to a 'state of nature.' Thus, as early as the fall of 1774 the colonists began to organize local government on the assumption that administrative relations with England had been terminated, and that the authority of the home Government had ceased. Under such circumstances it was inevitable that the Administration should undertake to apply a policy of repression. For further details of colonial history, see, besides the articles already referred to, the articles on the various States.

WAR OF INDEPENDENCE. It was now determined to enforce the authority of Parliament over the colonies, and a fleet, containing several ships of the line and 10,000 troops, was sent to America. The colonies, still asserting their loyalty, and with little or no thought of separation from the mother country, prepared to resist what they considered the unconstitutional assumptions of the home Government and the unwarranted violations of their rights as English citizens. Volunteers were drilling and depots of provisions and military stores were being formed. The sending of a small force from Boston to seize one of these depots at Concord, Mass., and to capture two of the most prominent provincial leaders, Samuel Adams and John Hancock, who were staying temporarily at Lexington, led to engagements at Lexington and at Concord (see LEXINGTON), and the real beginning of the Revolutionary War, on April 19, 1775. The British troops were compelled to retreat, and the news of this event promptly brought from fifteen to twenty thousand armed provincials to the vicinity of Boston, to which place the British, then numbering less than 4000, were effectually confined. On May 25, 1775, reinforcements under Howe, Clinton, and Burgoyne increased the strength of the British army to 10.000 men. Outlying royal forts and arsenals, with their arms and munitions, were taken possession of by the colonists, and on May 10th and May 11th respectively Ticonderoga and Crown Point, the principal Northern fortifications, were surprised by organized forces, and their artillery and stores appropriated. A congress of the colonies, known as the Continental Congress, had assembled at Philadelphia in September, 1774, and after appeals to the home Government, which proved unavailing, this body resolved to raise and equip an army of 20,000 men, and on June 15, 1775, appointed George Washington commander-in-chief. On June 17th, Breed's Hill, in Charlestown, near Boston, where a considerable force of Americans had hastily intrenched themselves, was taken by assault by the British troops, but with so heavy a loss that the defeat had for the provincials the moral effect of a victory. (See BUNKER HILL, BATTLE OF.) After a winter of great privation, during which they were closely besieged within the only city in their control, the British were compelled on March 17, 1776, to evacuate Boston, carrying away in their fleet to Halifax a large number of Loyalists. To forestall an expected attack by Sir Guy Carleton, Governor of Canada, upon Ticonderoga, an American force under Montgomery was sent in August, 1775, to invade Canada by way of Lake Champlain, while in September another American force under Benedict Arnold was sent from Cambridge through the forests of Maine against Quebec. Montgomery captured Chambly, Fort John, and Montreal, but on December 31, 1775, the Americans were defeated before Quebec, Montgomery being killed and Arnold wounded, and in the summer of 1776 the Americans were forced to abandon Canada.

After the evacuation of Boston the British

Government put forth a stronger effort to reduce the colonies to submission. An army of 55,000 men, including 17,000 Hessian mercenaries, was sent to put down the 'wicked rebellion.' At the men, including 17,000 Hessian mercenaries, was Sir William Howe. The Congress, declaring on May 15, 1776, that the royal authority had ceased, recommended to the several colonies to adopt "such governments as might best conduce to the safety and happiness of the people;" and most of the thirteen colonies soon adopted constitutions as independent and sovereign States. On June 7, 1776, Richard Henry Lee (q.v.), of Virginia, offered a resolution in Congress, declaring that "these United Colonies are, and of right ought to be, free and independent States; that they are absolved from all allegiance to the British Crown; and that all political connection between them and the State of Great Britain is, and ought to be, totally dissolved." This resolution was adopted on July 2d by the votes of twelve out of thirteen colonies, the New York delegates, who had not as yet received instructions, being excused from voting. A committee, consisting of Thomas Jefferson, John Adams, Benjamin Franklin, Roger Sherman, and Robert R. Livingston, had been appointed, on June 10th, to prepare a declaration in accordance with the above resolution; and the Declaration of Independence (q.v.), written by Jefferson, based upon the equality of men, and asserting that "all government derives its just powers from the consent of the governed," on July 4, 1776, received the final assent of the delegates of twelve colonies (the New York delegates still not voting), who thus undertook to dissolve the allegiance of the colonies to the British Crown, and to declare them free and independent States.

After the evacuation of Boston General Washington, with the greater portion of his army, had hastened to New York, which was the centre of hostilities during the following summer. General Howe, having been joined by his brother, Admiral Lord Howe, and Sir Henry Clinton, defeated the Americans in the battle of Long Island, August 27, 1776 (see LONG ISLAND, BATTLE OF), and thus was enabled to compel the evacuation of New York and secure the possession of its harbor and of the lower Hudson River. In spite of the gallantry of the Americans at the Battle of Harlem Heights, the British retained secure control of the city, and then sent a force from Long Island Sound into Westchester County, where was fought the battle of White Plains (October 28, 1776), after which Washington, with the larger part of his army, crossed over into New Jersey, leaving, however, a considerable force in the upper portion of Manhattan Island. There, on November 16th, Fort Washington (q.v.) was captured, along with its entire garrison of about 2600 men. Washington then retreated across New Jersey toward Philadelphia, closely followed by the British, under Cornwallis, into whose hands Newark, New Brunswick, and Princeton successively fell. The British then awaited the freezing of the Delaware in order to be able to occupy Philadelphia. On Christmas night General Washington crossed in boats amid floating ice, and early on the following morning surprised and captured a Hessian force at Trenton (q.v.). On January 3, 1777, he fought the successful battle of Princeton (q.v.), by which the waning confidence of the colonists was to a large extent restored, and the prospects of the American arms materially improved. The British thereupon retired to New York, where they spent the rest of the winter.

In the meantime Silas Deane and Benjamin Franklin had been sent to France to solicit recognition and aid, and although formal recognition was delayed important assistance was privately given in money and supplies, and European volunteers—the Marquis de Lafayette, Baron Steuben, Baron de Kalb, Kosciuszko, and Pulaski—rendered most important services. Efforts were also made, but without success, to induce the British colonies of Canada and Nova Scotia to unite in the struggle for independence and diplomatic agents in Europe attempted to secure recognition and material assistance from various Powers. Late in September, 1777, after the defeat of the Americans on the 11th at Chadd's Ford on the Brandywine (see BRANDYWINE, BATTLE OF), the British, who under Howe had come by water from New York to the head of Chesapeake Bay, took possession of Philadelphia; and Washington, after attacking the British unsuccessfully on October 4th, at Germantown (q.v.), went into winter quarters early in December at Valley Forge (q.v.), where his troops suffered greatly from cold and hunger.

In the meanwhile General Burgoyne was leading an army of 7000 British and Hessian troops with probably a larger force of Canadians and Indians, from Canada into northern New York, in order to form a junction with the British on the lower Hudson, and thus, by gaining virtual control of New York, separate New England from the rest of the Confederacy. In coöperation with him another force, mostly of Loyalists and Indians, under Saint Leger, was to proceed from Canada by way of Oswego and the Mohawk Valley to the Hudson, but this force was unable to capture Fort Stanwix on its line of march, and after the battle of Oriskany withdrew. (See SAINT LEGER; FORT STANWIX; and ORISKANY, BATTLE OF.) Burgoyne's march was delayed by felled trees and destroyed roads; the defeat of a large force of foragers at Bennington (August 16, 1777) was a severe reverse (see BENNINGTON, BATTLE OF); and after the two sharp battles of Saratoga (q.v.)—on September 19th and October 7th—he was compelled to capitulate to General Gates, October 17, 1777, and England heard with dismay of the loss of an entire army. The Americans took between 5000 and 6000 prisoners and much artillery.

This victory has been regarded as the 'turning-point' of the war. Almost equally important with its military results was its effect upon international relations, in that it gave to the European Powers the first definite proof of the possibility and even the probability of colonial success, and made it feasible for France, with a greater degree of propriety, to recognize formally the new nation, and to enter into a treaty of alliance with the United States on February 6, 1778, a step which largely altered both the military and political situation, and hastened the final success of the Americans. The recognition of the new nation by France prompted Lord North to a policy of reconciliation, but his commissioners, though empowered to grant virtually everything for which the colonists had originally taken up arms, were unable to secure a favorable reception without a prior recognition of the independence of the United States.

In the summer of 1778 the Americans were strengthened by the presence of a French fleet and of a considerable land force, and after the abandonment of Philadelphia by Sir Henry Clinton, who had replaced Howe in May, 1778, their opponents in the north were confined to Newport and to the region around New York City. As Clinton withdrew from Philadelphia and marched across New Jersey toward New York, he was followed by Washington, who gained a qualified success at Monmouth on June 28, 1778. (See MONMOUTH, BATTLE OF.) Thereafter the greater energy on both sides was devoted to the campaign in the South, though in 1778-79 George Rogers Clark (q.v.) achieved a virtual conquest of the Northwest. Savannah was taken (December 29, 1778) by the British, who in the following two years, under Clinton and Cornwallis, secured control of Georgia and South Carolina, taking Charleston May 12, 1780. In June, 1780, General Gates was placed in command of the Southern Department, and on August 16th was badly defeated by Cornwallis at Camden (q.v.). Soon afterwards, on September 23, 1780, General Benedict Arnold's treasonable plot to surrender West Point was frustrated through the capture of Major André. The first real reverse of the British forces in the South was that experienced at the hands of the hurriedly gathered backwoodsmen at King's Mountain (q.v.), October 7, 1780. In the following December General Gates was superseded by General Greene as commander of the American army in the South, and a more active campaign was thereafter undertaken. At the Cowpens, January 17, 1781, the force of Tarleton, the British cavalry leader, was overwhelmed by the Americans under Morgan, while Cornwallis, after a dearly bought victory over Greene at Guilford Court House, March 15, 1781, was compelled to retire to Wilmington. Two more important battles, at Hobkirk's Hill (April 25, 1781) and Eutaw Springs (September 8, 1781), marked the contest for the control of the Southern territory. Finally the army of Cornwallis was confined between the York and James rivers, where, with the French controlling the sea, the British commander was unable to hold out long against the Americans and French under Washington and Rochambeau. His surrender at Yorktown (q.v.) on October 19, 1781, assured the triumph of the American cause. The provisional treaty of peace was signed at Paris in November, 1782, a cessation of hostilities was declared by Washington in January, 1783, and on September 3, 1783, the definitive Treaty of Paris was signed. (See PARIS, TREATIES OF.) This treaty, besides recognizing the independence of the United States, secured to the country the territory between the Alleghanies and the Mississippi. On November 25, 1783, New York was evacuated by the British.

THE CONFEDERATION. The need of more unity of action having been felt, Articles of Confederation, first reported to Congress in July, 1776, had been adopted by that body in November, 1777, and by May, 1779, all the States had formally ratified them except Maryland, which refused its assent so long as the various States continued to hold their Western lands. Finally New York offered to cede to the General Government her claims to such lands, and, it being evident that other States would follow her example, Maryland gave her assent to the Articles in 1781, and the necessary unanimous adoption having thus been secured, the Articles of Confederation went into effect. The result was the formation of a 'league of friendship' only, the General Government having no power of coercion, and the various States being virtually independent. The Articles provided, among other things, that each State was to have only one vote in Congress, that Congress was to be vested with the power of declaring war and peace and of negotiating treaties, that both the General Government and the States were to have the power of coining and issuing money, that the various States were to be intrusted with the regulation of commerce and the raising of revenue, that Congress on appeal was to decide all controversies between States, and that when Congress was not in session a 'Committee of the States,' appointed by that body, was to manage the general affairs of the Confederation.

When the long war had ended, the States had become free, but the inefficacy of their form of federal government became more and more apparent, and the condition of the young Confederacy seemed most discouraging. Its treasury was empty; it was burdened with a foreign debt of $8,000,000, domestic obligations of $30,000,000, and a paper currency of nearly $90,000,000 which no one would receive. Moreover, the Congress whose predecessor had incurred these various obligations had now no power to provide for discharging them. It could only make recommendations to the States and urge them to provide their share toward the expenses of the Government, and was wholly without power to enforce either upon individuals or upon the States a compliance with its requirements, while, furthermore, the States were themselves in debt, and unable as well as unwilling to respond to the demands of the Congress. An amendment to the Articles of Confederation empowering Congress to levy a five per cent. duty on imported goods was proposed in 1782, but was defeated by Rhode Island, which alone of the States withheld its assent. The resistance offered to constituted authority in Massachusetts in 1786-87, when a portion of the people actually organized to resist the collection of debts and to close the local courts (see SHAYS'S REBELLION), emphasized the need of a stronger central government.

After the close of the Revolutionary struggle, weakness of the General Government was even more keenly realized than before. Congress had no power of maintaining an army or navy, no control over commerce, no means of actually raising public funds, and no effectual mode of enforcing its will even in matters over which it nominally had jurisdiction. In the words of Washington, it was "little more than the shadow without the substance." Moreover, from its want of power, it soon became despised and neglected by those who should have been its chief supporters, and the ablest men preferred to devote themselves to the politics of their own States. Congress consisted of scarcely more than twenty members, few of whom in its closing years were men of any great influence. The evils of this lack of system were soon made evident, when, after some difficulty, twelve States had assented to a general system of import duties, and the thirteenth, New York, resisted, and thus alone was able to defeat a measure which was essential to the credit and security of the whole nation. So, too, articles in the treaty with England were set at naught by the different State governments, laws being passed by the various Legislatures in direct defiance of these articles, while Congress was unable to do more than merely to exhort them to annul these laws and to comply with the treaty. In this state of affairs, thoughtful men began to see that, if the United States were to exist as a nation, there must be a central government with direct power both in internal and external affairs, able to carry on foreign negotiations in the name of the nation, to create statutes operative upon all the citizens of the States, to enforce these statutes, and, if necessary, to punish those who neglected them. The first men clearly to perceive and boldly to declare this were Alexander Hamilton and James Bowdoin.

THE CONSTITUTION. Though Hamilton had been among the most ardent supporters of American independence, he was not an advocate of the system of government that had been the immediate result of the war. He wished his countrymen to secure the advantages of a strong central government, and the model that he had in mind was the English system, without the monarchical principle. In 1785 an opportunity occurred of effecting, or at least of suggesting, a radical change. In that year commissioners were appointed by Virginia and Maryland to settle certain difficulties about the navigation of the Potomac River and Chesapeake Bay. They met at Mount Vernon, Washington's home, where a plan was proposed for settling commercial duties, and this led to the proposal, made by the Assembly of Virginia, for a general conference of commissioners from all the States to consider the state of trade. Hamilton, seeing that this conference might be made the instrument of more fundamental changes, persuaded New York to send commissioners, himself among them; and in 1786 commissioners from five States met at Annapolis, Md. (See ANNAPOLIS CONVENTION.) Hamilton laid before them a report, giving reasons for calling a convention of delegates from all the States to consider the reorganization of the National Government. Such a proposal was adopted by the conference and submitted to Congress, by which it was indorsed, with the recommendation that each State should send delegates to a National Constitutional Convention. The suggestion was generally adopted, and the convention met at Philadelphia in May, 1787. Washington was chosen president of the body, which proceeded to create an entirely new scheme of government rather than to revise the existing plan as had been originally intended.

The two paramount questions at issue were the powers of the Federal Government and of the individual States and the system by which the States were to be represented in the Federal Legislature. Two tentative plans were laid before the convention, one by Edmund Randolph of Virginia, the other by William Paterson of New Jersey. The 'Virginia Plan,' as the former was commonly called, provided that in each branch of the National Legislature representation should be according to population, while the 'New Jersey Plan' provided for equal representation of the States in each branch. The practical question at issue was settled by the so-called 'Connecticut Compromise,' according to which in one branch of the National Legislature representation of the States should be according to population, while in the other branch it should be equal. Other compromises were also necessary in the convention, as a result of which Congress was to be given control over commerce, three-fifths of the slaves were to be counted in estimating the population of a State with reference to its representation in the Lower House, and the various States were given power to admit imported slaves for twenty years. The frame of government drawn up, with subsequent amendments, has continued to be the Constitution of the United States to the present day. See CONSTITUTION.

The difficulties incident to the ratification of the proposed Constitution were enormous. The old Congress was still in existence as the National Government, but it was in even lower repute, and of less influence, than it had been earlier in the decade, and it confessedly had neither the authority nor the power to take effective steps for the establishment of the new form of government. The convention accordingly determined to report its proceedings to the old Congress, which body was to submit the Constitution to each State for acceptance or rejection, the people of each State expressing themselves through a convention called for the purpose. All questions at issue were now revived in the vigorous and protracted discussions and contests which took place in several of these conventions. Two bitterly opposing parties arose, the Federalists (q.v.) and the Anti-Federalists, the former favoring the Constitution and the latter rejecting it. Some of the States ratified the Constitution promptly; but in others, especially Massachusetts, Virginia, and New York, the opposition was strongly developed and it was only after a protracted struggle that the opposition of such men as Patrick Henry in Virginia, and of Melancthon Smith and Yates in New York, was overcome. To this end the chief single contribution was made by the influence of *The Federalist* (q.v.), the series of essays produced by Hamilton, Madison, and Jay, in explanation and justification of the convention's work. Finally, on June 21, 1788, the ninth State, New Hampshire, ratified the Constitution, and, according to the terms of the instrument itself, by that event it went into force. The two important States of Virginia and New York followed with their approval on June 25th and July 26th, respectively, leaving only North Carolina and Rhode Island in the anomalous position of not being members of the new nation which claimed jurisdiction over their territory.

During the whole period of the Confederation Congress had enacted only one piece of legislation of extraordinary and enduring importance—the Ordinance of 1787 for the government of the Northwest Territory.) See NORTHWEST TERRITORY.) After the ratification of the Constitution by the requisite number of States, the old

Congress arranged a plan for carrying the new government into operation. The first Wednesday of January, 1789, was selected for the choice of electors for President and Vice-President, the first Wednesday in February for the voting of the electors, and the first Wednesday in March as the date of the inauguration. The 69 electors who met in February all voted for George Washington, who was accordingly chosen President. The next highest number of electoral votes cast was 34, which were given to John Adams, who was thus elected Vice-President in accordance with the method then prescribed by the Constitution. Owing to delays, however, the actual inauguration of the new Government did not take place until April 30, 1789.

I. and II. ADMINISTRATION OF GEORGE WASHINGTON (1789-1797). *Cabinets.—Secretary of State*, Thomas Jefferson, Virginia, September 26, 1789; Edmund Randolph, Virginia, January 2, 1794; Timothy Pickering, Pennsylvania, December 10, 1795. *Secretary of the Treasury*, Alexander Hamilton, New York, September 11, 1789; Oliver Wolcott, Connecticut, February 2, 1795. *Secretary of War*, Henry Knox, Massachusetts, September 12, 1789; Timothy Pickering, Pennsylvania, January 2, 1795; James McHenry, Maryland, January 27, 1796. *Attorney-General*, Edmund Randolph, Virginia, September 26, 1789; William Bradford, Pennsylvania, January 27, 1794; Charles Lee, Virginia, December 10, 1795. *Postmaster-General*,* Samuel Osgood, Massachusetts, September 26, 1789; Timothy Pickering, Pennsylvania, August 12, 1791; Joseph Habersham, Georgia, February 25, 1795.

George Washington was sworn into office on April 30, 1789, at New York, where the newly elected Congress, the first under the Constitution, had assembled earlier in the month. The House of Representatives elected Frederick A. Muhlenberg, of Pennsylvania, as the first Speaker. The first Congress witnessed a gradual formation of two political groups, opposing each other on questions of centralization and decentralization, those favoring a liberal interpretation of the powers of the Federal Government being known as Federalists, and those favoring a very strict interpretation and limitation of these powers soon styling themselves Democratic-Republicans or simply Republicans. The latter was made up in great part of the Anti-Federalists of 1787-88, but also came to include some of the advocates of the Constitution, Madison among them. Both factions were represented in Washington's first Cabinet, Hamilton coming to be the recognized leader of the Federalists, and Jefferson coming to be regarded as the ablest advocate of the strict-constructionist doctrine.

Three important events of Washington's first administration, all closely connected with the work of Hamilton, were the inauguration of a scheme of tariff (see TARIFF), directed primarily toward the raising of revenue, but also based upon the expediency of encouraging domestic industries, the establishment in 1791 of a national bank (see BANK, BANKING), planned to serve partly as a fiscal agency of the new Government, and the systematizing and funding of the national debt, in which were now included not only the strictly national debts, but also those obligations of the several States which had been incurred for national purposes during the Revolution. The political controversy over this assumption of State debts by the National Government was, for purposes of convenient adjustment, combined with the pending controversy as to the location of the national capital, the opponents of 'assumption' yielding upon that proposition in sufficient number to secure in return the choice of the banks of the Potomac as the seat of government. The Constitution had been put into operation without any settlement of the delicate and vital question of the authority of the new Government over the territory of the States which at that time had not ratified that instrument, and the possibility of a crisis was early removed by the successive ratifications by North Carolina (November, 1789), and by Rhode Island (May, 1790). Membership in the Union was further increased by the admission of Vermont (March, 1791), and of Kentucky (June, 1792). In Washington's first term executive departments were organized by acts of Congress, the Federal judicial system was organized, in September, 1789, a national mint was established in Philadelphia, and a system of coinage devised, and in 1791 the first ten amendments to the Federal Constitution were formally adopted.

At the request of both Federalists and Republicans, Washington consented to serve a second term as President, and was unanimously reëlected. John Adams was also reëlected to the office of Vice-President, being opposed by George Clinton (q.v.), of New York, the Republican candidate. Washington's second term was one of much public turmoil and uneasiness, owing to the attitude of the two parties toward France and England, then at war. The Federalists expressed an open sympathy with England; the Republicans with France. The conduct of the French Minister to the United States, known as 'Citizen' Genet (q.v.), did much to increase the popular excitement. He openly violated the President's proclamation of neutrality, endeavored to fit out French cruisers in American ports, raised money and men for the service in France, and acted with such offensive and undisguised insolence toward Washington and his Cabinet that the Government demanded his recall. The turbulence resulting from his injudicious course, however, had inflamed party passions to such an extent that even Washington's calm and dignified policy did not escape the bitterest partisan denunciation. This increased in volume and intensity when the so-called Jay Treaty (q.v.) with England was laid before the Senate by the President. England's course had been regarded as arrogant and far from conciliatory. She had impressed American seamen, had refused, ostensibly because of the neglect of the United States to carry out certain provisions of the treaty of peace, to evacuate the posts in the Northwest Territory, and had largely excluded American commerce from the West India trade. The Jay Treaty failed to secure the assurances from England that many believed to be justly due; but it embodied the best that could then be obtained, and the President approved it. The aspersions now recklessly heaped upon Washington became virulent; he was threatened with impeachment, and even was accused of treason and of usurpation. Yet his action was justified by the revival of commerce that followed the ratification of the Jay Treaty.

---

* The Postmaster-General was not regularly a member of the Cabinet until 1829.

The other noteworthy events of Washington's second administration were the fortunate and effective assertion of the authority of the Federal Government in the suppression of the so-called Whisky Insurrection (q.v.) in Pennsylvania (1794), the adoption of a plan for internal taxation (1795), the unsuccessful expeditions under Harmar and Saint Clair against the Western Indians in 1790 and 1791, the defeat of the Indians by Wayne at Fallen Timbers in 1794, the cession to the United States in the following year of 25,000 square miles of Indian lands, and the negotiation of a treaty with Spain in 1795, whereby the United States secured the free navigation of the Lower Mississippi, the right of deposit, for a limited period, at New Orleans, and a partially satisfactory settlement of the Florida boundary. The year 1793 was marked by the invention, by Eli Whitney, of the cotton gin, which was destined to bring about an industrial revolution in the South and profoundly to affect the question of slavery. In June, 1796, Tennessee, hitherto a part of North Carolina, was admitted to the Union as a new Commonwealth. On September 17th of the same year Washington delivered his historic "Farewell Address." As he declined again to be a candidate, the two great parties waged an open warfare for the election of his successor. The Federalist candidate, John Adams, received 71 votes, and the Republican, Thomas Jefferson, 68 votes, and in accordance with the constitutional provisions then operative, John Adams became President, and Thomas Jefferson Vice-President.

III. ADMINISTRATION OF JOHN ADAMS (1797-1801). *Cabinet.—Secretary of State,* Timothy Pickering, continued; John Marshall, Virginia, May 13, 1800. *Secretary of the Treasury,* Oliver Wolcott, continued; Samuel Dexter, Massachusetts, January 1, 1801. *Secretary of War,* James McHenry, continued; Samuel Dexter, May 13, 1800; Roger Griswold, Connecticut, February 3, 1801. *Secretary of the Navy,* George Cabot, Massachusetts, May 3, 1798;[*] Benjamin Stoddert, Maryland, May 21, 1798. *Attorney-General,* Charles Lee, continued; Theophilus Parsons, Massachusetts, February 20, 1801. *Postmaster-General,* Joseph Habersham, continued.

At first the prospects of the new Administration and of the Federalist Party seemed extremely bright. The insolent action of the French Directory, then at the head of affairs in France, in demanding of the American commissioners a bribe in return for a favorable hearing, inspired everywhere in the United States the most intense indignation. (See X. Y. Z. CORRESPONDENCE.) War seemed imminent; indeed, hostilities actually began (1799) on sea, and General Washington was again summoned to command the army, with Hamilton as the actual head until the outbreak of hostilities. But a change in the French Government made possible a reconciliation, and in 1800 a treaty removed the immediate cause of complaint.

Such popularity as the Government had secured by its firm attitude toward France was soon lost by the passage, in 1798, of the unwise 'Alien and Sedition Acts' (q.v.). These acts were generally felt to be opposed to those principles of the Constitution which assured the rights of individuals and of the States, and they brought the Government into great disrepute. Congress, however, was still largely controlled by the Federalists, and hence the Republicans were obliged to protest against the new enactments through the medium of the State Legislatures. Resolutions of protest drawn by Jefferson and Madison were passed by the Legislatures of Virginia and Kentucky, and became known as the 'Virginia and Kentucky Resolutions' (q.v.). These resolutions expressed the extreme Anti-Federalist doctrine, and precipitated an immediate agitation against the obnoxious laws, which helped to cause the defeat of the Federalist Party in the Presidential election of 1800. During Adams's administration the seat of the government was changed, in 1800, from Philadelphia, which had been the temporary capital for ten years, to Washington, in the newly constituted District of Columbia, and John Marshall, who was destined to influence profoundly the constitutional law of the nation, became Chief Justice of the Supreme Court. In the election of 1800, 73 electoral votes were cast for Thomas Jefferson and the same number for Aaron Burr, also a Republican, while Adams had 65. There being thus no choice, the election was thrown in accordance with Article II. of the Constitution into the House of Representatives, each State having only a single vote. After balloting for six days the House of Representatives elected Jefferson, who received the votes of ten States, while four States voted for Burr, and two voted in blank. Thomas Jefferson was thus chosen President, and Aaron Burr Vice-President.

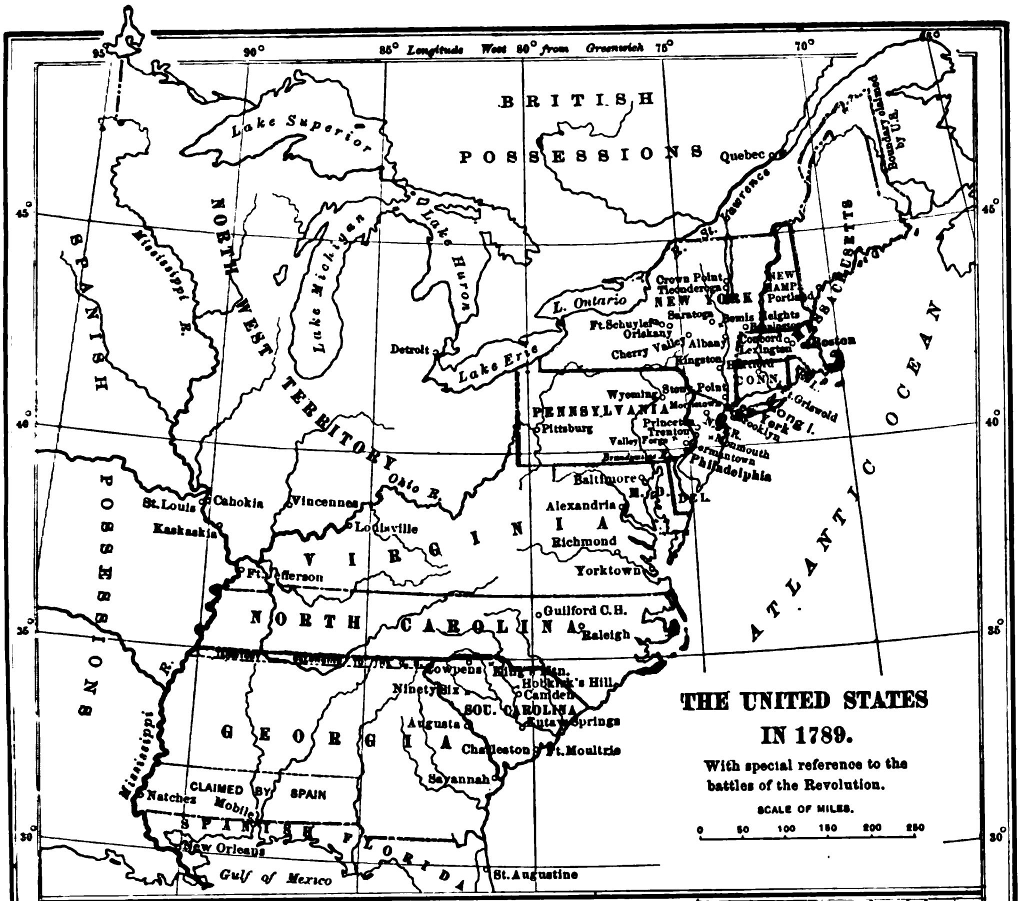
IV. AND V. ADMINISTRATION OF THOMAS JEFFERSON (1801-09). *Cabinet.—Secretary of State,* James Madison, Virginia, March 5, 1801. *Secretary of the Treasury,* Samuel Dexter, continued; Albert Gallatin, Pennsylvania, May 14, 1801. *Secretary of War,* Henry Dearborn, Massachusetts, March 5, 1801. *Secretary of Navy,* Benjamin Stoddert, continued; Robert Smith, Maryland, July 15, 1801.[*] *Attorney-General,* Levi Lincoln, Massachusetts, March 5, 1801; Robert Smith, Maryland, March 3, 1805; John Breckinridge, Kentucky, August 7, 1805; Cæsar A. Rodney, Pennsylvania, January 20, 1807. *Postmaster-General,* Joseph Habersham, continued; Gideon Granger, Connecticut, November 28, 1801.

The election of Jefferson marked the complete triumph of the Republicans. He made a number of removals from office without cause, although chiefly of those whom Adams had appointed in the last hours of his administration and hence known as 'midnight appointments.' (See MARBURY VS. MADISON.) Jefferson professed only to desire to maintain an equal distribution of offices between the parties, and to consider only an applicant's capability and honesty. He felt free, however, to join in undoing the work of Adams by aiding in the repeal of the law creating new judicial offices to which Federalists had been ap-

---

[*] Until this time the Navy had been under the general direction of the War Department.

[*] Jacob Crowninshield of Massachusetts was nominal Secretary of the Navy from March 3, 1805, till his death, April 15, 1808, Robert Smith continuing to discharge the duties of the office.

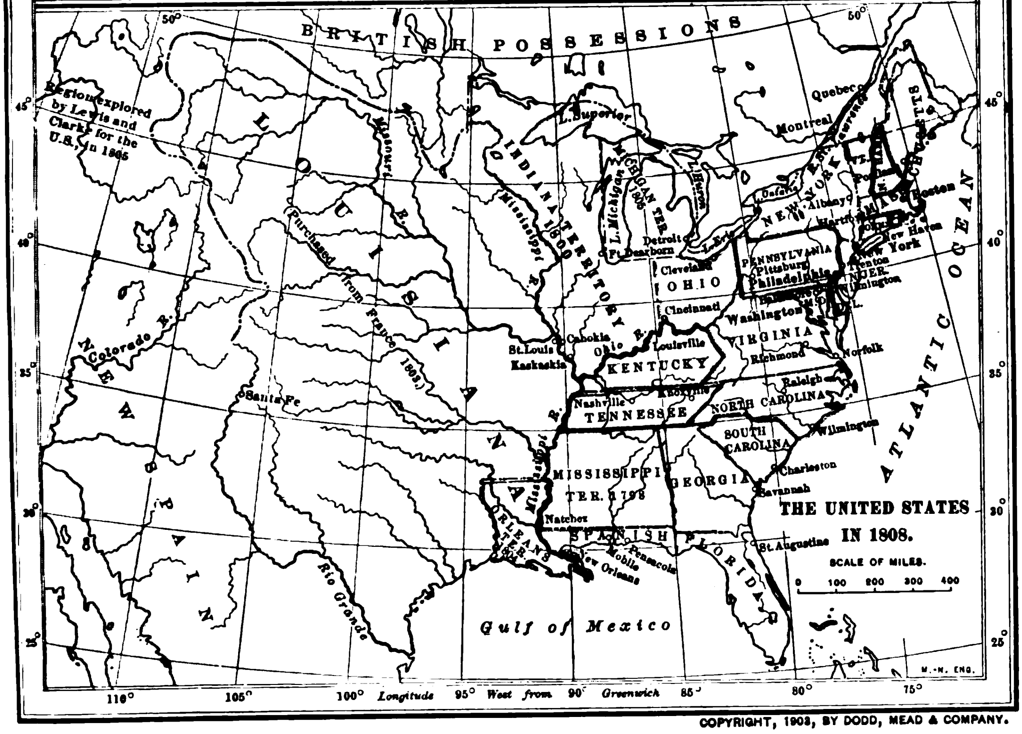


THE UNITED STATES IN 1789.

With special reference to the battles of the Revolution.

SCALE OF MILES.

0 50 100 150 200 250



THE UNITED STATES IN 1808.

SCALE OF MILES.

0 100 200 300 400

COPYRIGHT, 1903, BY DODD, MEAD & COMPANY.

pointed, and also by countenancing an attack which was made on the Federalist judges through impeachment. (See CHASE, SAMUEL.) He began his term of office with the extreme theories of the strict constructionists as his guide, as was shown by the steps which were promptly taken to bring about the abrogation of the system of internal revenue (April, 1802), and to reduce to five years the term of residence requisite for naturalization (April, 1802), as also by the repeal, in December, 1803, of the national bankruptcy law of 1800. Nevertheless, the force of circumstances finally led Jefferson to adopt and carry through measures that involved as liberal an interpretation of the Constitution as any that the Federalists had ever advanced. The first of these measures was the purchase from France in 1803 of Louisiana, which had recently been acquired by France from Spain. (See SAN ILDEFONSO, TREATY OF; LOUISIANA PURCHASE.) The annexation of this territory determined permanently the control of the Mississippi, and accordingly was thoroughly approved in the trans-Alleghany regions; but there was immediately raised not only the question of the Government's power so to acquire territory, but also the question whether the Government had acted within its constitutional powers in concluding a treaty which guaranteed citizenship to former subjects of France, and there developed a vigorous though unavailing opposition to the purchase among the members of Congress from New England. The application of a characteristic Republican policy was, however, illustrated in the marked tendency to minimize the importance of the functions of the National Government, and to render unimportant such departments as those of war and the navy. The very material reduction of the national forces was accomplished without effective opposition in view of the improved financial condition which was supposed to be secured by such a course. Any such justification was soon overbalanced by the pressing need of an efficient navy occasioned by the war with Tripoli (1801-05), in which Preble and Decatur won laurels for the American flag. (See BARBARY POWERS, WARS WITH THE.) In 1803 Ohio was admitted into the Union; and in December, 1803, Congress passed the Twelfth Amendment to the Constitution, which was ratified in 1804, providing that the electoral college should vote for Presidential and Vice-Presidential candidates separately. (See CONSTITUTION.) In 1804 Jefferson was reëlected President, receiving all the electoral votes except those of Connecticut, Delaware, and Maryland, which were cast for the Federalist, Charles C. Pinckney, of South Carolina. George Clinton (q.v.), of New York, was elected Vice-President.

Jefferson's second administration began with overwhelming Republican majorities in both Houses of Congress. The Napoleonic wars had begun anew in 1803, and it was impossible for such a struggle not to affect materially the interests of the United States. The commerce of America was highly prosperous, her ships enjoying much of the carrying trade of Europe; but in May, 1806, England declared a blockade from Brest to the Elbe, and Bonaparte, in November, decreed the blockade of the coasts of the United Kingdom. (See CONTINENTAL SYSTEM; ORDERS IN COUNCIL.) The maritime rights of neutrals were not at that time clearly defined, and the Americans suffered at the hands of both belligerents, American vessels being seized and searched with great insolence and discourtesy for contraband of war and being searched also by the British for British subjects. The right of expatriation was not then recognized by England, and those suspected of having been born on British soil were, in accordance with the doctrine, 'once a subject always a subject,' impressed into the British naval service. The British frigate *Leopard*, meeting the American frigate *Chesapeake*, June 22, 1807, demanded four of her men, and on refusal fired into her, and the *Chesapeake* was forced to strike her flag, the incident creating intense excitement and resentment, and British ships being thenceforth forbidden to enter American harbors. See CHESAPEAKE, THE.

In December, 1807, a further step was taken in the famous Embargo Act (see EMBARGO), which forbade American vessels to leave for foreign ports, and foreign vessels to take cargoes into American ports. This measure, which was intended to punish England and France for their contempt of American rights upon the sea, almost destroyed the commerce of the United States, and was violently opposed by the Federalists, especially in New England and New York, where the shipping interest was strongest. During Jefferson's administration Aaron Burr attempted to carry out a filibustering scheme against Mexico, and in addition he was charged with an attempt at the dismemberment of the Union, and in 1807 was tried for treason at Richmond, Va., but was acquitted. (See BURR, AARON.) Jefferson's administration was also marked by the Lewis and Clark expedition (q.v.) across the continent to the Pacific (1804-06); by the passage of a bill in 1806 for the construction of a national road from Cumberland, Md., to Ohio, the first important internal improvement measure (see CUMBERLAND ROAD); the establishment of the United States Military Academy at West Point, and the successful introduction of steam navigation by Fulton. (See STEAM NAVIGATION.) Another important event of Jefferson's administration was the passage of an act of Congress in 1807 abolishing the slave trade from January 1, 1808.

Following the example of Washington, Jefferson declined to be a candidate for a third term, and in the election of 1808 James Madison, of Virginia, was elected President, and George Clinton, of New York, Vice-President. Charles C. Pinckney was again the Federalist candidate for President. In February, 1809, owing to the threatening attitude of the New England States, which seemed to menace the Government with secession, the Embargo was relaxed and the Non-Intercourse Act was substituted for it, repealing the provisions of the Embargo, except as against England and France.

VI. and VII. ADMINISTRATION OF JAMES MADISON (1809-17). *Cabinet.—Secretary of State*, Robert Smith, Maryland, March 6, 1809; James Monroe, Virginia, April 2, 1811. *Secretary of the Treasury*, Albert Gallatin, continued; George W. Campbell, Tennessee, February 9, 1814; A. J. Dallas, Pennsylvania, October 6, 1814; William H. Crawford, Georgia, October 22, 1816. *Secretary of War*, William Eustis, Massachusetts, March 7, 1809; John Armstrong, New York, January 13, 1813; James Monroe (acting), September 27, 1814; William H. Crawford, Georgia, August 1, 1815. *Secretary of the Navy*, Paul Hamilton, South Carolina, March 7, 1809; William Jones, Pennsylvania, January 12, 1813; B. W. Crowninshield, Massachusetts, December 19, 1814. *Attorney-General*, C. A. Rodney, continued; William Pinkney, Maryland, December 11, 1811; Richard Rush, Pennsylvania, February 10, 1814. *Postmaster-General*, Gideon Granger, continued; Return J. Meigs, Ohio, March 17, 1814.

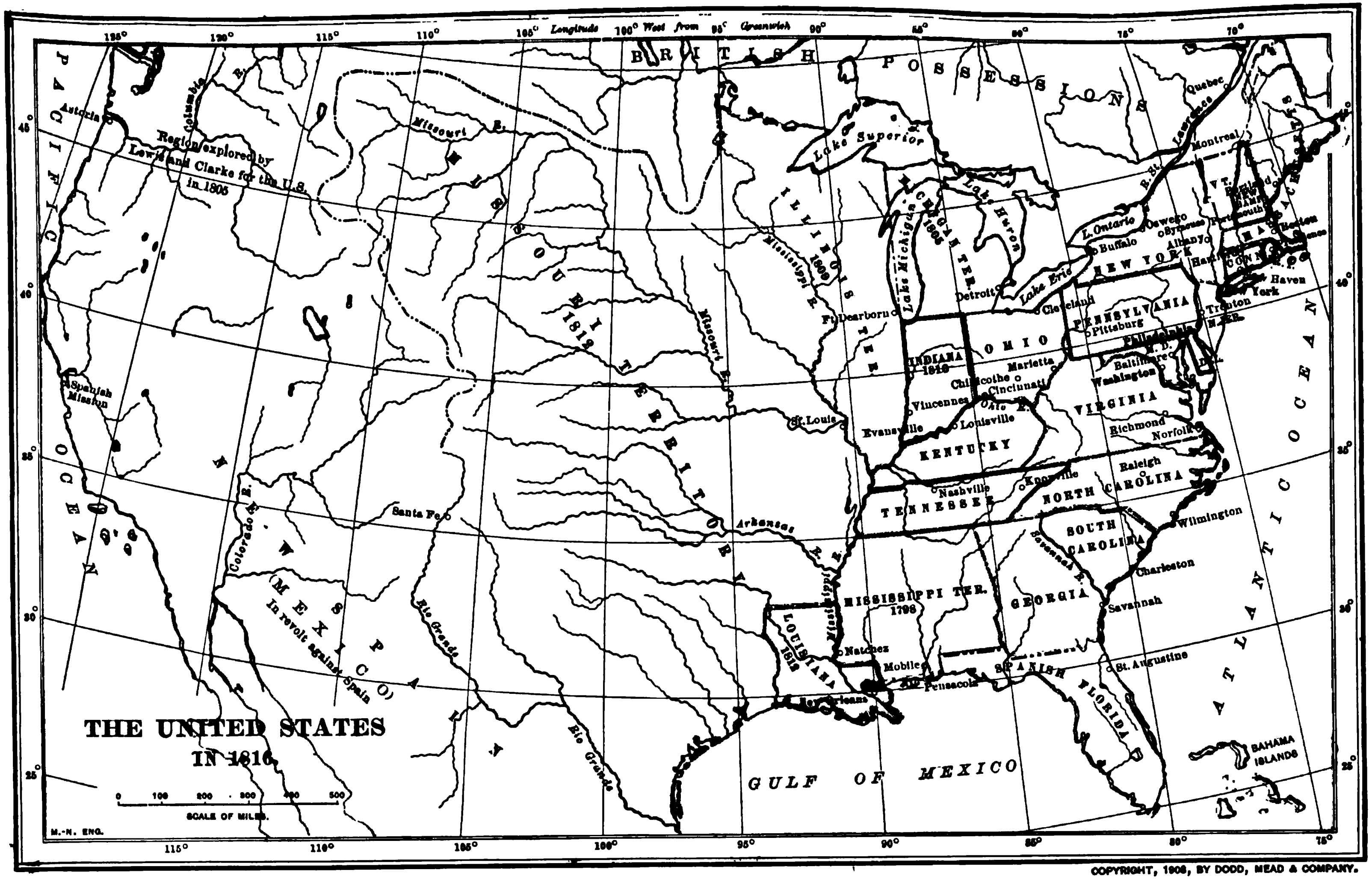
The beginning of Madison's administration witnessed a further straining of relations between the United States and England. Though the acts of France had been, in the main, no less unjust and arrogant than those of England, she had never attempted the impressment of American seamen, which had been made easy for England by identity of language and by the fact that, in some cases, British deserters were actually found upon American ships. Moreover, the Republican Party, now in power, had been traditionally the friend of France. Hence, as time went on, England was especially singled out for American dislike, and this feeling increased when the West complained that British agents were exciting disaffection on the frontiers and intriguing with the Indians, color being given to this latter charge by the hostility of some of the Indians and Tecumseh's attempt to form an Indian confederation. See TECUMSEH; TIPPECANOE, BATTLE OF.

In 1810 England and France each professed a readiness to repeal the decrees that had so hampered American commerce, if the other would do so first. France then revoked conditionally the Berlin and Milan decrees, and in 1812 revoked them unconditionally, dating the revocation back one year. Meanwhile, an aggressive element had risen to prominence in the councils of the Republican Party. Henry Clay, of Kentucky, was Speaker of the House, and John C. Calhoun, of South Carolina, on the floor of the House was the leader of the majority. Under the impulse of these two brilliant and impetuous spirits, the party in power became transformed into a war party. Acts were passed to enlist soldiers, to organize the militia, to enlarge the navy, and to prepare in every way for war. The adoption of a war policy was urged upon the President, who was himself reluctant to adopt it. England having refused to modify her policy toward neutrals, an embargo upon all American shipping was proclaimed for sixty days as a preliminary to the opening of hostilities; and on June 1st Madison sent a message to Congress in which, after reviewing the American grievances against England, he recommended a formal declaration of war. The chief grounds for this action, as given by Madison, were the impressment of American seamen, the extension of the right of search to United States war vessels, the 'paper blockades' established by the British Orders in Council, and the alleged efforts of Great Britain to persuade the Northwestern Indians to attack the Americans. On the 18th Congress formally declared war. Five days later, and before the declaration reached England, the British Government withdrew its objectionable Orders in Council, but although attempts were then made to restore peace, reconciliation at that time was impossible. The disparity in power between the United States and Great Britain at this time was enormous, and except that the latter was still engaged in her conflict with Napoleon, a declaration of war would have seemed little less than foolhardy. In 1810 the population of the United States was only about 7,250,000, while that of Great Britain was fully 18,500,000. Great Britain, moreover, had vastly superior resources at her disposal, was organized for war, while the United States was not, and, besides having a large and highly disciplined army, was the acknowledged mistress of the seas. In general, the war went against the Americans on land, though the British were decisively repulsed at New Orleans; and the warfare on sea demonstrated the superiority, vessel for vessel, of the American to the British navy. Gradually, however, by reason of her vastly larger fleet, Great Britain defeated the American vessels in detail or drove them under the shelter of forts. The American naval successes were, nevertheless, of such number and of such tactical importance as to add greatly to the standing of the United States as a naval power. Congress had voted to raise 25,000 enlisted soldiers, 50,000 volunteers, and 100,000 militia. General William Hull with 2000 men at Detroit invaded Canada, but on being met by a small force of British and Indians under General Brock, recrossed the river, and on August 16th surrendered at Detroit without resistance. A second invasion of Canada was made in October, 1812, near Niagara Falls, by General Van Rensselaer. One thousand American militia stormed the heights of Queenstown, and the British general, Brock, was killed, but reinforcements arriving, the heights were retaken, and nearly all the Americans were driven back with great loss. At this time some of the militia refused to cross into Canada, upon the ground that the Government had no right to send the militia across the frontier. The Federalist Party, opposed to the war, defended the doctrine, and General Van Rensselaer resigned in disgust.

American disasters on the land were, however, compensated for by victories at sea. On August 19th the United States frigate *Constitution* (q.v.) captured the British frigate *Guerrière;* on October 18th the *Wasp* (American) took the *Frolic* (British); on October 25th the *United States* captured the *Macedonian;* and on December 29th the *Constitution* took the *Java*. The Americans, in most cases, had the larger ships and heavier ordnance; but the immense disparity in the losses showed also superior seamanship and gunnery. American privateers, furthermore, took during the war, it is estimated, 300 British vessels and 3000 prisoners.

In May, 1812, Madison had been renominated for the Presidency, with Eldridge Gerry, of Massachusetts, as the Republican candidate for Vice-President. In the ensuing election Madison defeated De Witt Clinton by an electoral vote of 128 to 89, while Gerry defeated Jared Ingersoll by an electoral vote of 131 to 86.

In April, 1813, an American army of 1700 men under General Henry Dearborn captured York, now Toronto, and Dearborn having been relieved, Generals Wilkinson and Hampton undertook to capture Montreal, but met with no success. An attempt of the British general, Prevost, on Sackett's Harbor in May was repulsed; the British squadron on Lake Erie, consisting of 6 vessels



THE UNITED STATES
IN 1816

COPYRIGHT, 1906, BY DODD, MEAD & COMPANY.

carrying 63 guns, was captured on September 10, 1813, by Commodore Perry at the head of an American flotilla of 9 vessels with 54 guns (see ERIE, BATTLE OF LAKE); and this latter success enabled General Harrison to invade Canada, where he defeated General Proctor in the battle of the Thames (October 5th), in which the great Indian warrior-chief Tecumseh was killed. During the same period General Andrew Jackson in Alabama and Georgia defeated the Creek Indians, who had been incited to make war upon the frontier settlements. In the summer of 1814 General Jacob Brown, with Colonel Winfield Scott as his second in command, crossed to the Canadian side, captured Fort Erie (q.v.) on July 2d, and defeated General Riall at Chippewa on July 5th. On July 25th the indecisive battle of Lundy's Lane was fought, the Americans being under the immediate command of Scott; and the American forces then withdrew to Fort Erie, where they were besieged. (See FORT ERIE.) General Wilkinson also invaded Canada along the Sorel River, but was easily repulsed. A British invasion, by Lake Champlain, under Prevost, with 14,000 men and a flotilla on the lake, ended disastrously. On September 11th the flotilla was signally defeated in the harbor of Plattsburg by an American squadron under Commodore McDonough, while the army was repulsed on shore, and retreated with heavy loss. In August a British fleet ascended Chesapeake Bay and landed troops which, after dispersing with little difficulty a force of American militia at Bladensburg (q.v.), entered Washington and burned the Government buildings. A subsequent attack on Baltimore was unsuccessful. New York, New London, and Boston were blockaded, and a large expedition was sent against Mobile and New Orleans.

On January 8, 1815, General Pakenham attacked New Orleans, but his army was repulsed with great loss by General Jackson at the head of an inferior militia force. (See NEW ORLEANS, BATTLE OF.) This action was fought two weeks after peace had been concluded by the commissioners of England and the United States.

From the middle of 1813 the fortunes of war alternated on the sea. On June 1, 1813, the American frigate *Chesapeake* was taken by the *Shannon* and the American sloop *Argus* by the *Pelican* on August 14th; the British brig *Boxer* was captured by the *Enterprise* on September 5, 1813; the American frigate *Essex*, after a memorable career under Porter, surrendered to the *Phœbe* and *Cherub* on March 28, 1814; the British brig *Epervier* was captured by the *Peacock* on April 29, 1814; the British sloop *Avon* was sunk by the *Wasp* on September 8, 1814; on January 15, 1815, after the conclusion of peace, the American frigate *President* was taken by the British; and on February 20th the American frigate *Constitution* captured the *Cyane* and the *Levant*.

In December, 1814, the Federalists of New England held a convention at Hartford in opposition to the war and the Administration. (See HARTFORD CONVENTION.) The treaty of peace concluded with England at Ghent on December 24, 1814 (see GHENT, TREATY OF), was announced in February, 1815. The terms did not include any affirmative withdrawal of England's claim to search American ships, but nevertheless all parties in the country approved it.

In 1815 Commodore Decatur commanded an expedition against the Algerians, whose corsairs had preyed on American commerce in the Mediterranean and dictated terms to Algiers, Tunis, and Tripoli. See BARBARY POWERS, WARS WITH THE.

With the end of the War of 1812 came the virtual extinction of the Federalist Party, whose unpatriotic course during the struggle had made its name odious to the nation as a whole. It ceased, thereafter, to make itself felt in national affairs (see FEDERALIST PARTY), and for a time the country had the singular fortune to find all its citizens of one party, with principles derived from both the old party creeds. Perhaps the most marked influence left by the Federalists upon the political tenets of their opponents, and upon the popular mind, was to be found in the now very general recognition of the broad powers of the Central Government. This national idea had sustained the Republicans in the more liberal view which the war had compelled them to take of the inherent powers of the Federal Government. The noticeable effect of the war period in strengthening the nationalist tendency was immediately illustrated by the granting of the charter of the second United States Bank (see BANK, BANKING) in 1816, by the passage of the first really protective tariff, under the guidance of Dallas, in the same year (see TARIFF), and by the activity of Congress in attempting to appropriate large amounts of the national funds for public roads and similar improvements of a local character, an important bill for this purpose, passed by Congress in 1816, being, however, vetoed by Madison on the ground of its unconstitutionality. The tendency was also emphasized by judicial decisions (as in *Martin* vs. *Hunter's Lessee*, 1816, and *Cohens* vs. *Virginia*, 1821), establishing the supremacy of the Federal judicial power over that of the States, while in *McCulloch* vs. *Maryland*, in 1819, Chief Justice Marshall introduced into the law of the land his advanced views as to the relation of the States to the Union and elaborated his theory of the supreme and exclusive authority of the latter. For the moment, the close of Madison's administration found the country, as a whole, scarcely divided by party differences, so that the Presidential election of November, 1816, resulted in the choice of James Monroe, of Virginia, as President, and Daniel D. Tompkins, of New York, as Vice-President, these candidates receiving 183 electoral votes, while the votes of only three States—Massachusetts, Connecticut, and Delaware—were cast for the Federalist candidate, Rufus King, of New York. The Federalists made no formal nomination for the office of Vice-President. In Madison's first administration Louisiana was admitted into the Union (1812), and in the second Indiana (1816).

VIII. and IX. ADMINISTRATION OF JAMES MONROE (1817-25). *Cabinet.—Secretary of State*, John Quincy Adams, Massachusetts, March 5, 1817. *Secretary of the Treasury*, William H. Crawford, continued. *Secretary of War*, George Graham, Virginia, April 7, 1817; John C. Calhoun, South Carolina, October 8, 1817. *Secretary of the Navy*, B. W. Crowninshield, continued; Smith Thompson, New York, November 9, 1818; John Rogers, Massachusetts, September 1, 1823; Samuel L. Southard, New Jersey, September 16, 1823; *Attorney-General*, Richard Rush, continued; William Wirt, Virginia, November 13, 1817; *Postmaster-General*, R. J. Meigs, continued; John McLean, Ohio, June 26, 1823.

The period of Monroe's term of office has been commonly known in American political history as the Era of Good Feeling. Party questions were in abeyance, and when, in May, 1817, the President began an extended tour in the Northern and Western States, the warmth of the welcome given him by all classes of the people showed that the nation was contented, prosperous, and loyal. In accordance with the recommendations of the President's first message, the slightly protective tariff of 1816 was continued for seven years. (See TARIFF.) On December 10, 1817, Mississippi was admitted to the Union. In 1818 (December 3d) Illinois became a State, and on February 22, 1819, the United States purchased from Spain for $5,000,000 the territory of east and west Florida (in which region hostilities had recently been carried on against the Seminole Indians), together with all the claims which Spain might have to territory as far west as the Pacific, north of the forty-second parallel, including, of course, the Oregon country; while the United States relinquished all claim to the province west of the Sabine River (Texas). This treaty, however, was not formally ratified until 1821. Early in 1818 the people of the Territory of Missouri (q.v.), which had been included in the Louisiana Purchase, applied for admission to the Union. A bill providing for such admission was framed, but amended in the House in such a way as to forbid slavery in the new State. As so amended, the bill passed the House by the votes of the members from the free States, but was defeated in the Senate. This action brought the question of slavery prominently into the sphere of national politics, never again to disappear until the extinction of that institution as the result of the war between the States in 1861-65. In the Congress which met in December, 1819, the question of the admission of Missouri was again brought forward, coupled with a proposition for the admission of Maine, which had hitherto been a part of Massachusetts. An arrangement known as the 'Missouri Compromise' (q.v.) was effected (1820) by the action of Clay and the conservative members of both sections, which provided that the admission of Maine and Missouri should be voted upon separately, that slavery should be permitted in Missouri, but that slavery should forever be prohibited in territories acquired from France north of the parallel of 36° 30′ except Missouri. Maine was admitted in 1820 and Missouri in 1821, the latter step having been delayed by a vigorous debate in Congress occasioned by a clause in the proposed State Constitution which prohibited the settling of free negroes in the State (see MISSOURI COMPROMISE), the Missouri Legislature finally pledging the State not to shut out any negro citizen of another State. At the same session of Congress, Alabama was admitted to the Union (December 14, 1819). In 1820 the Presidential campaign resulted in the reëlection of Monroe and Tompkins, Monroe receiving all the electoral votes but one, which was cast for John Quincy Adams.

In 1821 the strict constructionists among the Republicans defeated bills looking to a national canal system and a higher tariff, and the President vetoed a bill for the outlay of national funds upon the Cumberland Road (q.v.). In December, 1823, in his annual message to Congress, Monroe promulgated the famous declaration that has since been known as the Monroe Doctrine (q.v.). In 1824, the nationalist policy being then followed by a majority in both Houses, there was adopted a more strictly protective tariff, framed with the design of excluding foreign competitors from American markets (see TARIFF), while a bill for making surveys for a national canal system also became law. The political issues arising out of the founding of a new government as well as out of international complications had now lost their importance, and attention was becoming centred on internal matters, as to none of which were sectional or factional issues as yet clearly drawn, although the sudden introduction of the slavery question into Congressional politics was to acquire more significance than any other circumstance of the administration. However, as there was now only one political party, the Republican, the Presidental election of 1824 was largely a personal and factional contest. When the electoral votes were counted, 99 were for Andrew Jackson, of Tennessee; 84 for John Quincy Adams, of Massachusetts; 41 for William H. Crawford, of Georgia; and 37 for Henry Clay, of Kentucky; there being thus no choice for President, and the decision being thrown into the House of Representatives, where, by a coalition of the supporters of Clay and Adams, the latter was finally chosen, Adams receiving the votes of thirteen States, while Jackson had those of seven, and Crawford those of four. The electors had chosen John C. Calhoun, of South Carolina, to be Vice-President, by a vote of 182 to 78 for various other candidates.

X. ADMINISTRATION OF JOHN QUINCY ADAMS (1825-29). *Cabinet.—Secretary of State*, Henry Clay, Kentucky, March 7, 1825. *Secretary of the Treasury*, Richard Rush, Pennsylvania, March 7, 1825. *Secretary of War*, James Barbour, Virginia, March 7, 1825; Peter B. Porter, New York, May 26, 1828. *Secretary of the Navy*, S. L. Southard, continued. *Attorney-General*, William Wirt, continued. *Postmaster-General*, John McLean, continued.

A new division of the American people into parties dates from the beginning of this administration. The party previously known as Republican or Democratic-Republican soon took the name of Democratic (see DEMOCRATIC PARTY), while the Clay and Adams factions, which had been identified with the doctrine of loose construction, after taking the name of National Republican, changed it eventually to that of Whig (see WHIG PARTY), by which the party continued to be known for some twenty-five years. The basis for the new party division lay largely in the factional differences between the followers of Adams and those of Jackson, and one result of this was the prolonged controversy throughout the administration of Adams and the development of especially bitter relations between the factions of the leaders, which continued throughout the two terms of Jackson. Owing to the determined obstruction which was made by the opponents of the Administration, few of its measures were carried, so that the net results of the four years' work were comparatively slight, and the period became distinguished chiefly by the partisan conflicts preliminary to the overthrow of the Adams faction in 1828.

During the suspension of commerce by the War of 1812, large amounts of capital were withdrawn from trading ventures and diverted to manufacturing establishments, with the result that gradually New England and the Northern coast States ceased to be free-trade regions, and became desirous of a protective tariff policy, while the South arrayed itself on the side of free trade. Upon the return of peace, the new manufacturing establishments were not firmly enough established to compete successfully with the foreign manufacturers, and accordingly in 1824 an act was passed for the purpose of giving the control of the home market to the wool manufacturers. This failing of its purpose, a national convention of protectionists at Harrisburg, Pa., in July, 1827, advocated a strongly protective policy, and in 1828 a tariff framed in accordance with these views became law. The South denounced this measure as being sectional legislation, intended to benefit New England and the Middle States at the expense of the South, and the doctrine of Nullification (q.v.), which had been promulgated in the Kentucky Resolutions of 1798 (see VIRGINIA AND KENTUCKY RESOLUTIONS), and had been revived in South Carolina in 1827, began to be widely accepted in the Southern States. Adams's administration was further marked by the expenditure by the National Government of some $14,000,000 for 'internal improvements,' by the rapid immigration to the West greatly promoted by the opening of the Erie Canal, and by the debates in Congress over the advisability of sending delegates to the Panama Congress (q.v.). In 1828 the Democratic candidate for President, Andrew Jackson of Tennessee, received 178 electoral votes to 83 cast for John Quincy Adams; and John C. Calhoun was reëlected Vice-President, having 171 electoral votes. The accession of President Jackson was the beginning of a new era in political practice. A radical change was typified by the discontent with the existing methods, which led to the more direct participation of the public at large in political affairs through the rise of the nominating convention and through the practice of choosing Presidential electors by popular vote. This marked departure toward practical democracy was emphasized by the striking influence which the new Western States and their ideals and standards of life now secured over national politics.

XI. and XII. ADMINISTRATION OF ANDREW JACKSON (1829-37). *Cabinet.—Secretary of State,* Martin Van Buren, New York, March 6, 1829; Edward Livingston, Louisiana, May 24, 1831; Louis McLane, Delaware, May 29, 1833; John Forsyth, Georgia, June 27, 1834. *Secretary of the Treasury,* Samuel D. Ingham, Pennsylvania, March 6, 1829; Louis McLane, Delaware, August 8, 1831; William J. Duane, Pennsylvania, May 29, 1833; Roger B. Taney, Maryland, September 23, 1833; Levi Woodbury, New Hampshire, June 27, 1834. *Secretary of War,* John H. Eaton, Tennessee, March 9, 1829; Lewis Cass, Michigan, August 1, 1831; Benjamin F. Butler, New York, March 3, 1837. *Secretary of the Navy,* John Branch, North Carolina, March 9, 1829; Levi Woodbury, New Hampshire, May 23, 1831; Mahlon Dickerson, New Jersey, June 30, 1834. *Attorney-General,* John M. Berrien, Georgia, March 9, 1829; Roger B. Taney, Maryland, July 20, 1831; Benjamin F. Butler, New York, November 15, 1833. *Postmaster-General,* William T. Barry, Kentucky, March 9, 1829; Amos Kendall, Kentucky, May 1, 1835.

The bold, decisive, and impetuous character of President Jackson was shown in a general removal of those, down to small postmasters and tidewaiters, who had held office under the late Administration, and in the appointment of his own partisans. The administration was distinctively one of conflict, the chief issues being the United States Bank and the tariff; and Jackson was swayed throughout, to a considerable extent, by the influence of a group of friends, who became known collectively as the 'Kitchen Cabinet' (q.v.). South Carolina declared the high protective tariff acts of 1828 and 1832 to be unconstitutional, and therefore null and void, and threatened to withdraw from the Union if an attempt were made to collect the duties on foreign importations. The President prepared to execute the laws by force; Calhoun resigned his office of Vice-President, and in the Senate, to which he was promptly sent, asserted the doctrine of State rights, including the right of secession. (See NULLIFICATION.) A collision seemed imminent, but the affair was settled by a compromise bill, introduced by Henry Clay, providing for a gradual reduction of duties until 1842, when they were not to exceed 20 per cent. *ad valorem.* As an incident of this controversy, though nominally occasioned by a resolution calling for an inquiry into the sale of Government lands, occurred the famous debate (January, 1830) in the Senate between Daniel Webster (q.v.), of Massachusetts, and Robert Y. Hayne (q.v.), of South Carolina, in which the two opposing views regarding slavery, nullification, and the true interpretation of the Constitution were advocated and discussed with such eloquence, learning, and enthusiasm as to make the debate a landmark in the constitutional development of the United States. The same period witnessed the rise of the Anti-Masonic Party, based on opposition to Free Masonry and to secret societies generally. See MORGAN, WILLIAM; ANTI-MASONS.

The President was a pronounced opponent of the national bank, the existence of which under its second charter was to continue to 1836. Jackson early raised the issue of its constitutionality, whereupon the friends of the bank introduced and carried through both Houses a bill for its continuation. This was vetoed, and its supporters were unable to carry the bill over the veto. The question, however, was made the chief issue in the campaign of 1832, in which the decisive triumph of Jackson was taken by him to be a vindication of his policy and an assurance that he represented the popular will more accurately even than did Congress. The result was still further to strengthen his position and to increase his influence over Congressional action. In the election of 1832 he received 219 electoral votes, as against only 49 for Henry Clay, 11 for John Floyd, of Virginia, and 7 for William Wirt, of Virginia. Martin Van Buren was elected Vice-President, receiving 189 votes.

The Cherokee Indians in Georgia, who had attained to a certain degree of civilization, appealed to the President for protection against the seizure of their lands by the State; but they were told that he "had no power to oppose the exercise of the sovereignty of any State over all who may be within its limits;" and the Indians were obliged to remove to the territory set apart for them west of the Mississippi. In 1832, in the West, trouble with the Indians had culminated in the Black Hawk War (see BLACK HAWK), and now in 1835 the Seminole War broke out in Florida, and a tribe of Indians, insignificant in numbers, under the crafty leadership of Osceola (q.v.), kept up hostilities for years, at a cost to the United States of several thousands of men and some $50,000,000. The removal in 1835 by order of the President of the Government deposits from the United States Bank to certain State banks, led to the weakening of the bank, and, after some years, to the adoption of Van Buren's plan of an independent treasury. Later the Senate, which was controlled by the Whigs, as Jackson's opponents now styled themselves, led by Henry Clay, took the extraordinary step of passing formal resolutions of censure of the President for his order removing the Government deposits from the bank. The President protested against the resolution, but the protest was not allowed by the Senate to appear upon the record. The warfare between the President and Senate continued through the next two years, the latter frequently rejecting the nominations made by the Executive. In 1837, however, largely under the influence of Benton, the Senate, which had at last become Democratic, voted to expunge from its records the resolutions of censure already mentioned. In 1835 (December 7th) the President announced to Congress that the national debt would soon be paid, and that provision should be made for the surplus revenue which was anticipated. In June, 1836, a bill was passed providing that after January 1, 1837, any surplus exceeding the sum of $5,000,000 should be divided among the States as a loan, subject to a recall by Congress; and in accordance with this act, some $28,000,000 was divided in 1837, which has never been recalled. In July, 1836, the President caused the famous Specie Circular to be issued, which ordered the agents of the Government to receive only gold or silver in payment for public lands.

---

* The Postmaster-General first came to be a regular member of the Cabinet in Jackson's administration.

At this time Texas, which had been colonized by Americans, was endeavoring to free itself from Mexican control and to establish its independence. The South saw in the movement a prospect of annexing this large territory to the United States, and of carving from it new slave States whose votes in the Senate would counterbalance those of the new free States. Many manifestations of sympathy with the Texans were therefore made, and a resolution recognizing the independence of Texas passed the Senate, but not the House. A new era in the slavery controversy had been inaugurated with the establishment of the *Liberator* by Garrison in 1831. The New England Anti-Slavery Society was organized in 1832, and the American Anti-Slavery Society at Philadelphia in 1833. (See SLAVERY; GARRISON, W. L.; PHILLIPS, WENDELL; ABOLITIONISTS; GAG RULES.) Arkansas (June 15, 1836) and Michigan (January 26, 1837) were admitted to the Union. The administration of Jackson was further marked by the political acerbities growing partly out of the Peggy O'Neill affair (see EATON, MARGARET), and leading to the reorganization of the Cabinet, by the treaty with France settling the spoliation claims and the treaty with England securing unrestricted direct trade with the British West Indies, by the adoption on a large scale by Jackson of the 'spoils system,' and by the introduction of railroads. The election of 1836 resulted in the success again of the Democratic Party, whose candidate for President, Martin Van Buren, of New York, received 170 electoral votes, against 73 for William Henry Harrison, of Indiana, and 51 scattering. No candidate for Vice-President received a clear majority, and so the Senate elected Richard M. Johnson (q.v.), of Kentucky.

XIII. ADMINISTRATION OF MARTIN VAN BUREN (1837-41). *Cabinet.—Secretary of State*, John Forsyth, continued. *Secretary of the Treasury*, Levi Woodbury, continued. *Secretary of War*, Joel R. Poinsett, South Carolina, March 7, 1837. *Secretary of the Navy*, Mahlon Dickerson, continued; James K. Paulding, New York, June 25, 1838. *Attorney-General*, Benjamin F. Butler, continued; Felix Grundy, Tennessee, July 5, 1838; Henry D. Gilpin, Pennsylvania, January 11, 1840. *Postmaster-General*, Amos Kendall, continued; John M. Niles, Connecticut, May 19, 1840.

Van Buren, in accordance with his pledges, carried out and perpetuated the policy of his predecessor. The new Administration was unfortunate in its beginnings. A financial disaster, such as had not until then been known in the United States, swept over the country in 1837. A general suspension of specie payments occurred; many banks suspended altogether, and innumerable corporations and individuals were ruined. Congress authorized the issue of $10,000,000 in treasury notes, and Jackson's Specie Circular was revoked. Van Buren's administration was marked by the establishment of the independent treasury system (reëstablished in 1846), by a renewal of hostilities against the Seminole Indians, and by the establishment of regular steamship communication with Europe. The Democrats with difficulty retained control of the House of Representatives, and through such methods as to decrease public confidence in the party leaders. This, together with the prevalent depression in business, weakened the dominant party in the country at large, so that in the campaign of 1840 the candidacy of the Whig nominee, General William Henry Harrison (q.v.), of Ohio, was supported with an enthusiasm such as no subsequent political campaign has ever witnessed. It has become known as the 'Log Cabin Campaign' and the 'Hard Cider Campaign,' from the prevalent symbols of the homely and simple frontier life of General Harrison. The 'Liberty Party' (q.v.) also made nominations, their candidates being James G. Birney (q.v.), of New York, for President, and Francis Lemoyne, of Pennsylvania, for Vice-President. The Democrats renominated Van Buren, but the convention did not agree upon the choice of a candidate for the Vice-Presidency. General Harrison received 234 electoral votes, to 60 for Van Buren; and for Vice-President the Whig, John Tyler, of Virginia, received 234, against 48 for R. M. Johnson and 12 scattering.

XIV. ADMINISTRATION OF WILLIAM HENRY HARRISON (1841) AND OF JOHN TYLER (1841-45).

Cabinet.—Secretary of State, Daniel Webster, Massachusetts, March 5, 1841; Hugh S. Legaré, South Carolina, May 9, 1843; A. P. Upshur, Virginia, July 24, 1843; John C. Calhoun, South Carolina, March 6, 1844. *Secretary of the Treasury,* Thomas Ewing, Ohio, March 5, 1841; Walter Forward, Pennsylvania, September 13, 1841; John C. Spencer, New York, March 3, 1843; George M. Bibb, Kentucky, June 15, 1844. *Secretary of War,* John Bell, Tennessee, March 5, 1841; John McLean, Ohio, September 13, 1841; John C. Spencer, New York, October 12, 1841; James M. Porter, Pennsylvania, March 8, 1843; William Wilkins, Pennsylvania, February 15, 1844. *Secretary of the Navy,* G. E. Badger, North Carolina, March 5, 1841; A. P. Upshur, Virginia, September 13, 1841; David Henshaw, Massachusetts, July 24, 1843; T. W. Gilmer, Virginia, February 15, 1844; John Y. Mason, Virginia, March 14, 1844. *Attorney-General,* John J. Crittenden, Kentucky, March 5, 1841; Hugh S. Legaré, South Carolina, September 13, 1841; John Nelson, Maryland, July 1, 1843. *Postmaster-General,* Francis Granger, New York, March 6, 1841; Charles A. Wickliffe, Kentucky, September 13, 1841.

Two weeks after his inauguration, President Harrison issued a proclamation calling an extra session of Congress to consider the financial distress prevailing throughout the country and other questions that beset the Government. The extra session was called for May 31st, but on April 4th the President died after a short illness. The new President, John Tyler, retained for a few months his predecessor's Cabinet. When Congress met in accordance with General Harrison's call of March 17th, the Whigs, who had a majority in both Houses, began to carry out the changes to which their party had pledged itself in the campaign of the preceding year. A bill was passed for the incorporation of a new United States Bank, to be called the 'Fiscal Bank of the United States,' planned somewhat after the model of that which had been so vigorously attacked by President Jackson. To the consternation of the Whigs, the new President on August 16th vetoed it as being unconstitutional, since it provided for the establishment of branches of the bank in the various States without securing the prior consent of these States. The leading members of the party then conferred with President Tyler and asked him to suggest the provisions of a bill that he would be willing to accept. He agreed to do so, yet after the bill framed largely in accordance with his own ideas had passed the two Houses (September 3d) it promptly met the fate of the former act. It now became evident that the President was at heart a Democrat, and that his political principles would prevent him from acting cordially with the party that had elected him to office. The indignation and chagrin of the Whigs was unbounded. The entire Cabinet with one exception immediately resigned, Webster remaining in the State Department until pending negotiations with England had been completed. On September 11th the leaders of the Whig Party issued a manifesto 'reading' the President out of the party, and holding him responsible for the failure to effect the reforms that had been promised. President Tyler immediately filled the places in his Cabinet with conservative politicians, and having been cut off from political affiliation with his own party, turned to the Democrats for support.

During Tyler's administration the relations between the United States and Great Britain became very strained. In the course of an insurrection in Canada in 1837 a party of supporters of the Canadian Government had crossed over to the American territory and destroyed a vessel, the *Caroline,* owned by the friends of the insurgents. In the affair one American had been killed. In 1840 one Alexander McLeod, who had come to New York State and boasted of having taken part in the destruction of the *Caroline,* was arrested and indicted for murder. England protested vigorously and serious international complications for a time seemed imminent. (See CAROLINE.) Again, in October, 1841, the British freed most of the slaves aboard an American vessel, the *Creole,* which had been seized by them and carried into a port in the Bahamas. (See CREOLE.) Thus each nation had a grievance against the other, and such ill feeling resulted that war was feared.

Fortunately, Webster, Tyler's Secretary of State, was liked and respected by English statesmen, and upon the reorganization of the Cabinet he retained his office until the pending negotiations were concluded. In 1842 Lord Ashburton was sent out from England to negotiate a treaty, with particular reference to adjusting the boundary between Canada and the Northeastern States. The boundary question was settled by a compromise, though Great Britain gave up the larger and more valuable share of the disputed territory. Two other points of importance were settled by this treaty. One was the agreement of the two governments looking to the suppression of the slave trade. The other was the provision for mutual surrender of criminals. The treaty was concluded on August 9, 1842, and was proclaimed on November 10th. See NORTHEAST BOUNDARY DISPUTE; WEBSTER-ASHBURTON TREATY.

In 1843 the Government arranged a treaty with the new Republic of Texas (q.v.), providing for the future annexation of that country to the United States. The Senate rejected this treaty by a vote of 35 to 16, seven Democrats voting with the Whigs for rejection. The problem of the future relations with Texas became still more critical in national politics, and its immediate importance was increased by the strong desire for annexation among the Southern leaders. To maintain the *status quo,* the annexation of Texas became an actual necessity to the interests of the South; for should the free States ultimately acquire a dominant power in the Senate, as they had already done in the House, the time might come when the existence of slavery would be imperiled. The possibility of this was kept continually before the Southern mind by the increasing activity in the North of the Liberty Party (q.v.), which in 1843 held a national convention at Buffalo and there put forth a series of resolutions denouncing slavery, and calling on the free States to pass penal laws to prevent the return of fugitive slaves, and which again nominated James G. Birney for the Presidency. The Whigs at their convention held at Baltimore in May, 1844, nominated Henry Clay, of Kentucky, with Theodore Frelinghuysen, of New York, as the candidate for Vice-President. The Democratic convention, in the same month, nominated James K. Polk, of Tennessee, and George M. Dallas, of Pennsylvania, and adopted a platform calling for the 'reannexation of Texas' and the 'reoccupation of Oregon.' The position of Clay as to the annexation of Texas was so equivocal as to arouse the suspicion of many Northerners, while the position of the Democrats on the Oregon question helped them in the Northwestern States. The election resulted in the choice of Polk and Dallas after a very close contest in which the Democrats succeeded only by the fact that several thousand votes in New York were cast for the anti-slavery ticket.

At the next session of Congress a joint resolution for the annexation of Texas was passed early in 1845 by both Houses and approved on March 1st by the President. It renewed the features of the Missouri Compromise as regards the Texan territory north of the compromise line, and as to the territory south of that line the question of slavery was left to the decision of the inhabitants of the States to be formed out of Texas.

Tyler's administration was marked by the 'Dorr Rebellion' in Rhode Island (see DORR, THOMAS W.; RHODE ISLAND), by anti-rent disturbances in New York (see ANTI-RENTISM), and by the construction under the direction of S. F. B. Morse (q.v.) of the first successful long-distance telegraph line (1844).

XV. ADMINISTRATION OF JAMES K. POLK (1845-49). *Cabinet.—Secretary of State,* James Buchanan, Pennsylvania, March 6, 1845. *Secretary of the Treasury,* Robert J. Walker, Mississippi, March 6, 1845. *Secretary of War,* William L. Marcy, New York, March 6, 1845. *Secretary of the Navy,* George Bancroft, Massachusetts, March 10, 1845; John Y. Mason, Virginia, September 9, 1846. *Attorney-General,* John Y. Mason, Virginia, March 5, 1845; Nathan Clifford, Maine, October 17, 1846. *Postmaster-General,* Cave Johnson, Tennessee, March 6, 1845.

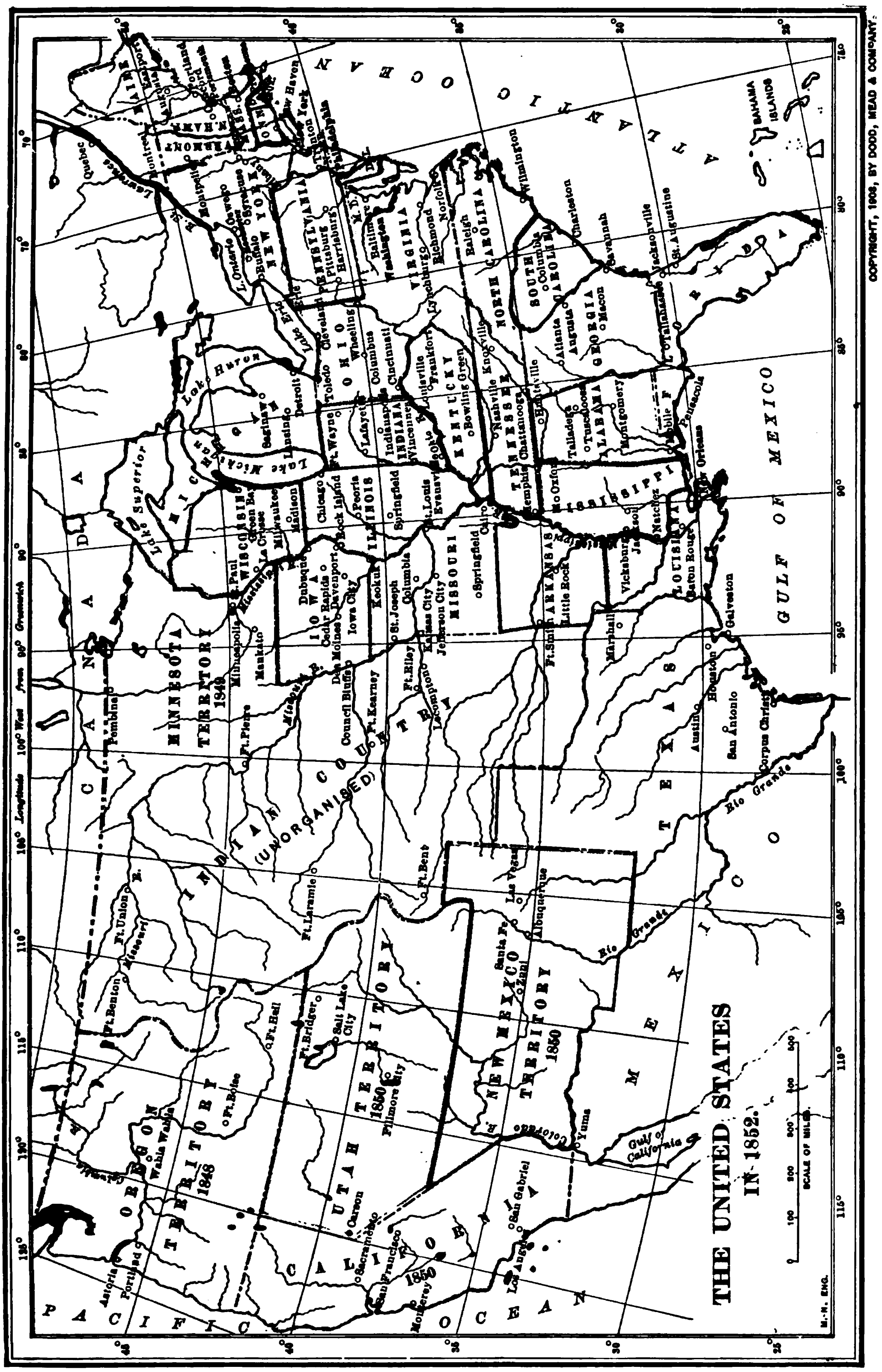
Soon after the beginning of Polk's administration United States troops under General Taylor were sent across the Nueces River to Corpus Christi, in territory then in dispute between the United States and Mexico, the United States claiming the Rio Grande as the boundary of Texas, and Mexico claiming the Nueces. In the meantime, both the Texan Congress (on June 18, 1845) and a convention of the people (on July 4th) had ratified the act of annexation, and on December 29th Texas formally entered the Union. Up to this date Mexico, being distracted by revolutions, had simply protested against the action of the United States and had recalled her Minister from Washington; but in the spring of 1846 the further advance of General Taylor toward the Rio Grande brought United States troops into conflict with the Mexicans, a small engagement taking place on April 24th. The Mexicans were then defeated at Palo Alto on May 8th, and on the following day at Resaca de la Palma. On May 11, 1846, news of the hostilities on April 24th having reached Washington, the President officially informed Congress of the occurrence and asked that war be declared. Both Houses responded to the message and to the awakened war spirit of the country by passing a bill (on May 13th) whose preamble began as follows: "Whereas, by the act of Mexico, a state of war exists between that Government and the United States"—a statement that provoked much criticism from the opponents of the Administration, as false, in view of the fact that hostilities had been precipitated by the military occupation of territory claimed by Mexico. The bill appropriated $10,000,000 for the prosecution of the war, and under it enlistment was actively begun. Volunteers to the number of 50,000 men were authorized. On May 23d Mexico formally declared war upon the United States. Whatever view one might take of the political aspect of the war, the brilliant series of victories aroused widespread enthusiasm and pride; as against forces that outnumbered them, sometimes four to one and not inferior in training, in a hostile country, and against formidable obstacles, both natural and artificial, the troops of Taylor and Scott won successive triumphs by the most splendid courage and the most stubborn fighting. For a detailed account, see MEXICAN WAR.

On February 2, 1848, peace was signed at Guadalupe Hidalgo (q.v.). Mexico resigned her claim to Texas, agreeing to the Rio Grande as the boundary, and also ceded New Mexico and Upper California to the United States for a payment of $15,000,000, the completion being thus attained of that great westward movement which had been going on since the Revolution.

Other important events of Polk's administration were the treaty with England (June 15, 1846) by which the long-disputed question of the northwest boundary was settled (see NORTHWEST BOUNDARY DISPUTE; OREGON); the so-called 'Tariff of 1846' (see TARIFF), which limited its purpose to the collection of revenues alone, without protection to native industries; the reënactment (1846) of the Independent Treasury Act; the introduction of the Wilmot Proviso (q.v.); the formation of the Free-Soil Party; the admission of Iowa (December 28, 1846); the establishment of the new Territory of Oregon without slavery, and the admission of Wisconsin (May 29, 1848). It was during Polk's term also that in 1848 gold was discovered in California, that the sewing machine was patented (1846) by Elias Howe, and that the use of anæsthetics was introduced in surgery. It was at this time that the great flood of Irish immigration consequent upon the potato famine of 1846 began.

The opposing candidates at the Presidential election of 1848 were Lewis Cass (q.v.), of Michigan, and William O. Butler, of Kentucky, Democrats, against General Zachary Taylor, of Louisiana, and Millard Fillmore, of New York, Whigs, the newly-organized Free-Soil Party (q.v.) nominating Martin Van Buren, of New York, and Charles Francis Adams, of Massachusetts. Taylor and Fillmore received 163 electoral votes, as against 127 cast for Cass and Butler, the Democratic vote being reduced by the support given by the Barnburners (q.v.) in New York to Van Buren.

XVI. ADMINISTRATION OF ZACHARY TAYLOR (1849-50) AND OF MILLARD FILLMORE (1850-53). *Cabinet.—Secretary of State,* John M. Clayton, Delaware, March 7, 1849; Daniel Webster, Massachusetts, December 6, 1852. *Secretary of the Treasury,* W. M. Meredith, Pennsylvania, March 8, 1849; Thomas Corwin, Ohio, July 23, 1850. *Secretary of War,* George W. Crawford, Georgia, March 8, 1849; Winfield Scott (ad interim), July



THE UNITED STATES IN 1852.

COPYRIGHT, 1906, BY DODD, MEAD & COMPANY.

23, 1850; Charles M. Conrad, Louisiana, August 15, 1850. *Secretary of the Navy,* William B. Preston, Virginia, March 8, 1849; William A. Graham, North Carolina, July 22, 1850; J. P. Kennedy, Maryland, July 22, 1852. *Secretary of the Interior,* Thomas H. Ewing, Ohio, March 8, 1849; A. H. H. Stuart, Virginia, September 12, 1850. *Attorney-General,* Reverdy Johnson, Maryland, March 8, 1849; John J. Crittenden, Kentucky, July 22, 1850. *Postmaster-General,* Jacob Collamer, Vermont, March 8, 1849; Nathan K. Hall, New York, July 23, 1850; S. D. Hubbard, Connecticut, August 31, 1852.

The course of American political history from the beginning of this administration down to the Civil War is marked by a gradual disintegration of the old Whig Party (q.v.), the increase in importance of the free-soil movement, culminating in the formation of the Republican Party, and the development of the Democratic Party into an organization whose foremost object, in so far as it was under the control of the Southern wing, was the maintenance of slavery and the perpetuation of the political power in the slave States. The increase of territory out of which new States might be created made the South anxious to prevent these new States from inhibiting slavery, as would probably be done in some of them, especially in California, if the question were left to the inhabitants. The contest began actively in 1846, while the acquisition of the land in question was still doubtful. In that year David Wilmot, a Representative from Pennsylvania, brought forward a resolution providing that slavery should be excluded from all territories that might be acquired from Mexico. This, commonly called the 'Wilmot Proviso,' was carried in the House of Representatives, but was defeated in the Senate. (See WILMOT PROVISO.) So fierce did the strife become that many of the most thoughtful statesmen began to fear secession or civil war. In this crisis Clay, now a man of seventy-two and in broken health, came forward in 1850 as a peacemaker. Like Webster, who now vigorously supported him, Clay had always held a moderate position between the two extreme parties in the slavery controversy. His proposal was that no legislation concerning slavery in California, about to be admitted as a State, and in the new Territories should be enacted by Congress. He also proposed that the slave trade should be abolished in the District of Columbia, but that a stricter law for the rendition of fugitive slaves should be enacted. In September, 1850, Clay's scheme, with important changes, was put into effect by Congress by the enactment of the so-called 'Compromise Measures of 1850.' The passage, however, of the new Fugitive Slave Law excited at the North feelings of repugnance and disgust; and several of the State Legislatures even passed laws, commonly known as 'Personal Liberty Laws,' intended especially for the protection of negroes. (See COMPROMISE MEASURES OF 1850; FUGITIVE SLAVE LAW.) Such incidents as the rescue of the negro named 'Jerry' at Syracuse, N. Y., and the increased activity of the 'Underground Railroad' (q.v.) emphasized the difficulty of the situation and embittered the feelings of the South.

President Taylor died on July 9, 1850. His successor, Millard Fillmore, strictly carried out the policy of his party. The Compromise Measures were approved by the new President and their final adoption caused a temporary lull in the contest over the question of slavery.

During this administration was concluded (April 19, 1850) the Clayton-Bulwer Treaty (q.v.), respecting an interoceanic canal.

In June, 1852, the two great parties made their Presidential nominations. The candidates of the Democracy were Franklin Pierce, of New Hampshire, and William R. King, of Alabama; the Whigs nominated General Winfield Scott, of Virginia, and William A. Graham, of North Carolina. Each of the leading parties adopted a platform which recognized the 'finality' of the Compromise of 1850. In August the Free-Soil Party nominated John P. Hale, of New Hampshire, and George W. Julian, of Indiana. The election resulted in the success of the Democratic ticket, which received 254 electoral votes, against 42 cast for the Whig nominees. The years of this administration were marked by the deaths of three of the most influential political leaders, Calhoun (March 31, 1850), Clay (June 29, 1850), and Webster (October 23, 1852).

XVII. ADMINISTRATION OF FRANKLIN PIERCE (1853-57). *Cabinet.—Secretary of State,* William L. Marcy, New York, March 7, 1853. *Secretary of the Treasury,* James Guthrie, Kentucky, March 7, 1853. *Secretary of War,* Jefferson Davis, Mississippi, March 7, 1853. *Secretary of the Navy,* James C. Dobbin, North Carolina, March 7, 1853. *Secretary of the Interior,* Robert McClelland, Michigan, March 7, 1853; Jacob Thompson, Mississippi, March 6, 1856. *Attorney-General,* Caleb Cushing, Massachusetts, March 7, 1853. *Postmaster-General,* James Campbell, Pennsylvania, March 7, 1853.

In spite of the 'finality' planks in the Presidential campaign, the question of slavery soon came once more to the front. The leader in reviving the struggle was Stephen A. Douglas (q.v.), by whom, in January, 1854, the Kansas-Nebraska Bill was introduced into Congress. This divided the territory previously known as Nebraska into two Territories, one between parallels 37° and 10° to be called Kansas and the other between 10° and 43° to be called Nebraska. In both of these Territories, by the Missouri Compromise of 1820, slavery was prohibited; but the bill now introduced was framed upon the theory that the Missouri Compromise had been repealed by the Compromise of 1850, in spirit at least, and accordingly in the bill it was left to the people of each new Territory to determine whether or not slavery should be tolerated on its soil. The Senate promptly passed this bill, and two months later it was passed by the House. (See KANSAS-NEBRASKA BILL; POPULAR SOVEREIGNTY.) This led to the final disruption of the old Whig Party. A new party, based on opposition to slavery, now arose in the North, whose members at first generally styled themselves 'Anti-Nebraska Men,' and which soon developed into the Republican Party (q.v.). It was composed of men opposed to the extension of slavery without regard to former party affiliations—Whigs, Democrats, Know-Nothings, and Free-Soilers. The bulk of the Southern Whigs for the time being became Know-Nothings. The so-called American Party, or Know-Nothings, who about this time began to exercise great influence, demanded especially more stringent naturalization laws and the election to high office of none but native-born citizens.

This virtual repeal of the Missouri Compromise, which left the new Territories to decide for themselves whether they would admit slavery or not, turned Kansas, as the Territory nearest the settled States, into a battleground for the two parties. The partisans of the North and those of the South kept pouring in fresh immigrants to outnumber the other side. At first the South was successful, and a code of laws was established with many and stringent provisions in behalf of slavery, although this was brought about, not by legitimate immigrants, but chiefly by a mob of Missourians, who passed across the border, took possession of the polling places, and carried the elections. A succession of outrages, amounting to civil war, followed, each faction establishing its own Government and electing its delegate to Congress. President Pierce issued a proclamation (February 11, 1856) calling for obedience to the laws and a cessation of violence and interference. Civil war, however, actually existed in Kansas. The two anti-slavery towns, Lawrence and Ossawattomie, were sacked, and the Free-Soil Legislature was twice dispersed. The outrages continued and no solution of the problem was reached during this administration. (See KANSAS.) In the meantime, public sentiment was excited to a still greater intensity by the assault upon Senator Charles Sumner (q.v.), of Massachusetts, by Preston S. Brooks (q.v.), of South Carolina (May 22, 1856).

In diplomacy during this administration friction arose between the United States and Austria over the Koszta affair (q.v.), and an important treaty was negotiated by Commodore Perry with Japan, by which intercourse was first opened between that country and the Western world.

In the Presidential election of 1856 the following tickets were in the field: Democratic, James Buchanan, of Pennsylvania, and John C. Breckenridge, of Kentucky; Republican, John C. Frémont, of California, and William A. Dayton, of New Jersey; Know-Nothing, Millard Fillmore, of New York, and A. J. Donelson, of Tennessee. The Democratic ticket received 174 electoral votes, the Republican 114, the Know-Nothing 8.

XVIII. ADMINISTRATION OF JAMES BUCHANAN (1857-61). *Cabinet.—Secretary of State*, Lewis Cass, Michigan, March 6, 1857; J. S. Black, Pennsylvania, December 17, 1860. *Secretary of the Treasury*, Howell Cobb, Georgia, March 6, 1857; Philip F. Thomas, Maryland, December 12, 1860; John A. Dix, New York, January 11, 1861. *Secretary of War*, John B. Floyd, Virginia, March 6, 1857; Joseph Holt, Kentucky, January 18, 1861. *Secretary of the Navy*, Isaac Toucey, Connecticut, March 6, 1857. *Secretary of the Interior*, Jacob Thompson, Mississippi, March 6, 1857. *Attorney-General*, J. S. Black, Pennsylvania, March 6, 1857; E. M. Stanton, Pennsylvania, December 20, 1860. *Postmaster-General*, Aaron V. Brown, Tennessee, March 6, 1857; Joseph Holt, Kentucky, March 14, 1859; Horatio King, Maine, February 12, 1861.

Two days after Buchanan's inauguration, the Supreme Court rendered its decision in the famous Dred Scott Case (q.v.), in which the majority of the justices held that Congress had no right to prohibit slavery in any Territory, and that slaves themselves were mere property whose secure possession in any Territory of the Union was guaranteed by the Constitution.

Events now succeeded one another with exciting rapidity. The sympathizers with the South had made various attempts to extend the area of slavery by the acquisition of Cuba. In 1854 the American ministers to England, France, and Spain met at the Belgian town of Ostend and there issued the so-called Ostend Manifesto (q.v.) to the effect that under certain contingencies the safety of the United States would demand the annexation of Cuba. Another attempt to acquire slave territory was through filibustering expeditions, the most famous of which were that of Lopez to Cuba in 1851 and that of William Walker (q.v.) from 1855 to 1858 to Central America. Even the reopening of the African slave trade began to be discussed.

In December, 1857, the pro-slavery party in Kansas held a convention at Lecompton and proceeded to impose slavery upon the future State by submitting to the voters the alternative of voting for the Constitution *with* slavery or the Constitution *without* slavery, the instrument itself, however, affirming the right to the ownership of slaves at the time within the Territory. The anti-slavery party, whose 'Topeka Constitution' had previously been disallowed by the Federal Government, generally abstained from voting, with the result that the Constitution *with* slavery was adopted. (See LECOMPTON CONSTITUTION.) A new Territorial Legislature with an anti-slavery majority ordered a new election, at which the Constitution was to be accepted or rejected. It was rejected (January, 1858). The National Congress passed a bill resubmitting the Lecompton Constitution to the vote of the people, its adoption to be followed by the immediate admission of Kansas as a State. They rejected it, and thus Kansas remained a Territory. In 1859 a new convention adopted another Constitution, known as the Wyandotte Constitution, prohibiting slavery, and this, being submitted to the people, was adopted by them. Kansas, however, was not admitted as a State until 1861. The controversy in Congress over the admission of Kansas under the Lecompton Constitution proved an event of momentous importance as leading up to the division of the Democratic Party in the Presidential campaign of 1860. Minnesota was admitted in May, 1858, and Oregon in February, 1859. In 1858 a marked impression was caused by the publication of Helper's *Impending Crisis*. (See HELPER, HINTON ROWAN.) In the following year occurred John Brown's raid on Harper's Ferry (q.v.). (See BROWN, JOHN). The South approached the campaign of 1860 with the conviction that there was no place for the South in an anti-slavery Union, and that the success of the Republicans, even though the Republican Party did not mean to interfere with slavery in the States, would mean an anti-slavery Union.

In the Presidential election of 1860 the situation was more complicated than ever before, and finally there appeared four tickets in the field. The Northern Democrats (see DEMOCRATIC PARTY) nominated Stephen A. Douglas, of Illinois, and Herschel V. Johnson, of Georgia; the Southern Democrats, who had seceded from the Democratic convention, nominated John C. Breckinridge, of Kentucky, and Joseph Lane, of Oregon; a third party, the so-called Constitutional Union Party (q.v.), composed of conservative members of the old Whig and Know-Nothing parties, especially powerful in the South, nominated John Bell, of Tennessee, and Edward Everett, of Massachusetts; while the Republicans (see REPUBLICAN PARTY) nominated Abraham Lincoln, of Illinois, and Hannibal Hamlin, of Maine. The Republican platform declared in favor of freedom in the Territories, a protective tariff, internal improvements, and a Pacific railway. In the ensuing election Lincoln received 180 electoral votes and was elected. He received every Northern vote in the electoral college, excepting three out of the seven cast by New Jersey. Breckinridge received 72 electoral votes of the South. Bell received the votes of Kentucky, Tennessee, and Virginia, 39 altogether. Douglas received only the nine votes of Missouri and three of the votes of New Jersey. The North and South were arrayed against each other, and the South was beaten. Of the popular vote, Lincoln received 1,866,452; Douglas, 1,375,157; Breckinridge, 847,953; Bell, 590,631. Thus while Lincoln gained an overwhelming majority of the electoral votes, the combined Democratic votes exceeded his by 366,821, and the popular votes against him all together exceeded his own by 947,289. In the Southern States alone, the combined vote of two of the 'Union' candidates, Douglas and Bell, exceeded the vote of the disunion candidate, Breckinridge.

There was some ground for the claim that Lincoln was a 'minority President,' but the true significance of the election was the fact that political power had finally departed from the South. The slave States were at last confronted by an overwhelming opposition. The following figures from the census of each decade up to 1860 show the gradual growth of the power of the free States, the figures given for the slave States including the slaves:

YEAR	Free States	Slave States
1790	1,968,453	1,961,374
1800	2,684,616	2,621,316
1810	3,758,910	3,480,902
1820	5,152,372	4,485,819
1830	7,006,399	5,848,312
1840	9,733,922	7,334,433
1850	13,599,488	9,663,997
1860	19,128,418	12,315,372

The South lost no time in acting upon what many of her leaders had declared would be the signal of her withdrawal from the Union. President Buchanan's administration witnessed the culmination of the conflict that had for years been waged between the Free States and the Slave States. It was during this administration that the leaders of the South appear to have definitely decided that the welfare of their section could not be satisfactorily conserved while the Southern States remained a part of the Federal Union. Ever since the foundation of the Government, the statesmen of the South had for the most part maintained that theory of the Federal Constitution which regarded the ultimate sovereignty as residing not in the nation as a whole, but rather in the individual States themselves, which this theory—the theory of Calhoun and Hayne—held to be supreme and independent commonwealths. According to the view prevalent at the South, these sovereign States had entered into a league of union with the other States for purposes of mutual advantage; and this partnership, like others, was to endure only as long as its original purpose was maintained with regard to all the members. Events seemed now to indicate that the time for the dissolution of the compact had arrived. In the first place, the balance of political power was passing rapidly into the hands of a party inimical to the interests of the South, a party pledged to the ultimate abolition of slavery and to a commercial system of protection which was peculiarly unfavorable to an agricultural community such as the South then was. The greatest statesmen of the South had often deplored the presence of the slaves as an economic and social evil; yet, inasmuch as slavery actually existed, the question appeared to them a practical one rather than a matter of speculative interest. The Abolitionists of the North had begun a crusade which, conducted with extreme bitterness and violence of denunciation, exasperated the South beyond measure. Men who believed thoroughly in the abstract wrongfulness of slavery indignantly took up its defense. The continual threats of the Southerners to destroy the Union, the violence to which so many of them were so ready to resort, as in the case of the assault upon Senator Sumner, and the high-handed proceedings that had marked the civil war in Kansas, all served to embitter and intensify the opposition at the North.

As soon as the result of the Presidential election was known, the Legislature of South Carolina ordered a State convention, which on December 20th unanimously declared that "the Union now subsisting between South Carolina and other States, under the name of the United States, is hereby dissolved." The example of South Carolina was followed by Mississippi, January 9, 1861; Florida, January 10; Alabama, January 11; Georgia, January 19; and later by Louisiana, Texas, Virginia, Arkansas, North Carolina, and Tennessee. Kentucky and Missouri were divided.

On February 4, 1861, delegates from seven seceding States met at Montgomery, Ala., and formed a provisional government, under the title of the Confederate States of America (q.v.). A provisional constitution was adopted similar in most respects to that of the United States, and the Government formally inaugurated, February 18, 1861, with Jefferson Davis, of Mississippi, as President, and Alexander H. Stephens, of Georgia, as Vice-President, and on May 24th, the seat of government was established at Richmond, Va. On the same day on which the Confederate delegates met at Montgomery a Peace Congress, in which twenty-one States were represented, assembled at Washington, but accomplished nothing. (See PEACE CONGRESS.) As State after State withdrew from the Union, its Senators and Representatives in Congress resigned their seats; and a large proportion of the officers of the army and navy of Southern birth, believing that their first and final allegiance was due to their State, and that the action of each State carried with it all its citizens, also resigned their commissions.

President Buchanan, denying his constitutional power to compel the seceding States to return to the Union, though he believed that secession was unconstitutional, made a feeble and ineffectual attempt to relieve the garrison at Fort Sumter, in Charleston Harbor, closely besieged by the forces of South Carolina. Commissioners were sent by South Carolina to Washington to arrange for a transfer to the State of United States property lying therein, and for a division of the national debt, but were not officially received. During all this time great efforts were made, but without result, to effect compromises of the difficulties. See Crittenden Compromise; Peace Congress.

Meanwhile, to the vacillation and incompetence of the President, the prompt and vigorous action of the Southern leaders formed a striking contrast. By their direction, armed forces were rapidly organized, United States arsenals and arms were seized, and batteries were planted for the reduction of such forts as threatened a firm resistance. In the last months, however, Buchanan's reorganized Cabinet showed a much more determined front.

Among the events of Buchanan's administration were the 'Mormon Rebellion' of 1857-58 (see Mormons; Mountain Meadows Massacre), the disastrous financial panic of 1857, the discovery of silver and petroleum in the United States, the Congressional investigation of President Buchanan's connection with the Lecompton Bill (see Covode Investigation), and the famous debates between Lincoln and Douglas. See Lincoln, Abraham.

XIX. and XX. Administrations of Abraham Lincoln (1861-1865) and of Andrew Johnson (1865-1869). *Cabinet.—Secretary of State,* William H. Seward, New York, March 5, 1861. *Secretary of the Treasury,* S. P. Chase, Ohio, March 5, 1861; W. P. Fessenden, Maine, July 1, 1864; Hugh McCulloch, Indiana, March 7, 1865. *Secretary of War,* Simon Cameron, Pennsylvania, March 5, 1861; Edwin M. Stanton, Pennsylvania, January 15, 1862; U. S. Grant (*ad interim*), August 12, 1867; Edwin M. Stanton (reinstated), January 14, 1868; J. M. Schofield, Illinois, May 28, 1868. *Secretary of the Navy,* Gideon Welles, Connecticut, March 5, 1861. *Secretary of the Interior,* Caleb P. Smith, March 5, 1861; John P. Usher, Indiana, January 8, 1863; James Harlan, Iowa, May 15, 1865; O. H. Browning, Illinois, July 27, 1866. *Attorney-General,* Edward Bates, Missouri, March 5, 1861; Titian J. Coffee, June 22, 1863; James Speed, Kentucky, December 2, 1864; Henry Stanbery, Ohio, July 23, 1866; William M. Evarts, New York, July 15, 1868. *Postmaster-General,* Montgomery Blair, Maryland, March 5, 1861; William Dennison, Ohio, September 24, 1864; Alexander W. Randall, Wisconsin, July 25, 1866.

On March 4, 1861, President Lincoln was inaugurated at Washington. In his inaugural address, he said: "I have no purpose, directly or indirectly, to interfere with the institution of slavery in the States where it exists. I believe that I have no lawful right to do so, and I have no inclination to do so." He also said, however: "The Union of these States is perpetual," and "No State upon its own mere motion can lawfully get out of the Union." The tension at the time was extreme, and was not lessened by the vigorous efforts at conciliation which marked the first month of his administration; and the feelings of the whole Northern people were inflamed by the bombardment April 12th-13th and the enforced surrender on April 14th of Fort Sumter, in Charleston Harbor. (See Fort Sumter.) On April 15th President Lincoln called for 75,000 'three months' volunteers, large numbers of whom were in a few days marching to the defense of Washington. After the battle of Bull Run on July 21st (see Bull Run, First Battle of), Congress voted to call out 500,000 men.

On January 1, 1862, the United States had about 576,000 men in the field, and the Confederates had about 350,000. For an account of the military operations, see Civil War and separate articles on the various battles; and for an account of the Confederacy, see Confederate States of America.

On July 1, 1862, the President called for 300,000 three years' men, and on August 4th for 300,000 nine months' militia for the Federal Army. The United States Congress passed an act on August 6, 1861, freeing all slaves used by Confederates in military operations in the Confederacy; in April, 1862, purchased and emancipated all slaves in the District of Columbia; and on June 9, 1862, abolished slavery throughout the public domain. On January 1, 1863, President Lincoln issued a proclamation in pursuance of a prior proclamation issued on September 22, 1862, after the battle of Antietam (q.v.), declaring the freedom of all the slaves in the rebellious States. (See Emancipation Proclamation.) The suspension of the writ of habeas corpus (q.v.), the frequent seizure of newspapers, the dispersion of public meetings, and the imprisonment without trial of opponents of the Government of the North, were generally recognized as essential to the security of the nation, although the introduction of such practices gave rise to sharp criticism of the Administration and furnished the opponents of its policy with ample opportunity for partisan attacks. (See Vallandigham, C. L.; and Milligan, *ex parte.*) The unanimity of the North was also somewhat affected by great peace-meetings, while the disturbed state of the public feeling was greatly increased by the terrible draft riots in New York, in July, 1863. (See Draft Riots.) Business conditions became unstable, inasmuch as many banks had been forced to suspend specie payments, the paper money of the United States having largely depreciated. Nevertheless, the strength of the Government was not seriously impaired, the appropriations of Congress in 1863 amounting to $972.-000,000. The Confederates were cut off from all foreign aid, except such as could come to them through the blockade, and their own resources, both of men and material, gradually became exhausted. The Southern railways had been in large measure destroyed or seized by the Federal troops, and it became difficult to transport supplies and to feed armies, while the North had the additional advantage of command of the sea and access to foreign markets.

In January, 1864, the United States had nearly 975,000 men raised and provided for; the entire Confederate forces probably numbered about 470,000. On April 9, 1865, the main Confederate army, under General Lee, surrendered to General Grant at Appomattox Court-House. On April 26th General Johnston surrendered to General Sherman in North Carolina; and with the surrender of Kirby Smith in Texas, on May 26th, the war was over.

In 1864 Lincoln had been reëlected President and Andrew Johnson, of Tennessee, elected Vice-President. The Democratic party had nominated General George B. McClellan, of New Jersey, and George H. Pendleton, of Ohio, on a platform which declared the conduct of the war a failure. Lincoln received 212 electoral votes, and McClellan 21, though the disparity between the popular votes was relatively much less, Lincoln receiving (counting the votes cast by soldiers in the field) 2,330,552 and McClellan 1,835,985. Only New Jersey, Delaware, and Kentucky were carried by the Democrats. West Virginia had been admitted to the Union, December 31, 1862. See West Virginia.

On April 14, 1865, while the North was rejoicing over the capture of Richmond and the surrender of General Lee, President Lincoln was assassinated at Ford's Theatre in Washington, by John Wilkes Booth (q.v.), while an accomplice attacked and severely injured Seward, the Secretary of State. Andrew Johnson thus became President.

The Thirteenth Amendment to the Constitution, forever abolishing slavery in the States and Territories of the Union, was declared ratified by two-thirds of the States, December 18, 1865.

The termination of the war imposed upon Congress and the Executive the duty of reconstructing the governments of the States that had seceded. This now became the most important question before the National Government, and for a decade dominated national politics. During Johnson's administration it involved a bitter struggle between the President and Congress, which culminated in the resolution of the House of Representatives, February 24, 1868, to impeach him "of high crimes and misdemeanors." (See Johnson, Andrew; Reconstruction.) The immediate occasion of the passage of this resolution was the course of President Johnson in violating the "Tenure of Office Act" (q.v.), which made requisite the consent of the Senate to removals from office by the President, and of which Congress availed itself to prevent the removal of Stanton from the position of Secretary of War. The Senate acted as the court of impeachment, and on March 23, 1868, the Chief Justice presiding, proceeded to try Andrew Johnson on eleven articles of impeachment. The result was his acquittal, the prosecution lacking the necessary two-thirds majority. It was not until 1868 that the States of Arkansas, Alabama, Florida, North and South Carolina, Georgia, and Louisiana were readmitted into the Union. On March 1, 1867, Nebraska had been admitted as a new State. About the same time Alaska was sold to the United States by Russia.

At the election of 1868 the Republican candidates were Ulysses S. Grant, of Illinois, and Schuyler Colfax, of Indiana. The Democrats nominated Horatio Seymour, of New York, and Francis P. Blair, Jr., of Missouri. Grant and Colfax received 214 electoral votes, and Seymour and Blair 80, the Democrats having carried nine States. On February 26, 1869, the Fifteenth Amendment to the Constitution, guaranteeing the right of suffrage without regard to race, color, or previous condition of servitude, passed Congress and was ratified March 30, 1870.

XXI. and XXII. Administration of Ulysses S. Grant (1869-1877). *Cabinet.—Secretary of State*, E. B. Washburne, Illinois, March 5, 1869; Hamilton Fish, New York, March 11, 1869. *Secretary of the Treasury*, George S. Boutwell, Massachusetts, March 11, 1869; William A. Richardson, Massachusetts, March 17, 1873; Benjamin H. Bristow, Kentucky, June 2, 1874; Lot M. Morrill, Maine, June 21, 1876. *Secretary of War*, John A. Rawlins, Illinois, March 11, 1869; William T. Sherman, Ohio, September 9, 1869; William W. Belknap, Iowa, October 25, 1869; Alphonso Taft, Ohio, March 8, 1876; J. D. Cameron, Pennsylvania, May 22, 1876. *Secretary of the Navy*, Adolph E. Borie, Pennsylvania, March 5, 1869; George M. Robeson, New Jersey, June 25, 1869. *Secretary of the Interior*, Jacob D. Cox, Ohio, March 5, 1869; Columbus Delano, Ohio, November 1, 1870; Zachariah Chandler, Michigan, October 19, 1875. *Attorney-General*, E. R. Hoar, Massachusetts, March 5, 1869; Amos T. Akerman, Georgia, June 23, 1870; George H. Williams, Oregon, December 14, 1871; Edwards Pierrepont, New York, April 26, 1875; Alphonso Taft, Ohio, May 22, 1876. *Postmaster-General*, J. A. J. Creswell, Maryland, March 5, 1869; Marshall Jewell, Connecticut, August 24, 1874; James M. Tyner, Indiana, July 12, 1876.

One of the most important events of President Grant's administration was the meeting of the Joint High Commission, appointed to consider the *Alabama* case (see Alabama Claims), and which concluded the Treaty of Washington (q.v.), ratified by the Senate May 24, 1871.

Among other notable occurrences during this administration was the completion in May, 1869, of the Union and Central Pacific railroads, begun in 1865, providing a continuous line of railway from the Missouri to the Pacific, and completing the transcontinental system. Out of the connection of the Government with the construction of these roads—the Government having given valuable subsidies in land and money to the constructing companies—arose the Crédit Mobilier scandal, which involved the reputation of many prominent officials and members of Congress. (See Crédit Mobilier of America.) The enmity of the white population of the Southern States toward the freedmen, particularly in regard to the exercise by the latter of their newly acquired right of suffrage, attracted public attention, 1868-72, until Congress intervened by legislation in the form of the so-called Force Act of April, 1870. (See Ku Klux Klan; Reconstruction.) Disputes arose in several of the States over contested elections, and the President intervened in Louisiana in 1872-73, by sending Federal troops to that State, to bring about an adjustment of the difficulty, the troops supporting the Republican candidate for Governor and installing him in office. (See Louisiana.) In this and other instances, as well as in the suppression of the Ku Klux Klan, the President was considered by many to have acted with undue severity toward the South. A movement was made by the Government at the desire of President Grant in the direction of the acquisition of San Domingo, the people of that country desiring annexation to the United States, but the project was defeated in the Senate. In March, 1871, the first steps were taken toward the reform of the civil service by a bill authorizing the President to appoint a board of Civil Service Commissioners to provide for the appointment of applicants for minor offices on the basis of an examination.

During General Grant's first administration a new party arose as the result of a reaction against the extreme centralization of power in the Federal Government due to the exigencies of war. This party was known as the Liberal Republican Party, and numbered among its adherents some of the most prominent names in the old Republican Party, such as Horace Greeley (q.v.), Charles Francis Adams, Charles Sumner, and Carl Schurz. This party nominated, in 1872, Horace Greeley, of New York, for President, and B. Gratz Brown, of Missouri, for Vice-President, on a platform deprecating any further interference by the Government in the local affairs of the South. (See Liberal Republican Party; Republican Party.) This ticket was ratified by the convention of the Democratic Party held in the same year. The Republicans renominated General Grant, with Henry Wilson (q.v.), of Massachusetts, for Vice-President. The Republican ticket received 286 electoral votes, against 66 scattering, Greeley having died before the Electoral College met. Of the popular votes Grant received 3,597,132, Greeley 2,834,125. In this election appeared for the first time the Prohibition Party and a Labor Reform Party, the latter being an expression of a significant movement among workingmen which began during this administration, and led in 1869 to the first attempt in the United States to organize on a permanent basis all kinds of manual labor. The votes of Louisiana and Arkansas and three votes from Georgia were not counted.

A serious difficulty with Spain arose because of the seizure on October 31, 1872, by the Spanish steamer *Tornado* of the *Virginius*, a filibustering vessel flying the American flag, and the execution of part of her crew. See Virginius Massacre.

In 1873-74 the party known as 'Grangers' or 'Patrons of Husbandry' (see Grange) rose into some prominence; an act for the resumption in 1879 of specie payment was passed in January, 1875; and an extensive 'Whisky Ring' involving a corrupt association among distillers and Federal officers to defraud the Government of the tax on liquors was exposed in the same year. (See Whisky Ring.) A new coinage act, since denounced by advocates of free silver as the 'crime of 1873,' was passed providing for the coinage of gold and of fractional silver currency; an act known as the 'salary grab' was passed in 1873; and much local disorder occurred in the Southern States between the so-called 'carpet-bag' governments and the white citizens, Grant interfering in what many considered a harsh and arbitrary manner. During Grant's second administration occurred the disastrous financial panic of 1873. A movement for the inflation of the paper currency was set on foot, and was checked by President Grant through his veto of the so-called Inflation Bill, which had been passed by Congress. This administration was disturbed by wars with the Modocs and Sioux, the latter of whom overwhelmed General Custer's command in 1876. (See Custer, George A.) In Philadelphia, between May and November, 1876, was held a mammoth exposition to commemorate the centennial of American independence. See Centennial Exhibition.

With Grant's administration of affairs much dissatisfaction was felt throughout the country, owing to corruption on the part of high Government officials. Before the close of his first term there were many signs of reaction against Republican rule, and the organization of the Liberal Republican Party showed the disaffection of a considerable element in the Republican Party itself. By the close of his second term a well-defined and powerful opposition had arisen, based primarily on the President's apparent severity toward the South; on legislative scandals, such as the Crédit Mobilier affair and the 'salary grab' scandal in Congress; the Whisky Ring scandal and the impeachment for corruption in distributing patronage of Belknap, Secretary of War, who resigned rather than submit to a trial; and on alleged general administrative demoralization, caused in part at least by the President's appointment, upon the advice of political leaders, of a number of unfit officials. Further discontent was caused by the consequences of the disastrous panic of 1873, for which, as was inevitable, the Administration was held by many in a measure accountable. Many 'War Democrats,' moreover, who had lent their support to the Republican Party when the prosecution of the war was the all-absorbing issue, now began to return to their old party affiliations, and to emphasize issues different from those immediately involved in the Republican war policy.

Colorado was admitted as a State, August 1, 1876. In 1876 the Republican candidates were Rutherford B. Hayes, of Ohio, and William A. Wheeler, of New York; the Democratic candidates were Samuel J. Tilden, of New York, and Thomas A. Hendricks, of Indiana. On the face of the returns, Tilden and Hendricks seemed to have 184 electoral votes, to 172 for Hayes and Wheeler, with the votes of Florida, South Carolina, and Louisiana, and one vote of Oregon in doubt. Charges were made of fraudulent voting in several States; party feeling ran so high as to suggest the possibility of acts of violence to secure control of the Government; and all the attendant circumstances made the struggle one of the most momentous since the foundation of the Government. Hayes and Wheeler were finally declared elected by an Electoral Commission chosen from both Houses of Congress and from the Supreme Court of the United States, whose decision was accepted by all concerned as final and irrevocable. (See Electoral Commission.) As thus finally decided 185 electoral votes were given to Hayes and Wheeler and 184 votes to Tilden and Hendricks.

XXIII. Administration of Rutherford B. Hayes (1877-1881). *Cabinet.—Secretary of State*, William M. Evarts, New York, March 12, 1877. *Secretary of the Treasury*, John Sherman, Ohio, March 8, 1877. *Secretary of War*, George W. McCrary, Iowa, March 12, 1877; Alexander Ramsey, Minnesota, December 12, 1879. *Secretary of the Navy*, Richard W. Thompson, Indiana, March 12, 1877; Nathan Goff, Jr., West Virginia, January 6, 1881. *Secretary of the Interior*, Carl Schurz, Missouri, March 12, 1877. *Attorney-General*, Charles Devens, Massachusetts, March 12, 1877. *Postmaster-General*, David M. Key, Tennessee, March 12, 1877; Horace Maynard, Tennessee, August 25, 1880.

The early portion of this administration was made memorable by the troubles in South Carolina and Louisiana, where rival State governments, each claiming to be legally elected, contended for supremacy. In the former State the difficulty was settled by President Hayes, who ordered the withdrawal of the United States troops which had been stationed at Columbia, and had been an objectionable feature of the contest; whereupon the Republican Governor, Chamberlain, retired, and General Wade Hampton took peaceful possession of the office. A settlement was also effected in Louisiana, a commission being sent thither by the President, when the Democratic Governor, Nichols, was enabled to gain possession of his seat, the Federal troops being in this instance also withdrawn from New Orleans. This marked the end of Federal interference in the local concerns of the Southern States, an interference that had become yearly more objectionable to moderate men at the North, who no longer cherished the animosities resulting from the Civil War. See RECONSTRUCTION.

This year was further noteworthy by the occurrence, in July, of the railroad strikes and riots which prevailed throughout the country, to the injury of business, and with serious loss of property. (See STRIKES.) The excitement occasioned by the near approach of the period fixed by Congress for the resumption of specie payments led to the formation of a party opposed to the prevailing sentiment with regard to financial questions. Such a party was organized in Toledo, Ohio, February 22, 1878, under the name of the National Party, delegates being present from 28 States; its principles included bimetallism, the suppression of national bank issues, a graduated income tax, and opposition to Chinese labor. In the State elections of the same year this party, which became popularly known as the Greenback Party (q.v.), polled upward of a million votes.

In February, 1878, the dissatisfaction which had been felt by the advocates of silver coinage with the act of 1873 suspending the coinage of silver, except for subsidiary coins, found expression in the passage by Congress, over the President's veto, of the so-called Bland-Allison Bill, which provided for the annual purchase by the Secretary of the Treasury of at least two million dollars' worth* of silver bullion to be coined into legal-tender dollars, each containing 412½ grains of standard silver. On January 1, 1879, specie payments were resumed throughout the United States, after a suspension of seventeen years, and in accordance with the act of Congress approved January 14, 1875, the process of resumption being effected without excitement.

An extraordinary movement northward of the colored population from certain of the Southern States took place in 1879 and was the source of much uneasiness among the planters. (See NEGRO EXODUS.) This year also saw the decline and fall of the labor agitation in San Francisco, which under the leadership of Denis Kearney (q.v.) had been continued with great virulence since 1877.

On June 2, 1880, the Republican National Convention met in Chicago to nominate candidates for President and Vice-President. The names most prominent before this convention were those of Ulysses S. Grant, James G. Blaine, and John Sherman. The final choice, however, was James A. Garfield, of Ohio, with Chester A. Arthur, of New York, for Vice-President. On June 11th the Greenback national convention met in Chicago and nominated for President James B. Weaver, who was afterward accepted as the candidate of the Socialist party. On June 22d the Democratic National Convention assembled at Cincinnati, Ohio, and nominated Winfield S. Hancock, of Pennsylvania, and William H. English, of Indiana. The result of the election was the choice of Garfield and Arthur, who received 214 electoral votes, against 155 votes cast for Hancock and English.

XXIV. ADMINISTRATION OF JAMES A. GARFIELD (1881) AND OF CHESTER A. ARTHUR (1881-1885). *Cabinet.—Secretary of State*, James G. Blaine, Maine, March 5, 1881; Frederick T. Frelinghuysen, New Jersey, December 12, 1881. *Secretary of the Treasury*, William H. Windom, Minnesota, March 5, 1881; Charles J. Folger, New York, October 27, 1881. *Secretary of War*, Robert T. Lincoln, Illinois, March 5, 1881. *Secretary of the Navy*, W. H. Hunt, Louisiana, March 5, 1881; William E. Chandler, New Hampshire, April 12, 1882. *Secretary of the Interior*, S. J. Kirkwood, Iowa, March 5, 1881; Henry M. Teller, Colorado, April 6, 1882. *Attorney-General*, Wayne MacVeagh, Pennsylvania, March 5, 1881; Benjamin H. Brewster, Pennsylvania, December 16, 1881. *Postmaster-General*, Thomas L. James, New York, March, 5, 1881; Timothy O. Howe, Wisconsin, December 20, 1881; W. Q. Gresham, Indiana, April 3, 1883; Frank Hatton, Iowa, October 14, 1884.

The politicians in the Republican Party who had favored the election of General Grant for a third term of the Presidency, popularly known, particularly in New York, as 'Stalwarts,' had not been pleased with the nomination of Garfield, and in the Presidential campaign they had been induced to give his candidacy their support only on a general understanding that the candidate if successful would give them a liberal share of patronage. The new President had in various ways shown his desire to conciliate both wings of the party; he had held many conferences with the leaders of each, and his first nominations were apparently dictated by a desire to conciliate the 'Stalwarts.' But his appointment of William H. Robertson, who had been instrumental in securing the President's nomination at Chicago, to the post of Collector of the Port of New York, aroused the opposition of the Senator from that State, Roscoe Conkling (q.v.), a leading 'Stalwart.' Finding that his opposition was ineffectual, Conkling and his colleague, Thomas C. Platt (q.v.), resigned their seats in the Senate, May 16, 1881, and appealed to the New York Legislature for reëlection as a justification of their course. The appeal was unsuccessful and a bitter contest, lasting until the latter part of July, ended with the election of Miller and Lapham to the Senate. Meanwhile the President's appointments had been confirmed. The new Postmaster-General had discovered colossal frauds in the Star Route Service of the Postal Department, and an effort was made to bring the criminals to justice. (See STAR-ROUTE FRAUDS.) The diplomacy of Secretary Blaine in regard to the war between Chile and Peru and the Panama Canal (q.v.) excited considerable newspaper criticism.

---

* He could buy as much as four million dollars' worth if he so desired.

On July 2d President Garfield was shot by an assassin, a disappointed office-seeker, Charles J. Guiteau, and after lingering for seventy-nine days between life and death died, on September 19th, at Elberon, N. J. (See GARFIELD, JAMES A.) On the same day in New York, Vice-President Arthur took the oath of office as President.

Among the national events of 1882 were the passage by Congress of the Anti-Polygamy Bill, March 22d; the Apportionment Bill, increasing the number of Congressional Representatives to 325; and the Anti-Chinese Bill, suspending Chinese immigration for twenty years. The last was vetoed by the President, who, however, signed a subsequent bill limiting the term of suspension to ten years. Among the several State elections of this year, one at least had a national significance. In New York the lukewarmness of that wing of the Republican Party which had sympathized with General Garfield in his contest with the leaders of the faction to which Arthur was allied, and the indignation of the 'Independents' at the political methods pursued by President Arthur to secure the nomination and election of his friend, Charles J. Folger, as Governor of the State, resulted in the election of the Democratic candidate, Grover Cleveland (q.v.), by the immense majority of 192,000 votes. The victory of the Democrats in Pennsylvania was also looked upon as to some extent a rebuke of the Administration, and especially of machine methods in politics. The question of civil-service reform was now pressed with renewed eagerness by its advocates; and the so-called Pendleton Bill, which had already passed the Senate, passed the House in January, 1883, and was signed by the President. See CIVIL-SERVICE REFORM.

The Republican National Convention of 1884 met in Chicago during the first week of June and the fourth ballot resulted in the nomination of James G. Blaine (q.v.) for the Presidency, and of John A. Logan, of Illinois, for the Vice-Presidency. The nomination of Blaine was secured in spite of bitter organized opposition of the 'Independent' faction in the Republican Party, popularly known as 'Mugwumps' (q.v.). The papers which represented the views of the 'Independents' withheld their support from Blaine, and indicated that they would cast their influence on the side of the Democratic candidate, in case some statesman of tried incorruptibility were chosen by the Democratic convention. It was generally understood that either Grover Cleveland or Thomas F. Bayard would be acceptable to them. When the convention met in July these two were the leading candidates on the first ballot. On the second ballot Cleveland secured the necessary two-thirds majority, and was declared the nominee. Thomas A. Hendricks, of Indiana, was nominated for Vice-President. Tickets were put in the field by the Prohibitionists (see PROHIBITION), who nominated John P. St. John, of Kansas, for President, and William Daniel, of Maryland, for Vice-President; and by the Anti-Monopoly and Greenback Labor parties, both of which nominated Gen. Benjamin F. Butler (q.v.), of Massachusetts, for President. The campaign which followed developed unusual excitement, party rancor, and personal recrimination. The election was unexpectedly close, and the result for a few days hung in doubt over conflicting returns in the pivotal State of New York; but the official count gave a plurality of 1047 to Cleveland, who received 219 electoral votes, while Blaine received 182, and a popular vote of 4,874,986, while Blaine received 4,851,981. St. John had a popular vote of 150,369, and Butler a popular vote of 175,370.

XXV. ADMINISTRATION OF GROVER CLEVELAND (1885-89). *Cabinet.—Secretary of State,* Thomas F. Bayard, Delaware, March 6, 1885. *Secretary of the Treasury,* Daniel Manning, New York, March 6, 1885; Charles S. Fairchild, New York, April 1, 1887. *Secretary of War,* William C. Endicott, Massachusetts, March 6, 1885. *Secretary of the Navy,* William C. Whitney, New York, March 6, 1885. *Secretary of the Interior,* Lucius Q. C. Lamar, Mississippi, March 6, 1885; William F. Vilas, Wisconsin, January 16, 1888. *Attorney-General,* Augustus H. Garland, Arkansas, March 6, 1885. *Postmaster-General,* William F. Vilas, Wisconsin, March 6, 1885; Don M. Dickinson, Michigan, January 16, 1888.

Cleveland was the first Democratic President to be chosen after the election of 1856. His administration from the outset was marked by a general application to the public service of the principles so long advocated by the friends of civil-service reform, the President applying the principles of the Pendleton Bill (see CIVIL-SERVICE REFORM) to many offices not specifically covered by the act. For the first time in half a century no sweeping changes were made in the public service on the accession to power of a new party.

In 1886 a bill passed Congress to regulate the succession to the Presidential office—a question that assumed some special importance on the death of Vice-President Hendricks. Among the important Congressional acts of this Administration were the new Anti-Polygamy or the Edmunds-Tucker Act (1887) dissolving the Mormon Church as a corporate body, and confiscating all the property of that Church in excess of $50,000; the Interstate Commerce Act (q.v.) of 1887; and an act (1888) absolutely prohibiting further immigration of the Chinese. With respect to legislation President Cleveland's administration was characterized by an unprecedented number of Presidential vetoes, the number aggregating more than 300, mostly of pension bills.

In December, 1887, President Cleveland sent to Congress a message devoted to the single question of the tariff. After stating that the estimated surplus in the Treasury in June, 1888, would be fully $140,000,000, he declared the existing tariff laws to be the source of unnecessary taxation, and asked for a reduction of the duties on raw materials, especially on wool. In accordance with this recommendation, the so-called Mills Bill was introduced and passed the House. It removed duties aggregating $50,000,000 per annum, but failed to pass the Senate, which was Republican. At this session of Congress the largest appropriation for rivers and harbors ever known was made. It amounted to $22,227,000, and became law without the President's signature.

At the Democratic Convention of 1888, Cleveland was nominated for President, with Allen G. Thurman, of Ohio, as the candidate for Vice-President. The Republicans nominated Benjamin Harrison, of Indiana, and Levi P. Morton, of New York. The Prohibition Party put forward as its candidates Clinton B. Fisk, of New Jersey, and John A. Brooks, of Missouri. The campaign was fought out largely on the tariff questions raised by Cleveland's message of 1887, and resulted in the choice of the Republican candidates, who received 233 electoral votes, as against 168 cast for the Democratic nominees, the popular vote for Cleveland, however (5,540,329), exceeding that of Harrison (5,439,853). The Prohibition ticket received 249,406 votes, and the Union Labor candidate, Alson J. Streeter, 146,935 votes.

XXVI. Administration of Benjamin Harrison (1889-93). *Cabinet.—Secretary of State,* James G. Blaine, Maine, March 7, 1889. *Secretary of the Treasury,* William Windom, Minnesota, March 7, 1889; Charles Foster, Ohio, February 21, 1891. *Secretary of War,* Redfield Proctor, Vermont, March 7, 1889. *Attorney-General,* W. H. H. Miller, Indiana, March 7, 1889. *Postmaster-General,* John Wanamaker, Pennsylvania, March 7, 1889. *Secretary of the Navy,* Benjamin F. Tracy, New York, March 7, 1889. *Secretary of the Interior,* John W. Noble, Missouri, March 7, 1889. *Secretary of Agriculture,* Jere M. Rusk, Wisconsin, March 7, 1889.

The administration of Harrison witnessed a remarkable growth of public interest in the foreign relations of the United States, both commercially and otherwise. One cause of this is to be found in the meeting of the so-called Pan-American Congress at Washington, October 21, 1889, under the presidency of Secretary Blaine, which did much to foster a popular sentiment in favor of commercial reciprocity between the United States and the other American republics. This policy, warmly advocated by Blaine, found expression in the so-called 'reciprocity section' of the important bill for the revision of the tariff prepared by William McKinley (q.v.), of Ohio, which passed both Houses of Congress and became a law October 1, 1890. (For other provisions of the bill, see Tariff.) Under this section reciprocity treaties were early negotiated with Brazil and Spain, and the principle was thereafter strikingly developed.

Several diplomatic difficulties of more or less seriousness had arisen between the United States and foreign Powers within a few years. Among these had been complications growing out of a state of anarchy on the Isthmus of Panama, the United States Government, in accordance with its treaty obligations, being required to send an armed force to protect the Isthmus. A dispute with Germany over the Samoan Islands (q.v.) in 1889 had also taken a serious aspect, though finally arranged in an amicable manner by a treaty signed at Berlin (February 4, 1890). A serious disagreement with England also arose in 1890-91 regarding the rights of this country acquired in Bering Sea by our treaty with Russia, and was referred to arbitration in 1891. The question was finally settled in 1893. (See Bering Sea Controversy.) The lynching of several Italians by a mob in New Orleans, in 1891, led to something like a diplomatic rupture with Italy, which recalled its Minister from Washington. In October, 1891, difficulties arose with Chile in consequence of a murderous assault upon American seamen in Valparaiso.

In November, 1889, four States, North Dakota, South Dakota, Montana, and Washington, were admitted into the Union. On May 2, 1890, the new Territory of Oklahoma (q.v.) was organized, and Idaho (July 3d) and Wyoming (July 11th) were admitted as States. Other events of importance during Harrison's administration were the passage in 1890 of the Dependent Pension Bill, which nearly doubled the number of pensioners; the repeal of the Bland-Allison Silver Coinage Act; the passage of the Sherman Silver Purchase and Coinage Act, requiring the Secretary of the Treasury to purchase 4,500,000 ounces of silver each month and to coin 2,000,000 ounces into silver dollars each month until July 1, 1891; and the labor disturbances at Homestead, Pa.

The close of Harrison's administration witnessed a serious financial panic. An event of international importance was the overthrow of the monarchy in Hawaii by the foreign residents, and the application made by the new Government for annexation of the islands to the United States. The President sent a treaty of annexation to the Senate (February, 1893), but it was not acted upon. See Hawaiian Islands.

The conventions of the two great political parties had been held in June, 1892. The Democrats nominated Grover Cleveland, of New York, for the Presidency, and Adlai E. Stevenson, of Illinois, for the Vice-Presidency. The Republican Convention renominated President Harrison for the Presidency and selected Whitelaw Reid, of New York, for the Vice-Presidency. The People's Party, or Populists, nominated General J. B. Weaver, of Iowa, and James G. Field, of Virginia. The ensuing campaign was largely conducted on the question of the tariff, and resulted in the election of Cleveland and Stevenson, who received 277 electoral votes, as against 145 for Harrison and Reid, and 22 for Weaver and Field.

XXVII. Second Administration of Grover Cleveland (1893-97). *Cabinet.—Secretary of State,* Walter Q. Gresham, Indiana, March 6, 1893; Richard Olney, Massachusetts. *Secretary of the Treasury,* John G. Carlisle, Kentucky, March 6, 1893. *Secretary of War,* Daniel S. Lamont, New York, March 6, 1893. *Secretary of the Navy,* Hilary A. Herbert, Alabama, March 6, 1893. *Secretary of the Interior,* Hoke Smith, Georgia, March 6, 1893. *Attorney-General,* Richard Olney, Massachusetts, March 6, 1893; Judson Harmon, Ohio. *Postmaster-General,* Wilson S. Bissell, New York, March 6, 1893; William L. Wilson, West Virginia, March 1895. *Secretary of Agriculture,* J. Sterling Morton, Nebraska, March 6, 1893.

In his second administration the President applied himself particularly to the promotion of tariff and financial reforms, and this period was marked by the intense and persistent opposition of his own party in both Houses of Congress. His earliest act of importance was the withdrawal from the Senate of the treaty for the annexation of Hawaii to the United States, which had been negotiated in the closing days of the previous administration. He also sent James H. Blount, ex-Congressman from Georgia, to Hawaii as a special commissioner to investigate the circumstances of the overthrow of the royal Government, and, on his report, took the ground that the United States Government had through its representatives committed a grievous wrong against the kingdom. See HAWAIIAN ISLANDS.

The legislation on the tariff was the most important domestic incident of this term. A new bill, bearing the name of Chairman Wilson, of the House Committee on Ways and Means, and providing for free raw sugar, free wool, free coal, free lumber, and free iron ore, and reducing the duties on many articles in the existing schedules, was introduced December 19, 1893. In the following month a measure providing for an income tax was presented in the House, and that and others concerning the internal revenue were incorporated in the bill during the subsequent debate. When the bill reached the Senate it underwent radical alterations, many amendments being made, notably those imposing a duty on sugar, coal, and iron ore, and the House at first refused to concur in the Senate amendments. Finally, however, it withdrew from its position of non-concurrence and the bill was passed. (See TARIFF.) The President allowed the bill to become a law without his signature. On an appeal to the United States Supreme Court, that body, April 2, 1893, declared two provisions of the income-tax law unconstitutional, and upheld the remainder by a tie vote, and on May 20th, on a rehearing, declared the whole measure unconstitutional.

Early in the term occurred the great commercial panic of 1893, which was followed by a long period of depression. President Cleveland was determined to maintain the gold standard, and in the summer of that year called an extra session of Congress in order to secure the repeal of the Sherman Act of 1890. This he accomplished in the face of great opposition. In January, 1894, because of the heavy withdrawal of gold coin from the Treasury and the large reduction in the gold reserve of $100,000,000, Secretary Carlisle, of the Treasury Department, invited proposals for the purchase of $50,000,000 of 5 per cent. bonds, and this sale resulted in the acquisition of $58,660,917 in gold, which was added to the reserve. The drain on the reserve, however, continued, and in November following the Secretary issued a second call for the purchase of $50,000,000 bonds, when the subscriptions aggregated $178,341,150 and the sale yielded $58,538,500 in gold, which brought the reserve to $111,142,021. In about two months after this sale the reserve declined to $41,340,181. The President, in a special message to Congress, January 28, 1895, recommended that authority be given the Secretary of the Treasury to issue bonds bearing a low rate of interest, to maintain the reserve and redeem outstanding notes issued for the purchase of silver; but Congress did not approve the recommendation. Secretary Carlisle then signed a contract with New York bankers to supply the Government with 3,500,000 ounces of standard gold coin, at the rate of $17.80441 per ounce, for 30-year 4 per cent. bonds, on condition that one-half of the coin should be obtained in Europe, and that if Congress should authorize their issue, bonds payable in gold and bearing 3 per cent. interest might within ten days be substituted at par for the 4 per cent. bonds. The President again urged Congress to authorize the issue of low-rate bonds, declaring in his message that more than $16,000,000 in interest would be saved thereby, and Congress again withheld its sanction. Under the contract the Secretary sold $62,315,000 in bonds for a little over $65,000,000 in gold. The subscriptions to this loan aggregated $590,000,000 in London and $200,000,000 in New York. Under the continuance of the business depression, Secretary Carlisle was forced early in 1896 to sell $100,000,000 of 30-year 4 per cent. bonds.

The silver question came up again in Congress, February 7, 1894, when the House Committee on Coinage, Weights, and Measures reported a bill directing the coinage of the silver held in the Treasury. A substitute by Congressman Bland providing for the coinage of the seigniorage was adopted, and passed in the House by a vote of 168 yeas to 129 nays, with 56 not voting, and in the Senate by 44 yeas to 31 nays, 10 not voting. This bill was vetoed by the President, and it failed of passage over the veto. In December, 1895, the House passed a bond bill prepared by the Republican members of its Committee on Ways and Means, and when it reached the Senate the Finance Committee reported a free silver coinage substitute, which the Senate passed, February 1, 1896, by a vote of 42 yeas to 35 nays. The House refused to concur in the substitute, and rejected it by a vote of 215 yeas to 90 nays, A few days afterwards the Senate defeated the Emergency Revenue Bill, prepared by Republican members of the House Committee on Ways and Means, and passed by the House by a vote of 205 yeas to 61 nays, the Senate vote being 22 yeas to 33 nays.

A long-standing dispute between Venezuela and Great Britain, over the boundary line between Venezuela and British Guiana, was the cause of a Presidential message to Congress in December, 1895, recommending the appointment of a commission to determine this boundary line. This message, on account of its sharp and determined tone toward Great Britain, created a great sensation. Both Houses unanimously concurred in the recommendation, and a commission was appointed January 1, 1896. (See VENEZUELA.) Among other events of President Cleveland's second administration were the World's Columbian Exposition at Chicago, the settlement of the Bering Sea controversy (q.v.) in 1893, the signing of treaties with China and Japan, in 1894, the extension by the President of civil-service reform (q.v.), the calling out of Federal troops to protect Government property and the mails against strikers at Chicago in 1894, the admission of Utah into the Union, in 1896, and the arbitration by the President of disputes between Brazil and the Argentine Republic, Colombia and Italy, and Brazil and Italy.

The Presidential campaign of 1896 turned principally on the Democratic demand for the free coinage of silver at the ratio of 16 to 1. There were seven tickets in the field, viz. the Republican (sound money), William McKinley, of Ohio, and Garret A. Hobart, of New Jersey; the Democratic (free silver), William J. Bryan, of Nebraska, and Arthur Sewall, of Maine; the National Democratic (sound money), John M. Palmer, of Illinois, and Simon B. Buckner, of Kentucky; the Prohibition, Joshua Levering and Hale Johnson; the Socialist Labor, Charles H. Matchett and Matthew Maguire; the Populist, William J. Bryan and Thomas E. Watson; and the Free Silver Prohibition, Charles E. Bentley and James H. Southgate. The total popular vote was 13,930,942, and the electoral, 447, of which the Republican candidates received 7,104,779 and 271, respectively, and the Democratic, 6,502,925 and 176. The Populist ticket received 144,928 votes; National Democratic, 134,731; Prohibition, 123,428; Socialist Labor, 35,306; and Free Silver Prohibition, 13,535.

XXVIII. ADMINISTRATIONS OF WILLIAM MCKINLEY (March 4, 1897-September 14, 1901) AND THEODORE ROOSEVELT (September 14, 1901). *Cabinet.*—*Secretary of State,* John Sherman, Ohio, 1897; W. R. Day, Ohio, 1897; John Hay, Ohio, 1898. *Secretary of the Treasury,* Lyman J. Gage, Illinois, 1897; Leslie M. Shaw, Iowa, 1901. *Secretary of the Navy,* John D. Long, Massachusetts, 1897; William H. Moody, Massachusetts, 1902. *Secretary of War,* Russell A. Alger, Michigan, 1897; Elihu Root, New York, 1899; W. H. Taft, Ohio, 1904. *Secretary of the Interior,* Cornelius N. Bliss, New York, 1897; E. A. Hitchcock, Missouri, 1899. *Postmaster-General,* James A. Gary, Maryland, 1897; Charles Emory Smith, Pennsylvania, 1898; Henry C. Payne, Wisconsin, 1901. *Attorney-General,* Joseph McKenna, California, 1897; J. W. Griggs, New Jersey, 1897; Philander C. Knox, Pennsylvania, 1901. *Secretary of Agriculture,* James Wilson, Iowa, 1897. *Secretary of Labor and Commerce,* George B. Cortelyou, 1903.

In his inaugural address President McKinley favored the protection of American industries, the restriction of immigration, the promotion of civil-service reform, the establishment of international bimetallism, and the appointment of a commission on currency and finance.

The Administration was concerned chiefly, however, with the war against Spain, growing out of the intolerable condition of affairs in Cuba, and with the problems growing out of the war and the acquisition by the United States of the Philippines and Porto Rico. These subjects will be found treated under the titles SPANISH-AMERICAN WAR; CUBA; PHILIPPINES; and PORTO RICO.

After the abolition of Spanish sovereignty over Cuba, military government under General Brooke was established by the United States. The Cuban Army was disbanded after an appropriation by Congress for the payment of soldiers. When the volunteers were withdrawn and regular troops substituted, order was fairly well maintained. On December 13, 1899, General Brooke was succeeded by General Wood. Public schools were established, an insular treasury organized, municipal autonomy increased, and other administrative measures introduced. On November 15, 1900, a convention assembled, and a Constitution, framed on the model of that of the United States, was completed on February 21, 1901. The question of the relation of Cuba to the United States complicated the settlement of the question of the Constitution. The United States proposed: (1) that no foreign Power should be permitted to secure control in the island; (2) that the United States should have a coaling station there; (3) that the debt-contracting power of the Cuban Government should be limited; and (4) that, when necessary, the United States should interfere with an armed force to maintain the Government and Cuban independence. The proposals met considerable opposition in Cuba, but were finally accepted. On December 31, 1901, a President, Senate, and House were elected, and an executive order from Washington, March 25, 1902, provided for the evacuation of Cuba and the transference of the government to the new authorities on May 20, 1902.

Under the authority of a joint resolution of Congress, Hawaii was annexed to the United States in August, 1898. Five commissioners were appointed to investigate conditions there and recommend legislation. On June 14, 1900, under an act of Congress approved April 30th of that year, the islands were organized into a Territory of the United States. See HAWAIIAN ISLANDS.

Owing to the disturbances in Samoa following the death of Malietoa, in 1899, the existing joint protectorate was abandoned, and Tutuila (q.v.) and other minor islands passed under the sovereignty of the United States, which took formal possession April 17, 1900.

On January 24, 1902, Denmark ceded to the United States the Danish West Indies for $5,000,000. The treaty was, however, finally rejected by the Upper House of the Danish Legislature, notwithstanding the extension of the time of ratification to July 24, 1903.

McKinley's administration was marked by the growth throughout the country of a strong anti-trust movement, which resulted in a large number of State laws regulating the formation and operation of large combinations of capital. In its decision in the case of United States vs. Trans-Missouri Freight Association, the Supreme Court gave an interpretation of the Sherman Anti-Trust Law, which forced the dissolution of a great association and gave a considerable impetus to the anti-trust movement. In political platforms, conferences, and party press a vigorous agitation was carried on against combinations. An Industrial Commission was created on June 18, 1898, for the purpose of investigating questions pertaining to immigration, labor, agriculture, manufacture, and business. The organization of trusts continued with increasing rapidity. During the first four months of 1899 the capitalization of these trusts was $2,000,000,000, as against $1,000,000,000 in the preceding twelve months. On February 12, 1900, an Anti-Trust League was formed at a convention in Chicago. (See TRUSTS.) The administration of McKinley coincided with an unprecedented commercial development.

While the great problems connected with the regulation of trusts and settlement of the dependencies were under consideration, the campaign of 1900 was inaugurated. At the Republican National Convention held on June 19th, at Philadelphia, President McKinley and Theodore Roosevelt were nominated by acclamation and the principles of 1896 reaffirmed. On July 4th the Democratic Convention at Kansas City nominated William J. Bryan and Adlai E. Stevenson, and declared against imperialism and militarism.

The platform advocated Cuban independence, the preparation of the Philippines for independence, and the renunciation of American dominion over those islands. The free-silver plank was also inserted. The Democratic nominees received the indorsement of the Anti-Imperialist League, the Populist Fusionists, and the Silver Republicans. The election resulted in a complete victory for the Republicans, McKinley receiving 292 electoral votes and Bryan 155. The popular vote was as follows: Republican, 7,206,677; Democratic, 6,374,397; Prohibitionist, 208,555; Social-Democratic, 84,003; Socialist Labor, 39,537; Union Reform, 5698; Middle of the Road Populist, 50,373; United Christian, 1060.

While receiving the people in the Temple of Music at the Pan-American Exposition at Buffalo, President McKinley was shot down by an anarchist, named Czolgosz (q.v.), on September 6, 1901. After eight days of suffering, the President died at Buffalo, and on September 19th was buried at his old home in Canton.

On the day of McKinley's death Vice-President Roosevelt took the oath of office. He retained the Cabinet of his predecessor and announced his intention to continue unaltered the policy of the previous Administration.

Important measures of the two administrations which have not been mentioned above may be briefly summarized. In 1900 a currency law was passed by Congress, which defined the gold dollar as the standard of value in the United States. In the same year a civil code for Alaska was enacted and provision made for the representation of the Territory in Congress. In 1901 the army was reorganized and the 'canteen' (q.v.) abolished. The Fifty-seventh Congress passed the Chinese Exclusion Bill, and an act for reclaiming and irrigating arid lands of the West. By a law approved March 6, 1902, the Census Office was made a permanent bureau with increased duties and facilities. In December, 1902, a reciprocity treaty was concluded with Cuba providing for mutual concessions in the customs duties. The Senate, however, ratified it only upon condition that it should not go into effect until approved by Congress. In 1903 a new Department of Labor and Commerce was created, the Secretary being made a regular member of the Cabinet. A Bureau of Manufactures and Corporations was established, with important functions of investigation and regulation, which have not as yet been tested. Laws for the reorganization of the militia and increase of the navy were passed. A general staff for the army was created. The anti-trust movement culminated in the Elkins Anti-Trust Act (1903), which requires common carriers to file tariff rates and forbids rebates, and which includes provisions and appropriations for the purpose of facilitating the prosecution of offenders.

After long and vexatious negotiations, a final convention on the Isthmian question was ratified by Great Britain and the United States on December 16, 1901. The United States was given the right to construct and police the canal; Great Britain withdrew her claim to participation in the maintenance of neutrality upon the condition that free navigation on the basis of the Suez stipulations should be guaranteed. (See HAY-PAUNCEFOTE TREATY.) On June 28, 1902, an act of Congress was approved empowering the President to acquire the rights and property of the Panama Canal Company at a cost not to exceed $40,000,000. It authorized him to purchase from the Republic of Colombia the necessary territory and to cause the construction of the canal at a cost not to exceed $130,000,000. If unable to secure a satisfactory title for this route, the President was instructed to build a canal by the Nicaragua route at a cost of not more than $189,000,000. Negotiations have been carried on with Colombia according to this act. The Hay-Herran Treaty, stipulating the terms on which the canal was to be constructed, was rejected by the Congress of Bogota in August, 1903. On October 18th Colombia proposed that the United States should pay her $25,000,000, and at the same time leave her in possession of the territory. The affair was complicated by the Isthmian revolution of November 4, 1903, which resulted in the declaration of independence of the State of Panama. The new republic was immediately recognized by the United States.

The commercial prosperity of the period was accompanied by a number of strikes, a most noteworthy occurrence in this connection being the appointment by the President in October, 1902, of a commission to arbitrate the differences between the striking anthracite miners and their employers.

In 1899 the inability of the Chinese Government to restrain the anti-foreign movement on the part of its subjects and to maintain internal order endangered the interests of the United States, as well as those of other Powers. The United States joined the other Powers in the work of restoring the Chinese Government and procuring indemnity for losses incurred. The policy of the United States throughout was the preservation of Chinese territorial and administrative unity and the maintenance of fair and impartial trade conditions. See CHINA.

On October 20, 1899, a *modus vivendi* in connection with the Alaskan boundary controversy was arranged with Great Britain. After futile negotiations, in January, 1903, Secretary Hay and the British Ambassador signed a convention providing for the reference of the dispute to a tribunal of six impartial jurists. On October 17, 1903, the tribunal decided the main points of the controversy in favor of the United States, the decision being signed by the three American arbitrators, Lodge, Root, and Turner, and by the English arbitrator, Lord Alverstone. The refusal of the two Canadian members to agree with the majority was strongly approved in Canada, where the decision was received with marked evidences of dissatisfaction.

BIBLIOGRAPHY. GENERAL WORKS AND PHYSICAL FEATURES. Reclus, *Nouvelle géographie universelle*, vols. xv.-xix. (Paris, 1890-94); Whitney, *The United States Physical Geography* (Boston, 1889); MacCoun, *Historical Geography of the United States* (New York, 1892); Sievers, *Amerika, eine allgemeine Landeskunde* (Leipzig, 1894); Shaler, *United States of America* (New York, 1894); id., *Nature and Man in America* (ib., 1897); Gannett, *North America—United States* (London, 1898); Dawson, *North America* (ib., 1897); Judson, *The Growth of the American Nation* (ib., 1897); *The Physiography of the United States*, ten monographs (New York, 1898); Russell, *Lakes of North America* (Bos-

ton. 1895); id., *Rivers of North America* (ib., 1898); Dupont, *Notions de géographie générale et géographie physique, ethnographique, politique et économique du continent americain* (Paris, 1900); Tarr and McMurry, *North America* (New York, 1900); Wilson, *The New America* (London, 1902); Brigham, *Geographic Influences in American History* (Boston, 1903); *National Geographic Magazine* (Washington, 1888 et seq.); *United States Geological and Geographical Survey Reports* (Washington, 1867-90); *American Geographical Society Bulletin* (New York, 1859 et seq.); *United States Hydrographic Office Publications* (Washington, 1867 et seq.).

CLIMATE. Bell, *Climatology and Mineral Waters of United States* (New York, 1885); Greely, *American Weather* (ib., 1888); *United States Weather Bureau Report* (Washington, 1891 et seq.); *Monthly Weather Review* (ib., 1891 et seq.).

FLORA. *Synoptical Flora of North America* (New York, 1878); Meehan, *The Native Flowers and Ferns of the United States* (Boston, 1878-80); Goodale, *The Wild Flowers of America* (ib., 1887); Beal, *Grasses of North America*, vol. ii. (London, 1886 et seq.); Michaux, *North American Silva* (Boston, 1887); Newhall, *The Trees of Northeastern America* (New York, 1891); id., *The Vines of Northeastern America* (ib., 1897); Sargent, *The Silva of North America* (Boston, 1891 et seq.); Britton and Brown, *Illustrated Flora of Northern United States* (New York, 1896-98); Heller, *Catalogue of North American Plants* (Lancaster, 1900); many articles in *United States War Department Reports of Exploration to the Pacific* (Washington, 1856); *United States Division of Botany Report* (ib., 1893 et seq.).

FAUNA. Audubon, *Birds of America* (New York, 1840-44); Agassiz, *Contributions to Natural History of United States* (Boston, 1857); Cassin, Baird, and others, *The Birds of North America* (Salem, 1870); Wallace, *Geographical Distribution of Animals* (New York, 1876); Goode, *American Fishes* (ib., 1888); Coues, *Key to North American Birds* (Boston, 1887); Maynard, *Manual of North American Butterflies* (ib., 1891); id., *Wild Fowl of North America* (ib., 1898); Jordan and Evermann, *Fishes of North and Middle America* (Washington, 1901-02); Apgar, *Birds of the United States* (New York, 1890); Ridgeway, *The Birds of North and Middle America* (Washington, 1901-02); Howard, *The Insect Book* (New York, 1901); Dyar, *List of North American Lepidoptera* (Washington, 1902); Stone and Cram, *American Animals* (New York, 1902).

GEOLOGY. Tarr, *Economic Geology of the United States* (New York, 1894); Geikie, *The Great Ice Age* (ib., 1895); Powell, *Canyons of the Colorado* (ib., 1895); Russell, *Volcanoes of North America* (ib., 1897); id., *Glaciers of North America* (Boston, 1898); Weeks, "Bibliography and Index of North American Geology," in *United States Geological Survey Bulletin 130* (Washington, 1892-93); *United States Geological Survey Bulletins* (ib., 1884 et seq.); *United States Geological Survey Monographs* (ib., 1890 et seq.); *Journal of Geology* (Chicago, 1893 et seq.); also Dana's *Manual of Geology*, 4th edition; *American Geologist* (Minneapolis); *Bulletin of Geological Society of America*.

MINING. *Mineral Resources of the United States* (annual, Washington); Rothwell, *The Mineral Industry, Its Statistics, etc., in the United States and Other Countries* (annual, New York); Kemp, *The Ore Deposits of the United States* (New York, 1893). AGRICULTURE. *Report of the Department of Agriculture* (Washington); Oetkin, *Die Landwirtschaft in den Vereinigten Staaten* (Berlin, 1893); Levasseur, *L'Agriculture aux Etats-Unis* (Paris and Nancy, 1894); Rousiers, *La vie américaine; ranches, fermes et usines* (Paris, 1899). FORESTS. Mayr, *Die Waldungen von Nordamerika* (München, 1890); Bruncken, *North American Forests and Forestry* (New York, 1900). MANUFACTURES. Bagnall, *Textile Industries of the United States* (Boston, 1893); Wright, *The Industrial Evolution of the United States* (Meadville, Pa., 1895); Wright, *The Industrial Evolution of the United States* (London, 1897); Rocheleau, *Great American Industries* (Chicago, 1898); *United States Industrial Commission Reports* (Washington, 1900 et seq.); Jeans, *American Industrial Conditions and Competition* (London, 1902); Lawson, *American Industrial Problems* (Edinburgh, 1903); Goldberger, *Das Land der unbegrenzten Möglichkeiten* (Berlin, 1903); Taussig, *Tariff History of the United States* (New York); *Reports of the Commissioner of Labor* (annual, Washington).

COMMERCE: TRANSPORTATION. Poor, *Manual of the Railroads of the United States* (London, 1868 et seq.); Ringwalt, *Development of Transportation Systems in the United States* (Philadelphia, 1888); Depew, *1795-1895. One Hundred Years of American Commerce* (New York, 1895); Vanderlip, *The American Commercial Invasion of Europe* (ib., 1903); *United States Treasury Department Report on Commerce and Navigation* (Washington, 1844 et seq., 1888 et seq.); *United States Inter-State Commerce Commission Report* (ib., 1888 et seq.); *United States Special Consular Reports* (ib., 1890 et seq.); *United States Foreign Commerce Bureau Report* (ib., 1856 et seq.).

GOVERNMENT. Tocqueville, *On Democracy in America*, trans. by H. Reeve (London, 1889); Bryce, *The American Commonwealth* (ib., 1893-1895); Scudder (editor), *American Commonwealths* (Boston, 1884 et seq.); Howard, *Local Constitutional History of the United States* (Baltimore, 1885); Giddings, *Democracy and Empire* (New York, 1900); Ostrogorski, *Democracy and the Organization of Political Parties* (ib., 1902); Zueblin, *American Municipal Progress* (London, 1902); Thetar, *The State* (revised first issued 1878.

FINANCE. The best work on the history of the United States finances is Dewey, *Financial History of the United States* (New York, 1903). Consult also Bullock, *Finances of the United States, 1775-1789* (Madison, 1895), and Noyes, *Thirty Years of American Finance* (New York, 1898). For statistics, consult *Reports of the Secretary of the Treasury of the United States*, 1789-1849, and *Report on the Finances*, issued annually, beginning with 1849. Statistics of the finances may also be conveniently obtained from the *Statistical Abstract of the United States*, first issued, 1878.

DEFENSE. Nelson, *The Army of the United States* (London, 1897); *Annual Reports United States War Department* (Washington, annual);

Kelly, *The American Navy* (ib., 1897); Spears, *History of Our American Navy* (New York, 1897-99); Morris, *The American Navy* (London, 1898); Marvin, *American Merchant Marine* (ib., 1902); Long, *The New American Navy* (New York, 1903); *United States Navy Department Annual Reports* (Washington, 1822 et seq.); *United States War Department Annual Reports* (ib., 1845 et seq.).

Immigration. *Report of Commissioners of Immigration* (Washington).

Education. Boone, *Education in the United States* (New York, 1889); Butler, editor, *Education in the United States* (Albany, 1900); *Four American Universities* (New York, 1895); Gilman, *University Problems in the United States* (ib., 1898); *United States Commissioner of Education Reports* (Washington, 1867 et seq.).

History. For more or less elaborate bibliographies, consult: Winsor, *Narrative and Critical History of America* (Boston, 1886-89); Larned (ed.), *The Literature of American History. A Bibliographical Guide* (Boston, 1902); Channing and Hart, *Guide to the Study of American History* (ib., 1896); and Adams, *Manual of Historical Literature* (New York, 1889).

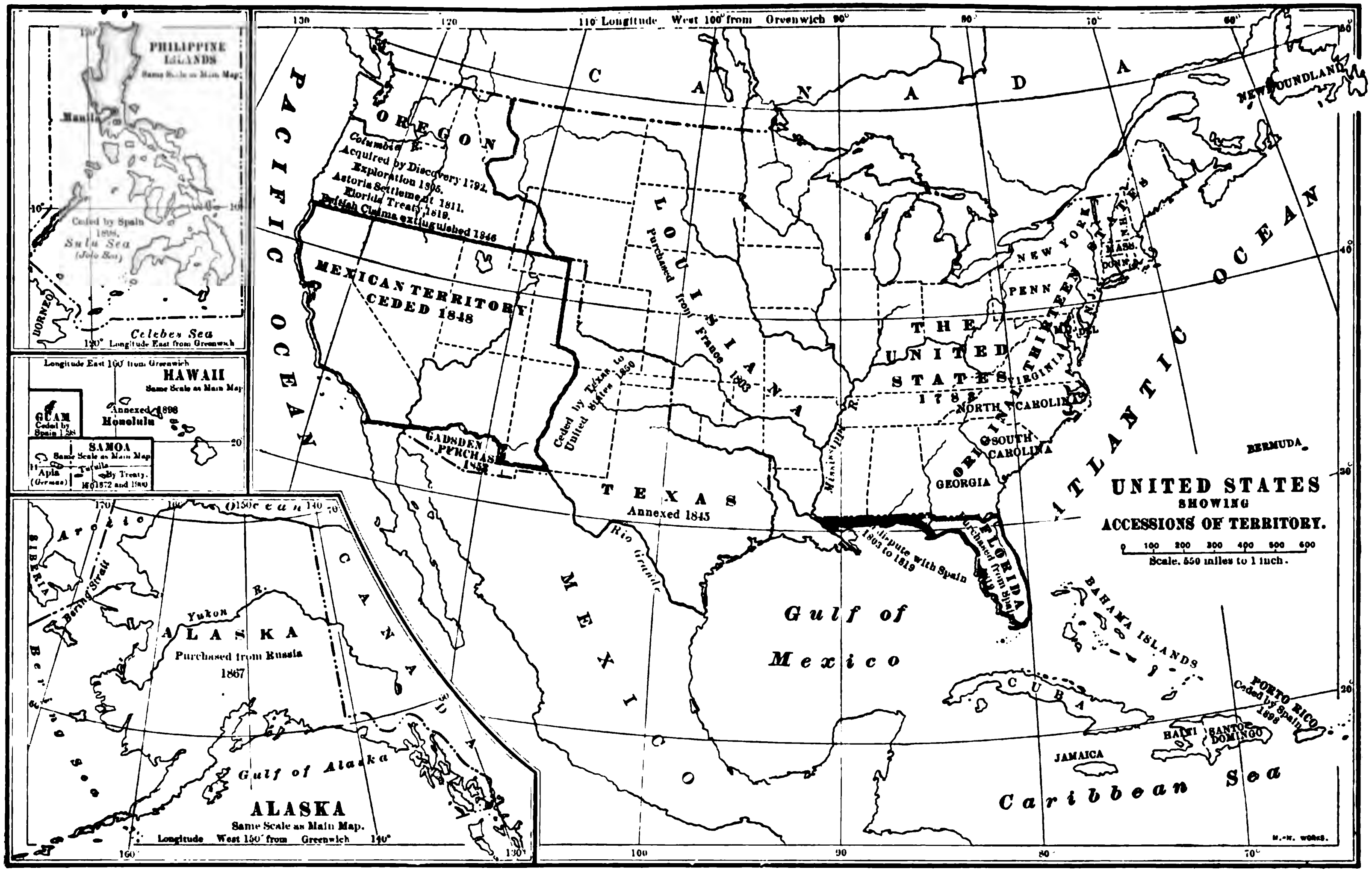
Standard works are the histories by Bancroft [to 1789] (revised ed., New York, 1883-85); Hildreth [to 1821] (revised ed., ib., 1882); Bryant and Gay (last ed., ib., 1896); Winsor (supra); McMaster [from the Revolution to the Civil War] (New York, 1883—); Schouler [to 1865] (ib.,1899); Rhodes [from the Compromise of 1850] (ib., 1893—); Henry Adams [during the administrations of Jefferson and Madison] (ib., 1889-91); Von Holst, *The Constitutional and Political History of the United States* (new ed., Chicago, 1899); Curtis, *Constitutional History of the United States* (New York, 1889-96); Thorpe, *The Constitutional History of the American People 1776-1850* (Chicago, 1898); Wilson, *History of the American People* (New York, 1902); vol. vii. of the *Cambridge Modern History* (Cambridge, 1903); and the works of Parkman (q.v.), and of John Fiske (q.v.).

On the Colonial period consult, besides several of those already mentioned, Doyle, *The English in America* (London, 1882-87); Lodge, *Short History of the English Colonies in America* (New York, 1881); Tyler, *History of American Literature 1607-1765* (rev. ed., New York, 1897); Palfrey, *Compendious History of New England to the First General Congress of the Anglo-American Colonies* (Boston, 1865-73). For further references see bibliographies under the titles of the various States. On the Revolutionary War and the War of 1812: Fiske, *The American Revolution* (1891); Botta, *History of the War of the Independence of the United States* (8th ed., New Haven, 1840); Trevelyan, *The American Revolution* (London, 1899); Carrington, *Battles of the American Revolution* (New York, 1876); Roosevelt, *The Naval War of 1812* (ib., 1882); and Maclay, *History of the United States Navy from 1774* (ib., 1897-1900). Further references are given under titles of different battles, and of men prominent in the two wars.

For further references to works on the history of the United States, see the bibliographies to special articles, such as Loyalists; Mexican War; Civil War; Confederate States of America; Reconstruction, etc.; and the bibliographical notes appended to articles on the various States, and to biographical sketches of prominent men.

UNITED STATES, Extension of the Territory of the. Prior to 1781 only six of the thirteen original States, viz. New Hampshire, Rhode Island, New Jersey, Pennsylvania, Maryland, and Delaware, had exactly defined boundaries. Of the remaining seven States, some claimed to extend to the Pacific Ocean and others to the Mississippi River. The States with inexact boundaries ceded to the General Government their claims to lands west of their present limits in succession, as follows: March 1, 1781, New York; March 1, 1784, Virginia, the cession including the territory which now forms the State of Kentucky and the parts of the States of Ohio, Indiana, and Illinois which lie south of the forty-first parallel, Virginia, however, reserving from this cession for military-bounty lands the entire territory, 6570 square miles, between the Scioto and Little Miami rivers, from their sources to the Ohio River; April 19, 1785, Massachusetts, including her claims to territory west of the present boundary of New York; September 14, 1786, Connecticut, the cession being the territory west of the Alleghanies between the parallels of 41° and 42°, except a strip 120 miles in length lying directly west of Pennsylvania retained for the benefit of her public schools and later known as the Western Reserve (q.v.), which she ceded to the United States in 1800; August 9, 1787, South Carolina, the territory ceded being a strip of land about 12 miles wide, south of the thirty-fifth parallel and extending along the southern boundaries of North Carolina and Tennessee to the Mississippi; February 25, 1790, North Carolina, the territory ceded constituting what is now Tennessee; June 16, 1802, Georgia, after receiving that part of the cession of South Carolina lying within her present limits, ceding all between her present western boundary and the Mississippi, and between the South Carolina cession and the thirty-first parallel, embracing a large part of what is now Mississippi and Alabama. The foregoing cessions secured to the General Government nearly all territory ceded by Great Britain, not included in the original thirteen States, as in the main now bounded. On November 25, 1850, the State of Texas ceded all her claims to lands west of the twenty-sixth meridian west of Washington (103d Greenwich) and between latitudes 32° and 36° 30′.

Cessions by Foreign Powers. In the treaty of September 3, 1783, with Great Britain the western limits of the United States were declared to be the Mississippi River to the thirty-first parallel. On April 30, 1803, by treaty with France, the 'Province of Louisiana' was acquired. (See Louisiana Purchase.) Its western boundary as finally adjusted, February 22, 1819, by treaty with Spain, ran up the Sabine River, to and along the seventeenth meridian (94th Greenwich), to and along the Red River, to and along the twenty-third meridian (100th Greenwich), to and along the Arkansas River, to and along the Rocky Mountains, to and along the twenty-ninth meridian (106th Greenwich), to and along the forty-second parallel, to the Pacific Ocean. Its northern boundary conformed to the boundary established



COPYRIGHT, 1903, BY DODD, MEAD & COMPANY

between the British possessions and the United States. On the east it was bounded by the Mississippi as far south as the thirty-first parallel, where different boundaries were claimed. The United States construed the cession of France to include all the territory between the thirty-first parallel and the Gulf of Mexico, and between the Mississippi and Perdido, the latter of which is now the western boundary of Florida. Under this construction of the cession, the 'Province of Louisiana' is now covered by those portions of the States of Alabama and Mississippi which lie south of the thirty-first parallel; by Louisiana, Arkansas, Missouri, Iowa, Minnesota west of the Mississippi, Kansas, Nebraska, North and South Dakota, Montana, Idaho, Oregon, Washington, and the Indian Territory; and by the portion of Colorado lying east of the Rocky Mountains and north of the Arkansas River, and that portion of Wyoming lying east of the Rockies and south of the forty-second parallel. Spain, from which power France had acquired Louisiana by treaty in 1800 (see SAN ILDEFONSO, TREATY OF), claimed that she had ceded to France no territory east of the Mississippi except the 'Island of New Orleans,' and also contended that her Province of West Florida included all of the territory south of the thirty-first parallel and between the Perdido and Mississippi, except the 'Island of New Orleans.' Under this construction, the 'Province of Louisiana' included on the east of the Mississippi only the territory bounded on the north and east by the "rivers Iberville and Amite and by the lakes Maurepas and Pontchartrain." By this treaty of 1803 the national territory was increased by 1,171,931 square miles. The extreme northwestern portion of this territory was claimed by Great Britain, with which power the United States concluded the Northwest Boundary Treaty in 1846. By the treaty of February 22, 1819, Spain formally ceded the territory now covered by Florida, by those portions of Alabama and Mississippi which lie south of the thirty-first parallel, and by that portion of Louisiana which lies east of the Mississippi and is not included in the 'Island of New Orleans.' This territory was styled by Spain the 'provinces of East and West Florida.' Previous to this cession, by the authority of the joint resolution of January 15, 1811, and the acts of January 15, 1811, and March 3, 1811, passed in secret session and first published in 1818, the United States had taken possession of the East and West Floridas. In fact, as early as 1810 the Americans controlled all of West Florida except Mobile, while in 1814 Jackson temporarily seized Pensacola, and again in 1818 occupied both Pensacola and Saint Marks. The United States, however, did not take formal possession until 1821. After prolonged negotiations, and a vigorous political contest, Texas, formerly a portion of Mexico, and later an independent republic, was admitted to the Union by a joint resolution of Congress, approved by President Tyler on March 1, 1845. As a result of the Mexican War (q.v.), by the Treaty of Guadalupe Hidalgo (q.v.), on February 2, 1848, Mexico ceded the territory now covered by California and Nevada, also her claims to the territory covered by the present Texas, by Utah, by the bulk of Arizona and of New Mexico, and by portions of Wyoming and Colorado. That part of Arizona and that part of New Mexico lying south of the Gila and known as the Gadsden Purchase were ceded by Mexico on December 30, 1853. By treaty of March 30, 1867, Russia ceded Alaska. At the close of the Revolutionary War the territory really occupied by the old thirteen States covered scarcely a quarter of a million square miles, and after the treaty of 1783 the nation occupied only 825,000 square miles, but in 1867 the territory belonging to the United States had an area in round numbers of 3,600,000 square miles. A further accession was effected in 1898, when, on July 6th, Congress passed a joint resolution annexing Hawaii (q.v.) to the United States. In the following year negotiations were concluded by which the island of Tutuila, Samoa, on which is located the excellent harbor of Pago-Pago, was ceded absolutely to the United States. An important accession of territory was that incident to the Spanish-American War (q.v.), and formally effected in the treaty of December 10, 1898, in accordance with which Spain ceded Porto Rico (q.v.) and the Philippine Islands (q.v.), together with the island of Guam (q.v.), to the United States.

BIBLIOGRAPHY. The most important volume in this connection, with all the texts, is the *Treaties and Conventions*, published by the Government (Washington, 1889). Some useful maps illustrating these treaties are to be found in *The United States of America, 1765-1865*, by Channing (New York, 1896). Consult also, as to treaty of 1803, Adams, *History of the United States*, vol. ii., and Roosevelt, *Winning of the West*, vol. iv. Of special works, consult: Adams, *Maryland's Influence on the Land Cessions* (Baltimore, 1885); Gannett, *Boundaries of the United States;* Garrett, *South Carolina Land Cession;* Donaldson, *Public Domain* (Washington, 1884); and the appendix to vol. vii. of Winsor, *Narrative and Critical History of America* (Boston, 1886-89)).

UNITED STATES, LITERATURE OF THE. See AMERICAN LITERATURE.

UNITED STATES CHRISTIAN COMMISSION. An organization kindred to the United States Sanitary Commission (q.v.), formed during the Civil War in America for the purpose of promoting the spiritual and physical welfare of Federal soldiers and sailors. A convention of Young Men's Christian Association delegates met in New York City in November, 1861, and formally organized the United States Christian Commission of 12 members with George H. Stuart, a Philadelphia philanthropist, as president, and B. F. Manierre, of New York, as secretary. Contributions of money, literature, and supplies were asked for and a generous response was made. The central office of the commission was in Philadelphia, but it had branches in all of the large towns and cities, and its agents followed the armies. Temporary libraries were established, chapels for religious worship were erected at permanent camps, and Christian burial was accorded to the dead, whose graves were suitably marked by agents of the commission. The American Bible and Tract societies gave enormous quantities of their publications to the commission for distribution; the Government furnished free transportation to its agents, and for its supplies, while the telegraph and transportation companies furthered its efforts in various ways. The following is a general summary of the work of the commission for the four years of the war: Delegates commissioned, 4859; Bibles and Testaments distributed, 1,466,748; hymn and Psalm books distributed, 1,370,053; knapsack books distributed, 8,308,052; bound library books distributed, 296,816; magazines and pamphlets distributed, 767,861; newspapers distributed, 18,126,002; tracts distributed, 39,104,243; sermons preached and prayer meetings held, 136,152; letters written by delegates, 92,321; cash receipts, $2,524,512; value of stores donated, $2,839,445; value of publications donated, $300,000. Consult Moss, *Annals of the United States Christian Commission* (Philadelphia, 1868).

UNITED STATES DAUGHTERS OF 1812. A patriotic society founded in Cleveland, Ohio, in 1892, and incorporated as a national organization February 25, 1901. It has for its object the perpetuation of the memory of the founders of America, with their records of service in the French War, the Revolution, and the War of 1812. It admits to membership women who are lineal descendants from an ancestor who assisted in the War of 1812, either as a military or naval officer, a soldier, or a sailor, or in any way gave aid to the cause. The membership is slightly over 1000.

UNITED STATES FLAG. See FLAG.

UNITED STATES MILITARY ACADEMY. See MILITARY ACADEMY, UNITED STATES.

UNITED STATES NATIONAL MUSEUM. A national depository at Washington, D. C., under the control of the Smithsonian Institution (q.v.). The collections of the Smithsonian Institution, beginning with the private cabinet of James Smithson, and added to by the material deposited by various exploring expeditions, increased rapidly and soon filled the Smithsonian Building. When the Centennial Exposition, held in Philadephia in 1876, was first considered, it was decided to make extensive exhibits, showing the development of the various governmental departments, and large collections were made for that purpose, which at the close of the Exposition were turned over to the National Museum, together with the choicest of the exhibits from 34 foreign governments. A building for the exhibition of these collections was authorized by Congress in 1879 and completed in 1881, and in 1903 Congress again authorized the construction of a building to cost $3,500,000. As at present organized, the National Museum is under the direction of the Secretary of the Smithsonian Institution as keeper *ex officio*, and in the direct charge of an assistant secretary, under whom are 18 curators in charge of special branches of science. A series of publications are issued by the National Museum, and include: (1) *Annual Report of the Smithsonian Institution*, part ii. begun in 1884; (2) *Bulletin of the United States National Museum*, begun in 1875 and now numbering 52; with these should be included the series of *Special Bulletins*, four in number; (3) *Proceedings of the United States National Museum*, which were begun in 1878 and now include 26 volumes. These were intended primarily as a medium of publication for newly acquired facts in science, descriptions of new forms of animals and plants acquired by the museum, etc. A complete list of these publications with index to titles was issued as *Bulletin No. 51*, in 1902. The National Museum is supported by an annual appropriation from Congress.

UNITED STATES NAVAL ACADEMY. See NAVAL ACADEMY, UNITED STATES.

UNITED STATES VETERAN NAVY. A patriotic society organized September 21, 1899. Eligible for membership are all persons who as commissioned officers or enlisted men were connected with any branch of the naval service of the United States during the Civil War or the Spanish-American War, or who in the future shall be engaged, as members of the navy, in war against an enemy of the United States. The society is organized into 11 squadrons, and has a total membership of about 3000.

UNITED WORKMEN, ANCIENT ORDER OF. A fraternal benevolent order founded at Meadsville, Pa., in 1868. The constitution provided that only white persons were eligible as members and that when the first 1000 should be enrolled an insurance feature should be added guaranteeing the payment of $500 on the death of the insured member. This amount was later increased to $2000. In 1895 the membership had reached 320,000 in the United States, and up to that date the order had paid to the beneficiaries of deceased members $70,000,000. The governing body of the order is the Supreme Lodge, which controls the dispensation of death benefits in States where there is no Grand Lodge. The subordinate lodges are controlled by the Grand or State Lodge. The payment of sick and funeral benefits is optional with each lodge.

UNITED ZION'S CHILDREN. See RIVER BRETHREN.

UNITIES, DRAMATIC. Three classical qualities of a drama, the unities of time, place, and action. See DRAMA.

UNITY OF CONSCIOUSNESS. A phrase used to denote the coherence running through the mental experience of the individual. One element of this unity consists in the relation which one part of experience bears to another, and a second element in the specific reference of experiences to the self. (See SELF; SELF-CONSCIOUSNESS.) Systematic arrangement of knowledge corresponds to one phase of the unitariness in question. The reference of experience to the self may be numbered among the mental functions. The notion of self is a matter of growth and elaboration, and no single group of processes can be pointed to as forming the 'I.' There is, however, one set of processes which is peculiarly important, at least in the earlier stages of development, in 'holding mind together,' in maintaining the unity and permanence of consciousness; it is the complex of 'bodily feelings,' the organic sensations arising from nervous disturbances throughout the trunk. These sensations are relatively permanent and, at the same time vague, indefinite, and but little attended to. Their function in the 'centralization of consciousness' is attested by their neural substrate, which lies in the central part of the cortex and communicates with the 'association centres,' the motor apparatus, and the other sensory centres by an unusually large number of connective tracts. Consult: Ebbinghaus, *Psychologie* (Leipzig, 1902); Titchener, *Outline of Psychology* (New York, 1899); James, *Principles of Psychology* (ib., 1890); Flechsig, *Gehirn und Seele* (Leipzig, 1896).

UNIVERSALISM (from *universal*, from Lat. *universalis*, relating to all or the whole, from *universus*, OLat. *oinovorsus*, *oinvorsus*, *unvorsus*, all, whole, entire, turned into one, from *unus*, one + *vertere*, to turn). The name given to the religious faith of those who believe in universal salvation, or the doctrine that the Holy Scriptures declare it to be the purpose of God to make His grace, revealed through the Lord Jesus Christ, as extensive as sin is or can be; to make an end of everything averse to God and His law; to bring in everlasting righteousness and reconcile all souls to God that God may be all in all. Universalists claim for this interpretation of the Bible great Christian antiquity, citing in proof thereof the Sibylline Oracles (c.150), and the teaching of Clement of Alexandria (c.195), that man was created to be educated and not for a limited trial, that his opportunity for education is as lasting as his being, and that punishment is remedial. They find it in the teachings of Origen (c.185-c.254), and in the common belief among Christians of all sects in the second and third centuries that between the death and the resurrection of Jesus he went to the underworld and there taught the souls that had sinned in the days of Noah; these, argued Clement, included all who there or elsewhere need salvation. Universalists also believe that their faith was extensively held in the fourth century and that of the six theological schools then established in the Christian world, four (the schools of Alexandria, Cæsarea, Antioch, and Eastern Syria) taught it; that it was also fundamental in the fifth century in the teachings of Theodore of Mopsuestia, the founder of the Nestorian Church, in whose *Confession of Faith* and *Sacramental Liturgy* it is plainly declared that Maximus the Confessor (580-663) also taught and defended it in the sixth and seventh centuries, that Pope Gregory's instructions to his missionaries show its existence in the eighth century, and that in the ninth it was ably advocated by John Scotus Erigena. The subsequent period until the Lutheran Reformation was not favorable to any expression of thought that antagonized the Latin theology. The Church silenced by force all voices that repudiated its teachings and burned all books contaminated by so-called heresies. But, in spite of all this, Universalism was manifest in the teachings of such thinkers as Raynold, Almaric, Albertus Magnus, Solomon, Bishop of Bosra, Ruysbroek, Tauler, and John of Goch, and in the societies of the Lollards, Brethren of the Common Life, Brethren and Sisters of the Free Spirit, and the Men of Understanding. With the Reformation Universalism revived. The original 42 articles of religion, drawn up by the Reformers in England in 1552, declare: "They also deserve to be condemned who endeavor to restore that pernicious opinion that all men (though never so ungodly) shall at last be saved; when for a certain time, appointed by the Divine Justice, they have endured punishment for their sins committed." When the articles were reduced to 39 in 1571 this condemnatory article was omitted. Many of the Mystics, the German Baptists, the Mennonites in Holland, the French Protestants, the Moravians, and various smaller sects in the Old World, advocated Universalism.

It was not, however, until about 1750 that an organization called Universalist was created. Before that time the believers in universal salvation were affiliated with sects bearing various names and were spoken of as 'Origenists,' 'Merciful Doctors,' and by other names indicating their dissent from the dogma of the never-ending misery of the wicked; but at the date first given Rev. James Relly (q.v.) became a Universalist and organized a Universalist church in London, to which he ministered until his death, about thirty years later. At the present time very few churches in Europe bear the Universalist name, but the doctrine of Universalism finds favor, and in some instances open advocacy, in churches of various names. The Unitarians abroad are avowed Universalists.

The doctrine of Universalism was preached in America as early as 1636 by Samuel Gorton, the New England Mystic, and put forth in the speeches and writings of Sir Henry Vane, the younger, Governor of Massachusetts; by Dr. George de Benneville about a century later; by eminent Episcopalians; by prominent Congregationalists, such as Chauncey and Mayhew of Boston, and Huntington of Connecticut; and by many German Baptists. John Murray (q.v.), 'the father of Universalism in America,' came to New Jersey in September, 1770. On January 1, 1779, 15 persons who had been suspended from the First Parish Church in Gloucester, Mass., for becoming regular attendants on the preaching of Murray, united under "Articles of Association as the Independent Christian Church in Gloucester" for the defense and promulgation of their Universalist faith. Murray was not long without ministerial helpers. Elhanan Winchester, who had been an eminent Baptist preacher in Philadelphia, with more than 100 of his church in that city, was excommunicated for having become believers in Universalism; Adams Streeter and Caleb Rich, in New England, became preachers of the common salvation before they saw or knew Murray. Later, Hosea Ballou, repudiating all the old notions connected with trinitarian dogmas, became the first openly avowed American advocate of Unitarian views of Christ; put the emphasis of Christian theology on God's Fatherhood of the human race; and interpreted the teachings, sufferings, death, and resurrection of Jesus as designed, not to effect any change whatever in God, but to change man and bring him into harmony with his Heavenly Father. These views prevail in the Universalist Church to-day.

In 1803, at the annual session of the General Convention, in view of 'diversity of opinion' as to how universal salvation was to be the result of God's government, three 'Articles of Belief' were agreed upon as stating the basis of fellowship. At the session in 1899 the following action was taken in regard to profession of belief and the conditions of fellowship:

"I. The Profession of Belief adopted at the session at Winchester, N. H., A.D. 1803, is as follows: Article 1—We believe that the Holy Scriptures of the Old and New Testaments contain a revelation of the character of God and of the duty, interest, and final destination of mankind. Article 2—We believe that there is one God, whose nature is Love, revealed in one Lord Jesus Christ, by one Holy Spirit of Grace, who will finally restore the whole family of mankind to holiness and happiness. Article 3—We believe that holiness and true happiness are inseparably connected, and that believers ought to be careful to maintain order and practice good works; for these things are good and profitable unto men.

"II. The conditions of fellowship shall be as follows: (1) The acceptance of the essential principles of the Universalist faith, to wit: (a) The universal fatherhood of God; (b) the Spiritual authority and leadership of His Son, Jesus Christ; (c) the trustworthiness of the Bible as containing a revelation from God; (d) the certainty of just retribution for sin; (e) the final harmony of all souls with God. The Winchester Profession is commended as containing these principles, but neither this nor any other precise form of words is required as a condition of fellowship, provided always that the principles above stated be professed. (2) The acknowledgment of the authority of the General Convention and assent to its laws."

During the first hundred years of its existence, the denominational polity was congregational or independent, the several conventions possessing only advisory powers. Since 1870 the General Convention has had authority to make laws on the subject of fellowship, ordination, and discipline, to which all subordinate conventions, churches, and preachers must conform. Since 1890 a mission has been sustained in Japan with good success in conversions, the establishing of theological and literary schools and planting churches, and the distribution of literature. Four colleges and five academies erected and managed under the auspices of the denomination had in 1902 249 professors and teachers, 1896 students. The following theological schools are maintained: (1) The Canton Theological School, opened at Canton, Saint Lawrence County, N. Y., in 1858. Although affiliated with Saint Lawrence University, the theological school is a separate institution in its management and property. (2) Tufts Divinity School, a department of Tufts College, located at Tufts College, near Boston, opened in 1869. (3) At the beginning of the college year in 1881 a theological department was opened in Lombard College, Galesburg, Ill. In honor of the late Rev. William Henry Ryder, who had endowed the school, its name was changed to the Ryder Divinity School in 1890.

The Church statistics for 1903 show 871 church organizations with 53,508 communicants, 773 Sunday schools with 57,529 members, and church property valued at $10,158,453. The number of preachers is 750. The Young People's Christian Union has about 10,000 members.

Bibliography. The denominational literature is very extensive. The following works may be mentioned: Winchester, *The Universal Restoration, Exhibited in Four Dialogues between a Minister and His Friend* (Philadelphia, 1792); Murray, *Universalism Vindicated* (Charlestown, 1797); Foster, *A Critical and Candid Examination of a Late Publication Entitled the Doctrine of Endless Misery Reconcilable with the Infinite Benevolence of God* (Walpole, N. H., 1803); Hosea Ballou, *A Treatise on Atonement* (Randolph, Vt., 1805); Hosea Ballou, 2d, *The Ancient History of Universalism* (Boston, 1829); Whitemore, *The Modern History of Universalism* (ib., 1830); Smith, *Historical Sketches and Incidents Illustrative of the Establishment and Progress of Universalism in the State of New York* (Albany, 1843-44); Cobb, *A Compend of Christian Divinity* (Boston, 1846); Thayer, *Theology of Universalism* (ib., 1862); Thomas, *A Century of Universalism in Philadelphia and New York* (Philadelphia, 1872); Eddy, *Universalism in America, 1636-1886* (Boston, 1884-86), with full bibliography; id., *Universalism from Apostolic Times to 1893*, vol. x. of the "American Church History Series" (New York, 1894). There are also a number of published discussions and debates between advocates and opponents of Universalism, as those by Ely and Thomas (New York, 1835); by Campbell and Skinner (Utica, N. Y., 1840); by Holmes and Austin (Auburn, N. Y., 1848); by Sawyer and Westcott (New York, 1854). The chief periodical of the Church is the *Universalist Leader*, issued weekly by the Universalist Publishing House, Boston.

UNIVERSAL LANGUAGE. A phrase applied in the specific sense to languages artificially formed for the purpose of ready communication by persons whose natural language is different. The aim is to do away with the difficulties and irregularities with which historical accidents have encumbered the existing languages, and to construct, out of old materials or new materials, a language so simple and regular that any learner of any nation can acquire it with ease, and use it with precision. Most of the schemes proposed are meant to serve the purposes of business, travel, and correspondence; not to displace the existing languages, nor to serve as vehicles of literary expression.

A definite attempt at the formation of a scientific language was made by Bishop Wilkins in his *Essay Toward a Real Character and a Philosophical Language* (London, 1668). This was a classification of ideas and of words by ideas, and a scheme of characters, much like shorthand, to represent them. Various other schemes appeared, but none attracted serious attention. It was not till the last quarter of the nineteenth century that the time was ripe for a serious effort at either a scientific or a universal language. At that time the history and nature of language were better known, and the number of students of language was great enough to furnish, in the proportion interested, an intelligent public to receive such proposals.

Accordingly, when Johann Martin Schleyer published, in 1879, his famous 'world-speech,' Volapük, it attracted wide attention. (See Volapük.) The impulse given by Schleyer moved other inventors; and in a few years more than a dozen 'international languages' were put forth. The chief schemes were: (1) 'La lingvo internacia' ('Internationale Sprache'), by Dr. L. Zamenhof, under the pseudonym of 'Esperanto,' which name was later attached to the language itself, Warsaw, 1894; (2) 'Kosmos,' by Eugene A. Lauda, Berlin, 1894; (3) 'Spelin,' by Prof. G. Bauer, Agram, 1888; (4) 'Myrana,' by J. Stempfl, Kempten, 1889; (5) 'Lingua internationa' or 'Mondolingue,' by J. Lott, Vienna, 1890; (6) 'Universala,' by Dr. Eugene Heintzeler, Stuttgart, 1893; (7) 'Novilatiin,' by Dr. E. Beermann, Leipzig, 1895; (8) 'Idiom neutral,' by 'the International Academy of the Universal Language,' 1893-1903.

'Spelin' is formed on the same lines as Volapük, is simpler in its phonetic form and inflexional system, and is briefer. The first named, 'Esperanto,' after a long quiescence, has recently gained much attention, and has an active following in Europe and America. The phonetic basis of 'Esperanto' is the Latin alphabet, except *q* and *y*, and with the addition of five new letters (old letters with diacritical marks) for the sounds represented in English by *ch* (tsh), *j* or *g* or *dg* (dzh), *oh* (kh or χ), as in *loch*, *sh*, and *z* (*zh*), as in *azure*. The structure is simple. Every noun ends in *-o*, every adjective in *-a*. The present tense of verbs ends in *-as*, the past in *-is*, the future in *-os*. The conditional mode ends in *-us*, the imperative in *-u*, the infinitive in *-i*, the present participle in *-anta*, the past participle in *-inta*, the future participle in *-onta*. The persons are expressed by separate pronouns. Thus, *ami*, to love, *mi amas*, I love, *vi amis*, you loved, *li amos*, he will love, *ili amus*, they should love, etc. The vocabulary is taken mainly from Latin, with less change than Volapük allows. With a little practice, any educated person, who knows some Latin or French, can recognize nearly all the words. The context indicates the meaning of the more arbitrary words and the rest is easy. The language is, as it were, a 'composite photograph' of Latin, French, and Italian. English as such hardly appears.

The last-named scheme, the 'Idiom neutral,' developed out of Volapük, resembles 'Esperanto' in taking its vocabulary mainly from Latin or Romance, with the minimum of change; but it abandons the use of purely arbitrary formatives, preferring formatives taken from Latin or English. Thus *dom*, house, *domi*, houses. There are no case-endings at all, their place being supplied by prepositions (*de dom*, *a dom*, etc.). The verb goes thus: *Mi am*, I love, *vo am*, you love, etc., *mi amav*, I loved, *mi amero*, I shall love, *mi es amed*, I am loved, etc. The prepositions, conjunctions, etc., are chiefly adopted or adapted from Latin or French. The result is a 'composite photograph' of Latin and French, and the Latin side of English. The object of easy intelligibility is fairly attained. It is quite possible for an educated reader to read the 'Idiom neutral' upon ten minutes' sight, without the aid of either grammar or dictionary. So much of the text is intelligible on mere inspection that the rest may easily be inferred.

'Esperanto' and 'Idiom neutral' approach a principle which has been made since 1880 the basis of several attempts at an international language. That principle is to employ the historical Latin for the purpose, without mutilation or serious alteration, but with a free addition of modern terms in Latin form, and with a modernized syntax, the order of words, in particular, being conformed to that of the modern languages. In view of the universal use of the Latin vocabulary, with the Greek, as the basis of modern scientific nomenclature, and of the continued and inevitable use of Latin in all kinds of historical, literary, and ecclesiastical scholarship, the proposal to extend it, in an emancipated form, to the uses of ordinary international correspondence and commerce is not at all unreasonable.

Consult: Steiner, *Pasilingua* (Neuwied, 1885-88); Ellis, "On the Conditions of a Universal Language," in *Philological Society Transactions* (London, 1888); Bauer, *Der Fortschritt der Weltsprache-Idee* (Agram, 1888); Schleyer, *Volapük. Die Weltsprache* (Sigmaringen, 1881); id., *Volapük. Grammatik des Universalsprache* (4th ed., Ueberlingen, 1884); O'Connor, *Esperanto, the Universal Language* (New York, 1903); André, *Le latin: le problème de la langue internationale* (Paris, 1803). Monthly periodicals are *Lingvo internacia* (Paris); *L'Espérantiste* (Epernay).

UNIVERSALS. Characteristics or attributes of objects when regarded as common to an indefinite number of individuals. There have been philosophers who denied the real existence of universals (see NOMINALISM), and others who asserted that universals exist apart from and prior to the objects they qualify. See REALISM.

UNIVERSITY (Lat. *universitas*). A term which, as originally used, denoted any corporate body, community, or association regarded as a whole. In its modern sense, that of a corporate body devoted to study, teaching, and investigation, the term came into use in the fourteenth and fifteenth centuries. The institutions first so designated in this modern sense of the term came into existence some two centuries before the common use of the term, and others somewhat similar had existed in ancient times under Greco-Roman influence. There was at Athens, at the time of the Roman Empire, a university not only in all the essentials of a great centre of learning, but one that closely corresponded even to what we now mean by that word. Schools of philosophy and letters similar to those at Athens sprang up at other great cities of the Roman Empire—at Constantinople, at Alexandria, at Rhodes, at Marseilles, at Apollonia (Illyria), and at Rome itself. These, however, had little or no influence on mediæval institutions.

MEDIÆVAL UNIVERSITIES. The university, in a modern sense, originated during the twelfth and thirteenth centuries, as an outgrowth of schools which had existed prior to that time in connection with cathedrals and monasteries.

Throughout the eleventh and twelfth centuries there had grown up a new interest in dialectic, logic, and philosophy through the many theological controversies aroused by the earlier schoolmen and the heresies of the times; in Roman law through the controversies between the Holy Roman Empire and the Italian municipalities and the growing importance of canon law in Church administration; and in medicine on account of the Crusades and the contact with the East and with Saracen learning. When a teacher of eminence appeared, such as Abélard or Peter Lombard at Paris, or Irnerius at Bologna, a large number of students were attracted. This student body is said to have numbered 30,000 at Paris at the time of Abélard. Such a place of learning and concourse of students was called a *studium*, or later a *studium generale* to distinguish such a one from the more selected *clientèle* and function of the monastic or cathedral school. The addition of the subject matter of philosophy to the previous religious discussions, the new methods of treatment, and the greater freedom of thought were responsible for the building up of the first universities of Northern Europe, and the most influential of all mediæval universities, that of Paris.

The students were no longer necessarily destined for monastic or clerical life, though most of them were. At least the discipline was much less strict, and the students would not adapt themselves to the closely regulated life of monastery or cathedral. The students were no longer drawn from a restricted area, but were admitted from any region, and great numbers flocked to schools in foreign lands. Civil and canon law, medicine and theology were now added to the seven liberal arts.

The determining characteristic of the universities, however, was their specialization; each of the earlier universities was especially strong in some one line. At Salerno, in Southern Italy, in the early part of the eleventh century, the monks had given special instruction in medicine, and the fame of this new seat of learning spread with the First Crusade. During the twelfth century great attention was paid to the study of Roman law, especially in Northern Italy, where the instruction centred in Bologna, and notably so during the life of the great teacher Irnerius. In Paris theology was the subject of interest beyond all others, though the majority of students there were students of the liberal arts, not yet qualified for the study of theology.

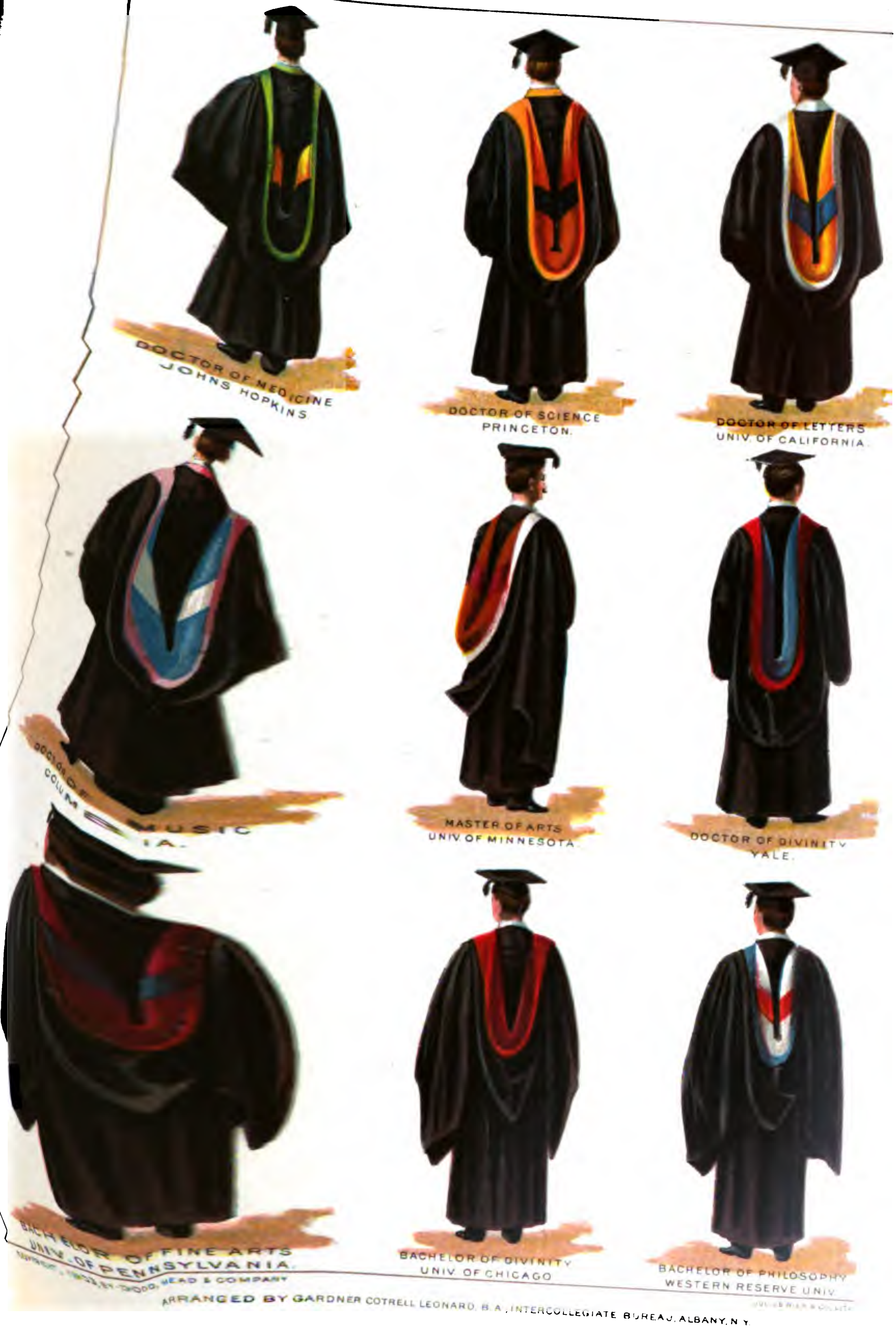
These groups of students and teachers, drawn together from the most distant regions, were controlled by no monastic rules, were amenable to no political authorities, and were practically without protection in their rights and privileges if any then existed. Organization was necessary, and the natural tendency was to organize on the basis of nationality. The 'nations' were the first organizations, and they, through their delegated officers, made the central organization of the body as a whole. Even before organization, as well as afterwards, such a body of students was termed a *studium generale*. To the organization the term *universitas* (corporation) was given, but never by itself alone. The terms most frequently used were *universitas magistrorum*, or *universitas magistrorum et scholarium*, or *universitatis collegium*. In the course of time the various nations and faculties, each at first a *universitas*, were united into one, the distinctions between the terms *studium generale* and *universitas* were lost sight of, and the latter term was used alone to indicate the general body instead of the constituent parts.

One great difference existed between the universities of Southern and those of Northern Europe. In the former, modeled as they were after Bologna, the students constituted the corporation; in the latter, modeled after Paris, the teachers controlled, if they did not always completely constitute, the corporation. The great reason for this distinction was that the students of the southern universities, especially those of Bologna, were mature students of law, capable of self-government, both on account of their age and the subject of study; while in the north they were the more youthful students of arts, many entering Paris at the age of twelve or thirteen.

The privileges which built up the universities were either local, bestowed to prevent removal elsewhere, or general, constituting them integral parts of Church and State. The State exempted members of the universities from financial and military services, save under exceptional circumstances; the Church bestowed the privilege of clergy, and above all the right to teach. When the student had demonstrated his ability to 'determine' and to 'define' the terms in the prescribed trivial (see TRIVIUM) texts he received the bachelor's degree. When he had demonstrated his ability to conduct a 'disputation,' that is, an exposition of the more advanced texts, through a public defense of a thesis, the master's or doctor's degree was conferred. This entitled the recipient to teach within the limits of the university. Toward the end of the thirteenth century Pope Nicholas III. granted to the University of Paris the right of endowing its graduates with the power of teaching everywhere, a privilege later conferred upon most universities. The degrees themselves were similar to and probably borrowed from the corresponding stages in the learning of a craft or in the organization of chivalry. The earlier stage was an apprenticeship, the close of which was marked by the conferring of the bachelor's degree; the following was a journeyman's period, during which the candidate pursued his studies, and at the same time practiced his art by teaching the younger students the trivial studies. The master or doctor had the right to teach at least in his own and usually in any university, and during the earlier period he was under obligations to teach in his own. In the course of time it became customary to endow a select number of the graduates as permanent public teachers; these privileged and salaried graduates were designated professors, and instruction by professors more or less supplanted the original plan of teaching by graduates. The *privat-docent* of the German universities now represents the modification of the old regent graduates.

The term 'faculty' was originally used in the most general sense of science or knowledge; later to indicate a department of study, as the Faculty of Arts. Then a more special connotation became not unusual, as synonymous with the 'consortum magistrorum' or 'council of masters.' By ordinary usage, however, the term was applied to the subordinate corporation of masters, or of masters and students in particular departments of learning. The University of Paris had at first only a Faculty of Arts, which existed in an organized from as early as 1169. In the thirteenth century Faculties of Theology, Medicine, and Canon Law were added. These, with the Faculty of Civil Law, constituted the organization of the typical mediæval university, though not all universities had all faculties represented even at the Renaissance period. The primary units of organization of the universities were the nations, though by the fourteenth and fifteenth centuries these were succeeded in importance by the faculties. In Paris the Faculty of Arts was divided into four nations, known as French, Picard, Norman, and German or English. After the thirteenth century these four nations, under their respective procurators, and the three faculties subsequently added, under their deans, constituted the seven component parts of the university. The procurators and deans elected the rector of the university, its highest officer, who possessed executive authority of a delegated nature. The rector with

ACADEMIC GOWNS—AMERICAN USAGE.



DOCTOR OF MEDICINE
JOHNS HOPKINS

DOCTOR OF SCIENCE
PRINCETON.

DOCTOR OF LETTERS
UNIV. OF CALIFORNIA.

DOCTOR OF MUSIC
COLUMBIA.

MASTER OF ARTS
UNIV. OF MINNESOTA.

DOCTOR OF DIVINITY
YALE.

BACHELOR OF FINE ARTS
UNIV. OF PENNSYLVANIA.

BACHELOR OF DIVINITY
UNIV. OF CHICAGO

BACHELOR OF PHILOSOPHY
WESTERN RESERVE UNIV.

COPYRIGHT, 1902, BY DODD, MEAD & COMPANY

ARRANGED BY GARDNER COTRELL LEONARD, B. A., INTERCOLLEGIATE BUREAU, ALBANY, N. Y.

JULIUS BIEN & CO. LITH.

the procurators and the deans formed a court having cognizance of all matters relating to discipline, from which there was an appeal to the university and thence to the Parliament of Paris. The chancellor, after the rector, was the highest in authority, though that authority was confined to the conferring of degrees. Originally the chancellor was the immediate representative of the archbishop to whom had previously belonged the right of conferring the privilege of teaching. The details of organization, as well as the designation of the officers, varied considerably in the early universities, though in general they were all modeled on Paris or Bologna. In the latter city the *universitates* were to be distinguished from the *collegia.* The former were two in number, the *ultramontani* and the *citramontani,* which were composed exclusively of the students of law organized into constituent nations, thirteen in one case and fourteen in the other, each presided over by its procurator and counselors. The *collegia* were organizations of professors and doctors that had control of the conferring of degrees. These colleges were of the Doctors of Civil Law, Doctors of Canon Law, Doctors of Medicine, and, from the middle of the fourteenth century, Doctors of Theology. The general control of the Studium Generale, however, was in the hands of the universities later combined into one.

The colleges, as they developed in other countries, were quite different institutions from those of Bologna. They arose through provisions that were made for poor students in connection with hospitals or monastic foundations. The necessity for some more domestic supervision of young students, combined with the other tendency, led to the foundation of Halls. These in turn were endowed with corporate privileges as well as property, and the term college, previously a general term as *universitas* itself had been, was appropriated by these institutions. They soon assumed the character of boarding houses for all classes of students, where they were privately trained and prepared for public lectures. In some universities the lectures came to be given in the college, first the extraordinary, then the ordinary, until the general university lectures almost disappeared, and no student was admitted except as a member of a college. Many of these colleges were identified with particular faculties, or even departments of faculties. Probably the earliest college of all, which served as a type for the others, was the college of the Sorbonne (q.v.), founded about 1250 in the University of Paris, which came to be identified with the theological faculty.

Details concerning the early history of the universities, their development and their present organization will be found in the articles on the individual universities. The early organization of universities has been best adapted to the needs of the present by the German universities, and is more specifically treated in that section.

English Universities. These are of two distinct types: those that date from the Middle Ages, Oxford and Cambridge, and those founded during the nineteenth century. The two former have had a profound influence upon national development and national life, for in no other country have universities been more intimately connected with the religious, political. and literary development. The details of the history and present organization of these two universities, together with the literature of the subject, will be found under the titles CAMBRIDGE and OXFORD. During the nineteenth century four universities of the modern type were founded, all laying especial stress on the study of the sciences and the technical branches. These are Durham University, founded in 1832; University of London, founded in 1836; Victoria University, founded in 1880; and Birmingham University, founded in 1900. The first is treated under DURHAM and the second and third appear under their respective titles. Birmingham University was organized on plans similar to those of London and Victoria universities, with Mason College as a nucleus. The university is governed by a chancellor, principal, and a court of governors consisting of the faculties or certain members thereof. Four faculties have been established, those of arts, science, medicine, and commerce, but degrees are also to be given in science and engineering. The aim in the establishment of this institution is to bring university work into more direct relations with industry and commerce. The university began work in the autumn of 1902 with the Rt. Hon. Joseph Chamberlain as chancellor.

Scotch Universities. These were mostly founded during the fifteenth century, and resemble the Continental, especially the German universities, more than they do the English. The mediæval character clung to them until 1858, when by statute the universities were reorganized. See SAINT ANDREWS; ABERDEEN; GLASGOW; EDINBURGH, UNIVERSITY OF.

Irish Universities are those of Dublin and Queen's University, including Queen's College at Belfast, Cork, and Galway. Under DUBLIN, UNIVERSITY OF, and QUEEN'S COLLEGE will be found the information relating to these universities.

Canadian Universities are those of Montreal and Toronto. There are fourteen other institutions of degree-giving rank in Canada, mostly on denominational foundation, and twenty-four institutions of higher learning, usually termed colleges, that give no degrees.

Australian Universities exist at Sidney, at Melbourne, and at Adelaide. The first was founded in 1851 and is affiliated with the University of London. There are four faculties—arts, law, medicine, and science. While the university is non-denominational, there are statutory provisions for facilitating the erection of colleges in connection with different religious bodies, and such colleges representing the Episcopal, Presbyterian, and Roman Catholic Church have been established. In 1901 the student body numbered 657. The University of Melbourne was established and endowed by royal act in 1853. There are three affiliated colleges in connection with the Church of England, the Presbyterian and the Wesleyan churches; also an affiliated school of mines at Belfast. The student attendance in 1901 was 647. The University of Adelaide was incorporated in 1874 and has been endowed chiefly by private benefactions. Faculties are organized in arts, sciences, medicine, law, and music. The number of matriculated students in 1901 was 316.

The University of New Zealand was founded in 1871 and later empowered to confer degrees in the four faculties. In 1874, by union with the University of Otago (founded in 1869), the functions of the former institution are restricted to its giving examination and conferring degrees, while the latter became an affiliated college. A College of Mines was later established. The attendance in the constituent colleges at Dunedin, Christchurch, Auckland, Wellington, and Canterbury was 783 in 1901.

The Universities of India, with the dates of their establishment, are as follows: Calcutta, 1857; Bombay, 1857; Madras, 1857; Punjab, 1883; and Allahabad, for the Northwest Provinces (United Provinces of Agra), in 1887. For the most part the instruction is given in numerous affiliated colleges. Faculties in arts and philosophy, medicine, law science, and engineering exist. Instruction is usually given in English, though in the Oriental College of the Punjab University instruction is in the vernacular. The more than fifty colleges of the University of Punjab are affiliated with the University of Cambridge.

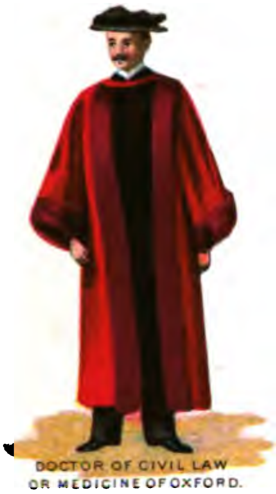
French Universities take their origin from the University of Paris, the first great university of Northern Europe. (See Paris, University of.) In the greater part of the nineteenth century the word university had a widely different meaning in France from that which it conveyed in other countries, the term 'Université de France' being nearly equivalent to 'national system of education of France.' The French Revolution put an end to the universities of the *ancien régime,* and the attempts of the Convention to establish similar institutions were short-lived. Napoleon organized a comprehensive system of higher education in one unified whole—the University of France. This was placed directly under the control of the Government, administered from Paris, and made an instrument of government in the hands of the central power. Higher education was given under fifteen faculties in each of the educational districts. These faculties were preëminently examining and degree-conferring bodies. The courses of study were strictly controlled from Paris, and the work was almost wholly of a professional and practical character. This organization, with various alterations, continued until 1896. While the various faculties of law, theology, medicine, science, and literature existed in most of the different educational districts, the so-called academies, in no case save at Paris were they organized into a university. The law of 1896, which went into effect January 1, 1898, created fifteen autonomous universities in place of the previous unified university with scattered faculties. While much of the control of the institution is still exercised by the Minister of Education and the authorities at Paris, yet much local autonomy is exercised in respect to examinations, degrees, and supplementary courses of instruction. The support of these institutions is now left largely to the localities. This stimulates local pride and activity, and many of the localities have made great additions to the material equipment and plant of the institution. Private munificence can now also be accepted, and it has been given in some instances. The universities in the smaller towns, however, have suffered considerably from the change, for while the change has largely increased the student attendance, yet this has been for the most part to the advantage of the universities in large cities, such as Paris, Bordeaux, and Lyons. The local universities are also under the necessity of supporting the course of study given outside of the State programme.

The reform of 1896 was quite as important in regard to methods of study as in regard to administration. New emphasis is laid upon the work of investigation. The professional student is now given an opportunity for doing this, and in some faculties is expected to do it previous to receiving a degree. The change has especially benefited the Faculty of Science and Arts, which previously had had no regular students, since all courses were public and free and were consequently attended chiefly by chance comers. The same reform provided for the opening of the universities to foreigners and the reëstablishment of the doctorate. The attendance of foreigners, especially Americans, has increased constantly since the reforms were instituted. The number of professorships has also been largely increased. The university system now includes two faculties of Protestant theology, thirteen faculties of law, seven faculties of medicine, fifteen faculties of science, fifteen faculties of letters, and four mixed faculties (Bordeaux, Lille, Lyons, Toulouse). The local universities in addition to the four just mentioned are Paris, Aix, Marseilles, Besançon, Caen, Clermont, Dijon, Montpellier, Nancy, Poitiers, and Rennes.

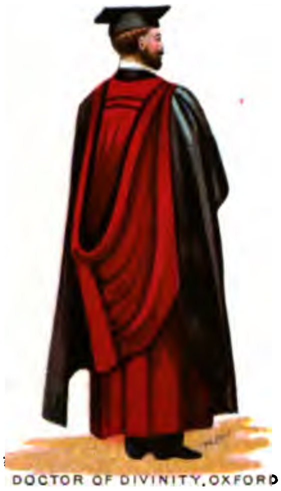
German, Austrian, and Swiss Universities. The early German universities were modeled after the University of Paris, though the University of Bologna had considerable influence on the universities of the South German States; and it is in the German universities that the general organization or structure of the mediæval universities is best preserved. Unlike the early universities of France and Italy, those of Germany were not of gradual growth, but were all created and chartered by both King and Pope and often by the Emperor as well. There were seven of these founded in the period to which all the early universities belong, that is, to the period previous to the Renaissance movement. The earliest of all was that of Prague, authorized by Pope Clement VI. in 1347, and by the Emperor Charles IV. in the following year. Then followed Vienna, in 1365; Heidelberg, in 1386; Cologne, in 1388; Erfurt, in 1393; Leipzig, in 1409; and Rostock, in 1419. It is only this group of German universities that incorporated the original organization into nations, and even in these the nations ceased to have any essential importance in the sixteenth century. Leipzig grew out of a secession of 5000 students and teachers from Prague, owing to hostility between the German and Bohemian students, and consequently the organization into nations was important, and continued to exist as a form until the nineteenth century. All these universities yet exist, save Cologne and Erfurt, which disappeared during the period of the French Revolution. The humanistic movement of the fifteenth and early sixteenth century produced nine new universities, four of which, Greifswald, Freiburg, Basel, and Tübingen, still exist. One of the others, Wittenberg (founded 1502) was the most influential of all during the later part of the sixteenth century.

The third period in the history of German universities is that of the Reformation and Counter-reformation, to the close of the seventeenth century. Twenty new foundations date from these two centuries, ten of them Protestant

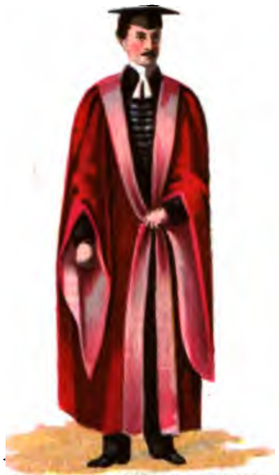
ACADEMIC GOWNS – BRITISH USAGE.



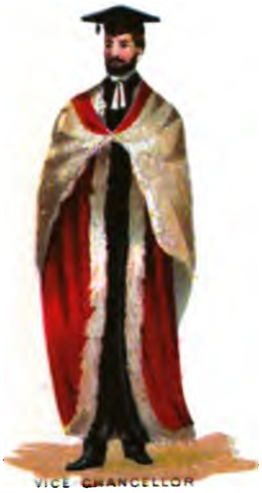
DOCTOR OF CIVIL LAW
OR MEDICINE OF OXFORD.
(FULL DRESS).



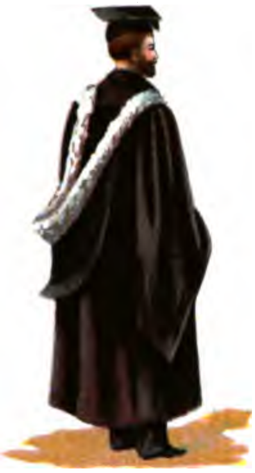
DOCTOR OF DIVINITY, OXFORD
(CONVOCATION ROBE).



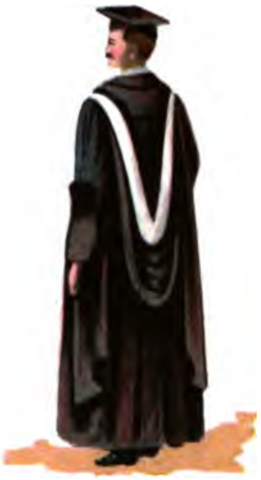
DOCTOR OF LAWS OR DIVINITY
CAMBRIDGE.



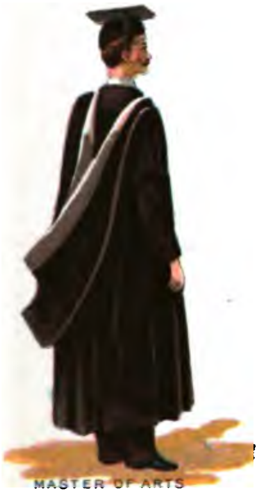
VICE CHANCELLOR
CAMBRIDGE.



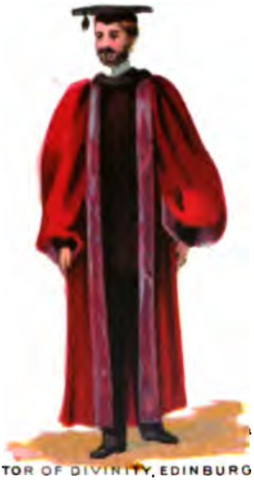
BACHELOR OF ARTS
OXFORD.



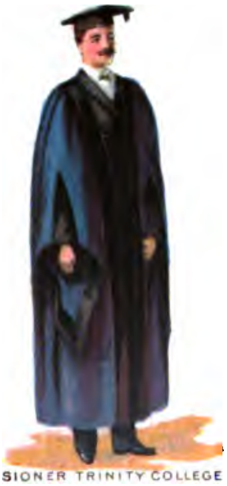
MASTER OF ARTS
CAMBRIDGE.



MASTER OF ARTS
EDINBURGH.



DOCTOR OF DIVINITY, EDINBURGH
(FULL DRESS)



PENSIONER TRINITY COLLEGE
CAMBRIDGE.

COPYRIGHT, 1903, BY DODD, MEAD & COMPANY

JULIUS BIEN & CO. LITH N.Y.

ARRANGED BY GARDNER COTRELL LEONARD, B. A., INTERCOLLEGIATE BUREAU, ALBANY N.Y.

and ten Roman Catholic. Half of each group has ceased to exist or continue merely as theological faculties under the control of the Church. These foundations were due for the most part to the territorial divisions caused by the religious dissensions, and throughout the period religious interest dominated all the universities, old and new. Consequently the influence, the spirit of the teaching, the manner of life was much more restricted during this period than in any other. The theological studies dominated. Toward the close of this period the universities of Germany sank to the lowest level of influence and importance, nor was the character of the work much higher. The court schools and circles of learning outshone the universities themselves.

The new era of the eighteenth century was ushered in by the foundation of Halle (1693) and Göttingen (1737). These two institutions marked the recovery from the stagnation of the seventeenth century. Halle was established in the interest of Lutheranism to combat some of the religious tendencies of the time, but soon outgrew the bounds originally set for it, especially under the influence of the famous Thomasius and Francke. Thomasius was the first to abandon the use of Latin for the German in the lecture room, and his example was soon followed to a greater or lesser extent throughout Germany. A further characteristic of this period was the dominance of the new rationalistic philosophy over the old scholasticism. The new philosophy recognized no bounds of authority, and the spirit of inquiry now came to be the dominant spirit of the universities. Instead of the merely formal study of the ancient classics, the various branches of philology were now recognized and pursued. The critical study of history also began. Halle and Göttingen dominate the eighteenth century and are recognized as the first universities of the modern type.

The present period, in which the scientific spirit of the nineteenth century is preëminent, opened after a period of upheaval consequent upon the Napoleonic wars. Nine of the old universities were suppressed and four combined with others. One of the measures adopted by the Prussian Government was the reformation of existing universities in the direction of greater freedom of thought, and the founding of the new University of Berlin in 1809. The influence of Berlin on other German universities has been paramount. Many antiquated and useless features have been abandoned and during the past century professorships in every branch of learning were established. The University of Bonn was founded in 1818 and has rapidly gained preëminence, especially in philosophy and philology.

At present the German universities are strictly State institutions and are subject to the 'Minister of Ecclesiastical, Educational, and Medical Affairs' of the respective States in which each is situated. Each, however, enjoys a high degree of autonomy and their constitutions are essentially republican. The internal administration of the university is in the hands of a rector, or, in case this title is borne by the sovereign, a prorector, a dean of each faculty, the senatus academicus, and the quæstor or treasurer. The discipline of the university over its students is maintained by means of a 'University Court,' composed of certain members of the faculty of law. The penalties inflicted are reprimands, fines, imprisonment in the University *Carcer*, deprivation of credit, suspension, and expulsion, the two latter holding good not only for the one but for all German universities. Aside from this the university exercises no control over its students, and there are, save in a few exceptional instances, no such institutions as colleges, halls, or dormitories. The term faculty signifies either (1) the teaching body, especially the full professors, or (2) the teachers and students in one of the great divisions of the university. At every German university there are faculties of law, medicine, philosophy, and either Protestant or Roman Catholic theology. In a few, such as Munich and Strassburg, an additional faculty in political science or in natural science has been organized. The teaching body of a German university consists of (1) full professors (*ordinarii, ordentliche Professoren*), (2) extraordinary professors (*ausserordentliche*), and (3) *Privatdocenten.* To these are to be added (4) readers (*lectoren*), appointed to give practical instruction in modern languages; there are also (5) masters of dancing, fencing, riding, etc., whose connection with the university is often merely nominal. The full professors are the occupants of chairs intended to be permanent foundations; they alone sit in the Senatus Academicus, and are alone eligible to the rectorship and deanships. The extraordinary professors are either younger men, to whom the professorial title has been granted by the Government for distinguished work, or they represent subjects in which no permanent chairs have been established; sometimes both conditions are exemplified in the same individual. The *Privatdocenten* are graduates who receive permission to lecture, but receive no official appointment and depend for their remuneration for the most part upon fees received from students. They are not subject to the authority of the professors, but from them are selected the *ausserordentliche Professoren.*

The only degrees given by the German universities at the present day are those of doctor and licentiate; the latter is given only in theology. The university degrees do not, as such, admit the recipient to the exercise of his profession in the Church, law, medicine, or the higher teaching service; for this, the passing of the State examination is necessary.

For a list of German, Austrian, and Swiss universities, see articles on the respective countries. The principal universities are described in separate articles.

ITALIAN UNIVERSITIES. During the Middle Ages the university movement had its origin and received its greatest impulse from Italy. The importance of Bologna in this respect has been discussed under the section on *Mediæval Universities.* Again, during the fifteenth and sixteenth centuries the Italian universities were the most important centres in all Europe of the new humanistic studies. While the new methods and subjects of study introduced by these Italian universities produced a complete academic revolution and paved the way for the Reformation, they possessed a fortunate immunity from dissensions like those which distracted the centres of learning in Northern Europe, especially Germany. The status of the professors in Italy was higher than in any other country. Nevertheless the universities suffered greatly from the general decline of the seventeenth and eighteenth centuries and did not recover with the early nineteenth, as did those of the Northern European countries. While they preserved their ancient organization and local independence, they suffered both from a great decrease of revenue and from the political disturbances of the Italian States. After the political unification of Italy in 1870 the Government nationalized the universities, by assuming their support and management and confiscating their property. Since that time the universities are included as a component part of the public system of education. There are seventeen of these State universities and four free universities—that is, supported by the local districts and municipalities. Consequently the opportunities for higher education are very much in excess of the needs of the population. Very few of these universities possess theological faculties, and the theological studies are little valued. Education for the Church is given in seminaries controlled by the Church and in its ecclesiastical character is most complete. The theological schools of Rome draw students from all quarters of the world, and in conjunction with them there is a system of national colleges for the students of the several countries. Faculties of philosophy do not exist in the free universities and are poorly attended in the State institutions. The faculties of medicine and of law possess an overwhelming preponderance of all students. The State universities are those of Bologna, Cagliari, Catania, Genoa, Macerata, Messina, Modena, Naples, Padua, Palermo, Parma, Pavia, Pisa, Rome, Sasseri, Siena, and Turin. The free universities are those of Camerino, Ferrara, Perugia, and Urbino.

Dutch and Belgian Universities. The universities of the Netherlands, which, like the later foundations of Germany, grew out of the Reformation struggles, were founded by the State for the especial purpose of training the clergy.

At the present time the Dutch universities are Leyden, Groningen, Utrecht, and Amsterdam, the last founded in 1877. These universities possess a uniform organization and are completely controlled by the State. The subjects of study and the examinations are determined by statute. Consequently there is little individuality among the universities and little to lead a student to prefer one institution to another. There are no colleges or halls, and no oversight of the students by the faculty. The Dutch universities are closely modeled after the German, but do not possess their flexibility. The character of student life, of methods of instruction, of conditions of examinations, of degrees conferred closely approximate those of the German universities.

Belgium now has four universities, two of which, Liège and Ghent, are State universities similar to those of the Netherlands, while Louvain is controlled by the Roman Catholic Church, and Brussels is a free establishment.

Spanish and Portugese Universities. There are at present nine universities in Spain, an additional law faculty at Oviedo, and a medical faculty at Cadiz. The universities are located at Barcelona, Granada, Madrid, Salamanca, Santiago, Seville, Valencia, Valladolid, and Saragossa. Each possesses two or more of the faculties of law, medicine, pharmacy, and science. Tuition charges are high and the universities depend almost wholly upon this source of revenue. For the most part the Spanish universities resemble in organization the French faculties previous to the reforms of 1896 and are not in a flourishing state. The largest is that of Madrid, with 95 professors and more than 5000 students in 1901. Portugal has one university, whose location in the early centuries of its existence alternated between Lisbon and Coimbra, but which is now at the latter place. There are faculties of theology, law, medicine, mathematics, philosophy, and a school of design. See Coimbra, University of.

Russian Universities are of two classes: those that are practically universities of the German type and date from the Reformation period, and those typically Russian. There are two of the former: Dorpat, founded in 1632 (see Yuriev, University of), and Helsingfors, in Finland, founded in 1640 by Queen Christina. The latter is a flourishing institution in the midst of a cultured people possessing a system of universal and compulsory education. Both the population which supports it and the institution itself are more closely allied to the Scandinavian countries than to Russia. The seven Russian universities are as follows: Moscow, founded in 1755; Saint Vladimir at Kiev, founded in 1832; Kazan, founded in 1804; Kharkov, founded in 1804; Warsaw, founded in 1816; Saint Petersburg, founded in 1819; Odessa, founded in 1865; and Tomsk, founded in 1888. In most of them the faculties are of history, science, jurisprudence, medicine, and languages. The attendance varies from about 5000 at Moscow to about 500 at Tomsk. In addition to the universities there are six theological schools and various medical and technical schools not represented in the university faculties.

Greece. No institutions of higher learning existed in Athens during modern times until after the liberation of the Greeks in the early part of the nineteenth century. In 1837 King Otho established the University of Athens, closely modeled after the universities of Germany. The four faculties of law, medicine, theology, and philosophy were created, with the power of appointment lodged with the King, who appointed mainly Germans. Since 1882 the right of nomination has been exercised by the faculties.

Scandinavian Universities. All State institutions since the Reformation have been strongly Lutheran in their character and are closely associated with the national Church. They were founded on the model of German universities and for the most part reproduce the present features of these. They are as follows: Upsala, in Sweden, founded in 1477; Copenhagen, in Denmark, founded in 1479; Lund, in Sweden, founded in 1666; and Christiania, in Norway, founded in 1811. The attendance varies from 2000 at Copenhagen to 650 at Lund. In addition to these universities there are in Sweden a State medical faculty at Stockholm, and private philosophical faculties at Stockholm and Göteborg.

American Universities. In the United States popular usage employs the terms 'university' and 'college' indiscriminately for any higher institution of learning which possesses the power of conferring the usual academic degrees. This confusion prevails also in official nomenclature, for some of the oldest, richest, and most completely equipped of our universities still bear the name of 'college,' while in certain parts of the country institutions inferior in endowment and in scholarly distinction to some of the secondary schools are officially designated as 'universities.' Harvard and Yale, though long since equipped with the amplest facilities for university work, have only very recently put aside the name of 'college,' and the same is true also of Columbia and Princeton.

Classified with reference to their pedagogic character, American universities may be roughly grouped under two general heads: (1) Universities that are equipped for the prosecution of original investigation and research in the various departments of study, besides usually having connected with them the various professional schools, representing the faculties of law, medicine, theology, and natural science; and (2) universities, so called, that perform chiefly the disciplinary and preparatory work similar to but somewhat more advanced than the work of the German Gymnasium (q.v.). Institutions of the second class have a course more or less prescribed (see ELECTIVE STUDIES) leading to the degree of Bachelor of Arts, and in some cases to the alternative degrees of Bachelor of Science, Bachelor of Letters, or Bachelor of Philosophy. With the granting of such degrees the responsibility of the institution usually ends, though some of the universities offer facilities for advanced lines of study. But in all the 'undergraduate courses' leading to the baccalaureate degree is the most important portion of the curriculum.

Of the former class, to which in the best usage the term university is now restricted, are Harvard, Yale, Columbia, Princeton, Michigan, Johns Hopkins, Clark, Pennsylvania, California, Chicago, Cornell, New York, and the Catholic University of America at Washington. The last is the only institution of all this class that does not now offer the preparatory collegiate work, but confines itself wholly to post-graduate instruction. However, in most of these less stress is laid upon the collegiate work than upon the more original work performed by those who have already received the first degree in arts and science, and who are consequently engaged in the special or professional investigations that are to fit them for their life's work. In the remainder of these, and in many similar institutions bearing the name university, the chief emphasis is upon the undergraduate work, though the advanced and progressive work is also represented and the title of university is appropriate. Such are the State universities of Virginia, California, Michigan, Indiana, Minnesota, and several other States, Boston University, and Princeton University. So far as the advanced work is carried in these institutions, it is in no wise inferior to that of institutions laying the chief stress on graduate investigation and instruction. In no case is there an institution comparable to the universities of Oxford and Cambridge, made up of constituent colleges doing undergraduate work; nor, on the other hand, universities in the German sense of the term. The one institution that confines itself wholly to graduate work is a denominational institution, and hence does not furnish a parallel, since it draws only from a restricted clientele.

The influence of the German universities, however, has been most instrumental in developing advanced instruction in American institutions. The first American to graduate at a German university was Edward Everett, who received his doctor's degree at Göttingen in 1817. During the next few years this example was imitated by four or five others, among them George Bancroft, who received his degree in 1820. Not until after 1840, however, were any great number of American students attracted to the German universities. From that time a constantly increasing number pursued such a course and returned to affect immediately the work of American institutions. As early as 1800 Harvard College had accepted resident graduates, and announced their names as students. A varying number, never over twelve, continued each year until 1860, when Harvard first definitely announced in its catalogue that such students would be accepted and provided for, and three years later announced a series of graduate courses.

Meanwhile Yale College had preceded Harvard in the development of graduate work. In 1847 a 'department of philosophy and arts' was organized for 'scientific and graduate study.' This department was expanded until in 1860-61 it was divided into (1) the Sheffield Scientific School and (2) the special courses in philology, history, philosophy, etc., and the announcement was made that the degree of Doctor of Philosophy would be conferred, as was done for the first time at the close of that year. In 1872 the graduate work was organized into a separate department, as the first distinct graduate school. In the same year Harvard announced that it would confer the advanced degree, but it was not until 1890 that a separate graduate school was organized. Other institutions, such as Columbia, Michigan, Cornell, and Princeton, soon followed the example of the older institutions in providing for advanced degrees and in the case of the Master's degree some even preceded the older institutions. In the case of Cornell University, opened in 1868, the graduate work and graduate degrees were planned from the beginning. The Johns Hopkins University, founded in 1876, has been the most influential of all factors in developing university work similar to that of the German universities. Here first was found an institution devoted chiefly to the training of advanced students; here first were found the opportunities for research along the line of all the social and natural sciences, literature, and philosophy; here first was the organization of work similar to that of German institutions and the same freedom and opportunity of wide choice given to the student. For many years the men trained at this university exerted the greatest influence toward the introduction of similar work in other institutions where the university work was developing out of the old collegiate work. A second great influence is that exerted by Harvard University during the incumbency of President Eliot. Nowhere else has the close and beneficial relationship that may exist between the graduate and undergraduate work been so demonstrated. A similar influence was exerted upon State universities, which for the most part are only colleges with non-graduate professional schools added, and by the graduate instruction both in natural and the social sciences by Cornell University, ample provisions for which were made at its foundation in 1868. More recently several other institutions have vied with these in the importance of their university work, notably two, which now lead all the others in graduate attendance, namely, Columbia University and the University of Chicago. Columbia as reorganized in 1890 provided for graduate work, in a graduate faculty of philosophy, of political science, and (in 1893) of pure science. Since then the faculty of medicine and the faculty of law have become graduate faculties, and the faculty of education (see TEACHERS COLLEGE) provides for a large number of graduate students. In numbers pursuing graduate studies this university now leads. The University of Chicago, founded in 1891, has laid the greater emphasis upon graduate work from the beginning and has introduced a number of novel features, some imitations of features of English universities, some of German, and some original. Several of these, such as the continuous session, and the publication department, as an important phase of the university work, seem destined to come into general acceptance.

The degrees conferred by universities for advanced work are usually those of Master of Arts (A.M.) and Doctor of Philosophy (Ph.D.), though sometimes the Master of Science (M.S.) and the Doctor of Science (D.S.) are also given. The tendency now in both the graduate and undergraduate work of universities is toward giving a single degree (A.B., A.M., and Ph.D.) upon the completion of any one of a number of allied courses. The requirements for the Master's degree show considerable variation among the different institutions. The degree usually indicates one year of resident graduate work beyond the bachelor's degree, though it is still frequently given *honoris causa*. The minimum for the Doctor's degree is two years' work beyond the baccalaureate, including the preparation and usually the publication of a thesis. In most cases the doctorate requires three years of graduate work. In 1873 there were 43 doctorate degrees conferred, 25 of which were upon examination. By the close of the century this number had increased to from 300 to 350 each year, with less than five per cent. given *honoris causa*. The graduate students in twenty-five institutions number four thousand. See DEGREE.

Complete freedom of choice is, as a matter of course, given to the student in the selection of his studies, as is now the usual, or at least the frequent custom in undergraduate studies. (See ELECTIVE STUDIES.) Consequently the A.B. degree as well as the Ph.D. does not indicate the mastery of any particular subject or subjects. The German custom of requiring the student to select a major and one or two minor subjects prevails in most universities, though Harvard and Yale simply require that the kind and amount of the work be satisfactory to the appropriate committee. The present tendency in other institutions is away from this division into majors and minors. The amount of time or number of courses included in a major or minor varies with the university. A major for a Doctor's degree ordinarily represents two courses of two or three or four hours weekly for two or three years, as the case may be. It is often more in amount. The minor is ordinarily one-half of the above requirement. The greatest variety of choice is offered the student for his selection of majors and minors.

The teaching staff is composed of professors, adjunct or associate professors, assistant professors, instructors, tutors, and assistants. The American professor is always a teacher, and the amount of his time that must be devoted to actual lecturing and teaching is usually prescribed for him by the college regulations; it is ordinarily from eight to twelve hours per week. He has not the privilege accorded to the German professor, of 'reading' or not, but must every year go through a certain number of courses of instruction, besides being expected, in many of the colleges, to assume a certain amount of responsibility for the morals and discipline of the undergraduates. This is a very serious obstacle in the way of his ability to carry on independent investigation and research, and makes the American professoriate a comparatively sterile body, though an improvement in this respect has been very noticeable in the past few years. The university instructor is now expected to be not only a director of investigation and an investigator himself, but he is also expected to publish the results of his investigations. The same kind of work is also coming in increased amount from the colleges, though there the instructor must spend the greater part of his time (from 15 to 20 hours per week) in class instruction. Harvard, Yale, Chicago, Cornell, Columbia, the Johns Hopkins, Clark, and other universities have now largely adopted the German conception of the professorial function, and allow the individual professor much greater liberty in the discharge of his duties than was formerly the case. Harvard, Columbia, Yale, Chicago, and Cornell have likewise adopted the laudable plan of allowing each professor one year's leave of absence in seven, though with some diminution of salary.

In organization the universities differ considerably, especially as to detail and local arrangements. In general the organization is into faculties of philosophy, pure science, applied science, medicine, law, etc., presided over by deans, who are administrative rather than educational heads; the faculties are divided into departments, of Greek, mathematics, etc., presided over by a head professor, who usually exercises a general control over the work of the department. To him the associate professors, tutors, etc., in the department are responsible. He arranges the subjects of study, assigns the work of the subordinate instructors, and reports to the president or chancellor from time to time upon the work accomplished. In other universities the departmental organization is wholly democratic, in which the only headship is the formal one of seniority. The president (or chancellor) exercises a general supervision over the entire institution, and is the medium of communication between the faculty or faculties and the 'trustees,' 'overseers,' 'regents,' or 'governors' of the university—a body with whom usually rests the ultimate sovereignty of the institution, and who have exclusive control of the finances. These men are generally a body with the right of coöptation; but in some institutions, as in Harvard and Dartmouth, the graduates elect a certain proportion of their number. In some of the State universities, as, for instance, the University of Michigan, the regents are elected by popular vote, and in others are appointed by the Governor, and in both cases the office has a semi-political significance. The right of interference with the internal concerns of the university is not always actively exercised.

The organization of the professors and instructors in American universities differs widely. In the institutions where most of the work is in arts and science there is generally a single faculty. In the larger universities the faculties are often wholly distinct, the president acting as the only bond between them. Each faculty, then, legislates independently of the others on matters affecting its own local interests, while questions affecting the university as a whole are left largely to the board of trustees, advised by the president and sometimes by the faculties.

From what has been said concerning the relation of colleges and universities, it will be readily seen that it is impossible to give any statistics covering all university work in the United States. There are few colleges that do not undertake the direction of the work of a graduate student for a year; and, on the other hand, there are very few institutions that devote even their major energies to advanced work. There is no institution comparable to the German university. While the line between graduate and undergraduate work is distinct, there are no such demarcations of institutions. The United States Commissioner of Education in his report for 1901 gives statistics for 647 universities, colleges, and technical schools of degree-giving rank. Four hundred and seventy-three of these are colleges and universities for men or for both sexes; of these 336 are open to both men and women, and 137 admit men only to the undergraduate department. The total attendance in these institutions for the year 1900-01 was 103,351; of these 75,472 were men and 27,879 were women. This is an increase of 68 per cent. for men and 159 per cent. for women during the decade. These institutions conferred degrees upon 11,463 men and 5050 women completing the course of study during that year. The number of professors and instructors in these institutions was 23,041; of this number 14,900 were in the 473 colleges and universities of the first group. The total value of the property possessed by the 473 colleges and universities was $391,230,784; of this sum $177,000,000 was in permanent endowment. One hundred and sixty-four of these institutions had no endowment, while thirty possessed more than one million each. The total income of the 473 institutions for the year was $33,359,612, and the benefactions $18,040,413.

BIBLIOGRAPHY. *Ancient Universities:* Capes, *University Life at Ancient Athens* (London, 1877); Mahaffy, *Old Greek Education* (New York, 1882); id., *The Greek World Under Roman Sway* (ib., 1890); Monroe, *Source-Book On the History of Education for the Greek and Roman Period* (ib., 1901). *Mediæval Universities:* The most recent and best reference book is Rashdall, *The Universities of Europe During the Middle Ages* (Oxford, 1895). Consult also Denifle, *Die Universitäten des Mittelalters bis 1400* (Berlin, 1885); Paulsen, *Geschichte des gelehrten Unterrichts* (Leipzig, 1896-97); Raumer, *Geschichte der Pädagogik* (Gütersloh, 1882); Zarncke, *Die deutschen Universitäten im Mittelalter* (Leipzig, 1857). More popular and briefer sketches of the entire subject are Compayré, *Abélard and the Origin and Early History of Universities* (New York, 1895); Laurie, *Rise and Early Constitution of Universities* (ib., 1895). A good bibliography is given in Cubberly, *Syllabus on the History of Education* (New York, 1902). For the German universities in particular, Paulsen, as above; Kaufmann, *Geschichte der deutschen Universitäten* (Stuttgart, 1888-96); Döllinger, *Die Universitäten sonst und jetzt* (Munich, 1871); Sybel, *Die deutschen Universitäten* (Bonn, 1874); Conrad, *The German Universities for the Last Fifty Years* (Eng. trans., with introduction by James Bryce, Glasgow, 1885). Yearly statements of lectures with information are given in Acherson, *Deutscher Universitäts-Kalender* (Berlin), and the *Deutscher Akademisches Jahrbuch* (Leipzig). For American treatment, Burgess, *The American University* (Boston, 1894); Butler, *The Meaning of Education* (New York, 1898); Eliot, *Educational Reform* (ib., 1898); Ladd, *Essays on Higher Education* (ib., 1899); Thwing, *The American Colleges and American Life* (ib., 1897); id., *American Colleges* (ib., 1883); Butler, *Education in the United States* (Albany, 1900); United States Bureau of Education, *Contributions to American Educational History* (36 vols.); annual statistics for the universities of the world are given in Trübner, *Minerva Jahrbuch der Gelehrten Welt* (Strassburg).

UNIVERSITY CLUB, THE. A social organization in New York City, incorporated in 1865. The qualification for membership is the holding of a college or university degree involving a three years' course of study, or an honorary degree from a university or college, if the holder is distinguished in literature, art, or the public service. Graduates of West Point and Annapolis are eligible for membership also. The number of members is limited to 2000 resident and 1500 non-resident and army and navy members. The total membership in March, 1903, was 3278. The library contains about 20,000 volumes.

UNIVERSITY EXTENSION. A system of higher education designed to meet the needs of men and women who are unable to attend higher institutions of learning. University extension work was begun by the University of Cambridge, England, in 1872-73, when, largely owing to the zeal of Professor James Stuart, it offered to supply the towns of England with capable instructors in the various departments of knowledge, under the supervision of the university. The administration of this work was vested in a syndicate instituted in 1873. In 1876 university men in London founded the London Society for the Extension of University Teaching, which was, in 1902, made a department of the University of London. In 1885 the University of Oxford instituted its 'Delegacy for the Extension of Teaching Beyond the Limits of the University.' This action was the result of the success attained by several of the Oxford colleges in the establishment of 'Extension Colleges' at Reading and other English towns. At the present time every university in England is engaged in extension work.

University extension teaching has been introduced, sometimes in a modified form, and successfully carried on in the United States, Germany, France, Belgium, Austria, Denmark, Scandinavia, Russia, Australia, and Canada. In a few instances, notably in the State of New York and in Vienna, the enterprise has received Government aid. But in general it has been supported by the fees of the students, assisted by college grants or private subscriptions.

The subject of university extension was first publicly presented in the United States at a meeting of the American Library Association during their session in the Thousand Islands in September, 1887. The English system, as adapted to American local needs, was promptly taken up by librarians in Buffalo, Chicago, and Saint Louis. In these and many other cities the idea was gradually developed and extended by the coöperation of university graduates with libraries, churches, and other local institutions. In January, 1888, Melvil Dewey, then chief librarian of Columbia University, laid the plan before the regents of the University of the State of New York, and at the University convocation in Albany, July, 1888, advocated university extension in connection with public libraries. In February, 1890, a committee of New York colleges and universities urged the regents to establish, under State supervision, a system of extension teaching. On May 1, 1891, a bill was signed by the Governor of New York appropriating $10,000 for the State organization of university extension. No part of the grant could be used for the payment of lecturers, but only for purposes of organization, supervision, and printing. This grant of $10,000 is the first case on record of a State appropriation for university extension.

In 1890 a few public-spirited citizens of Philadelphia founded the American Society for the Extension of University Teaching. In 1891 followed the Albany movement mentioned above; and upon its opening in 1892, the University of Chicago established an extension division as one of the main departments of its work. Mainly from these three centres university extension in the United States has been carried on, though other educational institutions in various parts of the country have done similar work. Some of the more notable of these are: Johns Hopkins, Brown, Stetson (Fla.), and Northwestern universities; the universities of Wisconsin, Indiana, Iowa, Wyoming, Kansas, Colorado, and California; Colby College (Me.); Rutgers College (N. J.); Lowell Institute, Boston; Brooklyn Institute; People's Institute (N. Y.), etc. Teachers College, Columbia University, has also conducted extension classes, and in 1903 Columbia University instituted an extension department, the administration of which is vested in Teachers College. Mention should be made of the system of 'free lectures to the people' of the New York Board of Education, embodying most of the features of university extension work.

As a system of instruction, university extension involves the following elements:

The Course of Lectures. The lectures must be given by one instructor, usually at weekly or fortnightly intervals. The lectures in a course must be correlated, dealing with a particular epoch of history, or author, or school of literature, or section of a department of science, etc. They must be scholarly, as representing the thought of the universities; they must be popular to attract and hold the auditors. The number of lectures in a course varies with different organizations. The unit adopted by Oxford, by the American Society, and by Chicago is the six-lecture course. Cambridge has a twelve-lecture unit; and Columbia a six-lecture unit for its more popular courses, and a thirty-lecture unit for its academic and professional courses. The lectures are frequently illustrated by stereopticon, or by demonstrations.

The Class. By 'class' is meant the group of people of the audience who remain after the lecture for questions, discussion, and suggestions on the subject of the lecture. Individuals, also, may here get personal advice on their work and reading, and criticism of their essays.

The Students' Association. This is a club of students and readers desirous of getting the stimulus that working in common affords. The Students' Association has its own organization, and its regular programme of work, both before and after, as well as during the lecture course.

The Syllabus. Systematic guidance in every lecture course is provided in a special syllabus, outlining each lecture, selecting the best books on the subject, offering topics for thought, reading and papers, and illustrative notes, and prescribing the work required for certificates.

Traveling Libraries. To facilitate the student work in places not provided with adequate library facilities, the central organization usually provides a select library of perhaps fifty volumes of books recommended by the lecturer.

The Examination. At the close of each course of lectures a written examination is given by the lecturer to those auditors qualified and willing to take it. The qualification may be the reading of certain books, the presentation of a certain number of essays during the course, regular attendance, etc. The certificates obtained by successful candidates in these examinations are sometimes valuable in special ways. For example, in England they are credited toward the Government requirements for pupil-teachers' standing. In Chicago they count toward the baccalaureate degree of the university. In Columbia the thirty-lecture courses receive the same credit as the corresponding courses within the university.

Local Centre. University extension is based on the principle of local initiative. It requires that those who desire to avail themselves of its assistance shall be organized as a centre. By 'local centre' is meant a group of people who are willing to adopt extension aims and methods, arranging through a local committee on the one hand and the central organization on the other for systematic courses of extension lectures.

Cambridge in 1901-02 gave 85 courses, with an attendance of about 16,000; London, 1901-02, 195 courses, with an attendance of 15,500; Oxford, 1901-02, 190 courses, with an attendance of 21,000; the American Society, 1902-03, 98 courses, with an attendance of 26,000; Chicago, 1902-03, 208 courses, with an attendance of 43,500; and the New York Board of Education, 1902-03, 4200 lectures, some given in courses, with a total attendance of 1,250,000.

Consult: Adams, in *Reports* of the United States Commissioner of Education, (a) 1898-

99, chap. xviii., "University Extension in Great Britain;" (b) 1899-1900, chap. v., "Educational Extension in the United States." In the latter article will be found select bibliographies of all branches of the subject.

UNIVERSITY SETTLEMENTS. See SETTLEMENT.

UNNA, ụn'nȧ. A town in the District of Arnsberg, Prussia, thirty miles south of Münster (Map: Germany, B 3). The town has important iron industries. In the vicinity is the great salt mine of Königsborn. Population, in 1895, 12,355; in 1900, 14,918.

UNNATURAL COMBAT, THE. A tragedy by Philip Massinger, produced at the Globe in 1619 and printed in 1639. It is a characteristic but hardly pleasing work, with fine bursts of rhetoric. The combat is a duel between a father who has poisoned his first wife in order to marry another and his son, who challenges his father and is killed by him.

UNST, ŭnst. The northernmost of the Shetland Islands (q.v.).

UNTER DEN LINDEN, o͞on'tẽr dȧn lĭn'den. A famous avenue of Berlin, named from the rows of linden trees with which it is planted. It extends from the Brandenburg gate to the palace of Emperor William I., and is extended thence to the Royal Palace by the Platz am Opernhaus, Platz am Zeughaus, and the Lustgarten, a total length of about a mile. The street is 196 feet broad and is flanked by the finest shops, the university, arsenal, and several palaces.

UNTERWALDEN, o͞on'tẽr-väl'den. A canton of Switzerland, bounded by the Canton of Lucerne and the Lake of Lucerne on the north, the Canton of Uri on the east, Bern on the south, and Lucerne on the west (Map: Switzerland, C 2). It is divided into the two half cantons of Nidwalden (112 square miles) and Obwalden (183 square miles), of which the former forms a part of the Engelberg Valley and slopes toward Lake Lucerne; the latter is more elevated, belonging to the region of the Bernese and the Lucerne Alps. The principal river is the Aa. Stock-raising and gardening are the leading industries, and dairy products and fruit are the main exports. The two half cantons have separate governments, and are among the most democratic cantons in Switzerland, the legislative power being exercised directly by the people assembled in the Landsgemeinde. The initiative is in force. The canton sends two members to the National Council. The capital of Obwalden is Sarnen, and of Nidwalden, Stanz. Population, in 1900, Obwalden, 15,270; Nidwalden, 13,017. The inhabitants are mostly German-speaking Catholics.

Unterwalden originally belonged to Aargau and Zürichgau. It came under the rule of the Hapsburgs, took part in the uprising against them, and in 1291 concluded an alliance with Uri and Schwyz, which formed the nucleus of the Swiss Confederation. It took part in the formation of the League of Sarnen (1832) and the Sonderbund (1843).

UN'WIN, WILLIAM CAWTHORNE (1838—). An English engineer, born at Essex. He was a student under Sir William Fairbairn, and from 1868 to 1872 was instructor at the Royal School of Naval Architecture. In 1872 he was made professor of mechanical and hydraulic engineering at the Royal Indian Engineering College, and in 1884 professor of engineering at the Central Technical College of the Guilds of London. His publications include: *Wrought Iron Bridges and Roofs* (1869); *The Testing of Materials of Construction* (1888); *Development of the Experimental Study of Steam Engines* (1895); and *The Life of Hirn* (Watt Lecture, 1896).

UNYORO, ŭn-yō'rô. A native kingdom of Central Africa, northwest of the Kingdom of Uganda, between lakes Albert and Ibrahim, and constituting a part of the Western Province of the Uganda Protectorate (Map: Congo Free State, F 2). Estimated area, 32,000 square miles; population unknown. In the south the country is hilly and in the north level and heavily wooded. The inhabitants are the Wanyoro, an agricultural Bantu tribe, whose language has considerably extended beyond their own territories. Under British protection the country has made commendable progress. See UGANDA.

UPANISHAD, o͞o'pȧ-nē-shăd' (Skt. *upaniṣad*, a sitting down beside, session, esoteric doctrine). The name of a class of Vedic works devoted to theological and philosophical speculations on the nature of the world and man. In the Vedic literature the Upanishads are closely related with the Aranyakas, being either imbedded in them or forming their concluding chapters. Both Aranyakas and Upanishads are found generally at the end of the Brahmanas, or, as in the *Iśā-Upanishad*, even at the end of a Samhita. (See VEDA.) They mark, therefore, a course of advanced knowledge consciously regarded as subsequent and superior to the primary ritual instruction which is the ordinary theme of the Veda. Hence the Upanishads are also called *vēdānta*, 'end of the Veda,' a term which is later interpreted to mean 'final goal of the Veda.' (See VEDANTA.) All Hindu speculation presupposes the theory of transmigration of souls. In the oldest Vedic period the Hindu people took a joyous view of future life. At a somewhat later period, however, the Hindus acquired, probably from popular channels, the firm belief in *Karma* (q.v.), which appears first in the Satapatha Brahmana, and has since remained an axiom of Hindu thought which requires no proof, doubted by none except by materialistic atheists. The theory of transmigration is coupled in the Upanishads with the equally important theory of the world-soul and its presence in all living or organic beings (pantheism). The human body is supposed to be pervaded by breaths, *âtman*. These vivify the body and are the essential part, the ego, the individual existence. The *âtmans*, or breaths, are conceived as flowing from a single *âtman*, the universal ego. All the worlds are merely an emanation of this great universal ego; the *âtman* is the all. The notion of the *âtman* is further coupled with that of the *brahma*, 'the sacred word.' (See BRAHMA.) The two ideas, in time, are fused so that in the composite *âtman-brahma* we have two manifestations of the final all-power. Here the *âtman* represents, as it were, the physical aspect, while the *brahma* stands for the spiritual side of universal life and the ultimate essence. The fundamental doctrine of the Upanishads is the identity of the individual soul (*ātman*) with the world-soul (*ātman-brahma*). The formula 'that art thou' (*tat tvam asi*) is the key-note of all Upanishad teaching. It is a curious fact that this doctrine is coupled with the pessimistic belief in transmigration. Instead of rejoicing in the knowledge of their own divine essence, the Hindus look upon their individual existence as a condition of separation from the divine essence. The wandering of the soul through the realms of death is the consequence of its separation from the *brahma*, and the Hindu salvation, the escape from the chain of successive deaths, can be attained only by reunion with the *brahma*. The Hindus never had any theory as to how the individual souls were separated from the all-soul; they took this for granted. Desire, or clinging to life, is the reason why this separation, with its attendant succession of deaths, continues. The only cure for desire is knowledge, or, perhaps better, recognition of the unity of the ego with Brahma and the ever present recognition of the divided condition of everything finite. Thus the ultimate attainment for man is this recognition, which is salvation through the penetrating knowledge of one's own divine nature, which effaces the entire delusion of individual existence.

The date of the Upanishads, like that of the Vedic writings, is quite uncertain, but the earliest of them can hardly be dated later than B.C. 600, since their most important ideas appear in an advanced and somewhat decayed state in the Buddhist writings. The older Upanishads are the products of Vedic schools. The two most important, the *Bṛhadāraṇyaka* and the *Chāndōgya*, belong respectively to the White Yajur Veda and the Sama-Veda; the *Aitarēya*, *Kaūṣitaki*, *Taittirīya*, *Kaṭhaka*, and *Maitṛāyaṇīya* or *Mānava* belong to schools of the same names. The *Kēna* and *Talavakāra* Upanishads also belong to the Sama-Veda, the *Iśa* to the White Yajur Veda, the *Svētāśvētara* and the *Mahānārāyaṇa* to the Black Yajur Veda. A large and indefinite number of Upanishads, of which the *Muṇḍaka*, *Praśna*, and *Māṇḍūkēya* are the most important, are counted as belonging to the Atharva-Veda. The most authoritative list counts twenty-seven, but later Upanishads are generally counted as belonging to the Atharvan. A complete list of Upanishads is impossible, because the term Upanishad does not represent a closed canon, but rather an indefinitely extensible type of literature which has not been formally concluded, and which may be continued in the present or future. In 1876 235 Upanishads were enumerated, including apocrypha, one of those actually a Mohammedan treatise called *Alla Upaniṣad*. The later Upanishads may be divided into five classes: (1) Pure Vedanta Upanishads, which combine the Vedanta doctrines of the older texts without undue development of the notions of *Yōga* (concentration and abstraction from all mundane matters) or Samnyāsa (asceticism); (2) Yoga Upanishads, which presuppose the Vedanta ideas, and in addition advise mental concentration upon the sacred syllable *ōm* (q.v.); (3) Samnyasa Upanishads, which recommend and describe a life of asceticism as the practical way of attaining the purpose of the Upanishads; (4) Siva Upanishads, which interpret the popular god Siva (q.v.) as a personification of the *ātman*; (5) Vishnu Upanishads, which interpret Vishnu (q.v.), or one of his avatars (see AVATAR), as divine or human manifestations of the *ātman*.

BIBLIOGRAPHY. Editions of individual Upanishads are extremely numerous in India. A select list is given by Macdonell, *History of Sanskrit Literature* (London, 1900). A convenient edition of 108 Upanishads was edited by Tukaram Tatya (Bombay, 1895). The older Upanishads were translated into English by Max Müller, *Sacred Books of the East*, vols. i., xv. (2d ed., Oxford, 1900). A more scholarly translation is given by Deussen, *Sechzig Upanishad's des Veda* (Leipzig, 1897), who also published the standard discussion of their philosophy, *Die Philosophie der Upanishads* (ib., 1899), superseding the work of Gough, *The Philosophy of the Upanishads* (London, 1882). A valuable aid to the study of these texts is Jacob, *Concordance to the Principal Upanishads and Bhagavadgītā* (Bombay, 1891).

UPAS (Malay *ūpas*, poison), *Antiaris toxicaria*. A tree of the Philippine Islands of the natural order Moraceæ, to which also belong the breadfruit, mulberry, etc. The fruit is a kind of drupe, covered with fleshy scales. The Malays mix the milky juice of this tree with black pepper and the root juices of galenga and ginger for tipping their arrows. The fibre of the bark is sometimes made into cloth, but unless it is thoroughly cleaned garments made of it are said to produce itching. Some botanists believe that the tree whose bark is used for fibre is a distinct species, as other species of this genus are innocuous. The story of a poison-vale in Java, in which the exhalations of numerous poison trees destroy all animal life, and even all other vegetable life, is a mere fable.

UPAS TREE

UP'COTT, WILLIAM (1779-1845). A famous English collector of autographs. He was a natural son of Ozias Humphry, one of the greatest English miniaturists, by the daughter of an Oxford shopkeeper. He was brought up to the book trade; and when Richard Porson (q.v.), the celebrated Greek scholar, was appointed librarian in the London Institution Upcott became his assistant (1806). He resigned in 1834, and passed the rest of his life at Islington. At his home, known as 'Autograph Cottage,' he collected over 32,000 letters illustrated by 3000 portraits. After his death these and other valuable manuscripts were sold, and many of them have found their way into the British Museum. Upcott published a *Bibliographical Account of* *the Principal Works Relating to English Topography* (3 vols., 1818); revised for the press *Evelyn's Diary* (1818); edited Evelyn's *Miscellaneous Writings* (1825); and engaged in much other antiquarian work.

UPERNIVIK, o͞o-pĕr′nĭ-vĭk, or **UPERNAVIK.** The most northern Danish district in Greenland, on Baffin Bay. The town Upernivik, with a mission station, is on a small island just off the coast in latitude 72° 48′ N., and longitude 55° 54′ W. (Map: Arctic Regions, G 6). The mean temperature here is 5.8° in January and 40.5° in July.

UPHAM, ŭp′am, Charles Wentworth (1802-75). A Unitarian clergyman. He was born at Saint John, N. B.; graduated at Harvard College, 1821, and at the divinity school, 1824; was ordained colleague pastor with the Rev. John Prince of the First Unitarian Church, Salem, Mass., the same year, and remained there until he was compelled to leave the ministry on account of loss of voice in 1844. He edited the *Christian Review* and *Christian Register;* was Mayor of Salem, 1852; several times member of the Legislature; president of State Senate, 1857-58); member of Congress 1853-55. He published Letters on the *Logos* (1828); *Lectures on Witchcraft, Comprising a History of the Salem Delusion, 1692* (1831, enlarged ed. 1867); *Salem Witchcraft and Cotton Mather, a Reply* (1870), and *Lives* of Sir Henry Vane (1835), J. C. Fremont (1856), Francis Peabody (1869), and Timothy Pickering (1867-72).

UPHAM, Thomas Cogswell (1799-1872). A Congregational theologian. He was born at Deerfield, N. H.; graduated at Dartmouth College, 1818, and at Andover Theological Seminary, 1821. He was assistant teacher of Hebrew at the latter place, 1821-22; colleague pastor of the Congregational Church, Rochester, N. H., 1823-24; professor of mental and moral philosophy, and instructor in Hebrew, Bowdoin College, 1825-67. He published a philosophical series: *Elements of Intellectual Philosophy* (1827); *Elements of Mental Philosophy* (1831); *Treatise on the Will* (1834); *Outlines of Disordered and Imperfect Mental Action* (1840); *Lives of the French Mystics, Madame Guyon and Fénelon* (1847), and *Madame Catharine Adorna* (1856); *The Life of Faith* (1848); *A Treatise on the Divine Union* (1851); *Christ in the Soul* (1872).

UPHAM, Warren (1850—). An American geologist and librarian, born in Amherst, N. H. He graduated at Dartmouth in 1871, was employed on the Geological Survey of New Hampshire from 1870 to 1878, and on the United States Geological Survey from 1885 to 1895. In 1895 he became librarian of the Minnesota Historical Society, Saint Paul. He wrote: *The Upper Beaches and Deltas of the Glacial Lake Agassiz* (1887); *The Glacial Lake Agassiz* (1895); and *Greenland Icefields and Life in the North Atlantic, with a New Discussion of the Causes of the Ice Age,* with Professor A. F. Wright (1896).

UPHUES, o͞o′fo͞o-ĕz, Joseph (1850—). A German sculptor, born at Sassenberg, Westphalia. He studied for three years at the Berlin Academy, and became a follower of Begas, whom he afterwards assisted in his workshop. Much severer treatment of form, however, than is characteristic of Begas distinguishes his work, as may be seen in his "Sabine Defending His Sister," and the "Bowman" (great gold medal, Melbourne, 1888; Chicago, 1893), in the National Gallery at Sydney. For Düren in Rhenish Prussia he executed a Monument to Emperor William I. and the Bismarck Monument (1892); for Homburg and Wiesbaden (1896), Monuments to Emperor Frederick; and in Berlin he created an entirely novel type of a youthful "Frederick the Great;" and contributed to the monuments in the Siegesallee the statue of Margrave Otto II. Three large sepulchral monuments of his design at Düren exhibit deep religious feeling and noble conception.

UP'JOHN, Richard (1802-78). An American architect, born in Shaftesbury, England. He emigrated to the United States in 1829, and in 1839 he settled in New York, where his best work was done. His principal works are the cathedral at Bangor, Me., Christ Church and the Church of the Pilgrims in Brooklyn; and in New York, Trinity Church, the Trinity Building, Grace Church and Saint Thomas's Church, the Corn Exchange Bank, besides numerous private residences. From 1857 to 1876 he was president of the American Institute of Architects.

UPLAND PLOVER. A sportsman's name for the large sandpiper (*Bartramia longicauda*) common throughout the United States, and frequenting uplands and plains more than is customary with other species of its kind. See Sandpiper.

UPMARK, ụp′märk, Gustaf Heinrich Vilhelm (1844—). A Swedish art-historian, born at Stockholm. After studying at Upsala from 1861 to 1869, he secured a position in the National Museum at Stockholm and was appointed its director in 1880. He is the founder and chairman of the "Gripsholms Society" which, in 1889-95, restored the long-neglected ancient castle of the Vasa dynasty. Upmark's more important publications include: *De grafiska konsterna* (1889); *Svenska Riddarhuset, byggnadshistoria* (1891); *Die Architektur der Renaissance in Schweden* 1530-1760 (1897 et. seq.); besides many essays concerning art in Sweden under the Vasa dynasty, such as *Tapetväfveriet i Sverige under de första Vasakonungarna* (1886), *Gripsholms slott* (1887), *Vadstena slott* (1892), *Skånska herrgårdar under renässanstiden* (1894), *Stockholms slott under Vasatiden* (1896), and others.

UPOLU, o͞o′pō-lo͞o. The second largest island of the Samoan group, situated just southeast of Savaii (Map: Australasia, L 4). It belongs to Germany. Length, 40 miles; extreme width. 15 miles; area, including adjacent islands, 340 square miles. It is the most fertile and attractive island of the archipelago. The coasts are fringed with coral reefs. The western part, the productive region, contains the volcano of Tafua (3100 feet). A mountain range extends east and west throughout the island. The northern slope is long and gentle and covered with forests. Apia is the capital; Falealili, the largest town. Vessels with 55,000 tonnage entered at Apia in 1901. Population, in 1900, 18,-341. See Samoan Islands.

UPPER AUSTRIA, or Austria Above the Enns. An archduchy and crownland, occupying the western part of the original Archduchy of Austria—the nucleus of the Austrian Empire. It is bounded on the north by Bavaria and Bohemia, on the east by Lower Austria, on the south by Styria and Salzburg, on the west by Bavaria, from which it is separated by the Inn and its tributary, the Salzach (Map: Austria, D 2). Area, 4631 square miles.

Almost all the archduchy is either mountainous or rolling. The Danube divides the land into two very unequal parts. The northern and smaller belongs to the primitive formation of the Böhmer Wald system, while the southern belongs to the Alps (Kalkalpen) system, where high peaks, with glaciers on their slopes, lift their heads. The highest point in the archduchy is approximately 10,000 feet—the Dachstein, on the extreme southern border. In the mountainous southwestern portion is the famous Salzkammergut (q.v.), from which the Traun Valley descends southeasterly to below Linz, through the heart of the archduchy. In the western portion is the Hausruck region, which produces brown coal in abundance. The Enns, an affluent of the Danube, entering near the southeast corner of the archduchy, marks the eastern boundary. Upper Austria is well watered, The Kammersee and Traunsee are the largest of its lakes. There are about thirty mineral springs, the best known being the saline waters at Ischl and the iodine waters at Hall. The climate is moderate and bracing.

The archduchy is highly productive. Over one-third of the total area is tilled, over one-third is in forests and nearly one-fifth meadows. Barley, oats, wheat, vegetables, fruit, and wine are the most prominent productions. Cattle and horse-raising are very important industries. Brown coal and salt are extensively mined, and there are valuable quarries of gypsum and stone. Copper is found in the north. The salt industry is a Government monopoly and about 30 per cent. of the product of the Empire is supplied by Upper Austria. The archduchy manufactures metal wares—weapons, knives, etc.—machinery, linens, cottons, paper, and cellulose.

The Landtag has 50 members, including the Bishop of Linz, 10 representatives from large landed estates, 17 from cities, 19 from rural communities, and 3 from the chambers of industry and commerce in the capital, Linz, the leading town. To the Lower House of Austria the crownland sends 20 delegates, all German. Population, in 1900, 810,246, mostly German Catholics.

UPPER SANDUS'KY. The county-seat of Wyandot County, Ohio, 60 miles north by west of Columbus; on the Sandusky River, and on the Pennsylvania and Hocking Valley railroads (Map: Ohio, D 4). It has an old mission church, a handsome court house, and a park. Upper Sandusky is chiefly engaged in manufacturing, the most important products being agricultural implements, hay presses, buggies, and other vehicles, caskets and burial cases, steam presses, and tools. Population, in 1890, 3572; in 1900, 3,355.

UPPER TUNGUSKA, tṳn-gōō'skȧ. See Angara.

UPSALA, ṳp-sä'lȧ. The capital of the Lăn of Upsala, Sweden, on both banks of the navigable Fyris, in a fertile and historic plain, 41 miles by rail north-northwest of Stockholm (Map: Sweden, G 7). The ancient city is best known now for its university. (See Upsala, University of.) The new town lies on a level on the left bank of the river; the old portion ascends the hills on the west shore. The fine French-Gothic cathedral dates from 1260 and was completely restored between 1886 and 1893. The interior contains the splendid burial chapel of Gustavus Vasa. The cathedral also contains a monument to Linnæus, who lived in Upsala.

Among the university buildings in the vicinity of the cathedral are the ancient Gustavianum, the Carolina Rediviva (1841), and the handsome new Renaissance structure completed in 1886. The valuable university library is celebrated for the Codex Argenteus of Ulfilas (q.v.). The botanic garden is very fine. The half-finished historic castle—the Slott—on the hill to the south of the town was built by Gustavus Vasa in 1548, and is now used for the provincial archives. Southeast and stretching along the Fyris is the Strömparterre—a pleasure park called by the students the 'hole of a beehive.' Upsala has an interesting cemetery. South of the city is the noteworthy Ultuna Agricultural Institute. Several miles farther south is the splendid Château of Skokloster. Its origin is due to Marshal Wrangel, who housed here his rich collections accumulated in Germany in the Thirty Years' War. Northeast of Upsala lies the notable village of Gamla Upsala, the capital of the ancient pagan kings, who worshiped here in a celebrated temple. Adjacent are tumuli (about 60 feet high) which were connected with the pagan rites. In the vicinity is the Tingshög—a hill (32 feet high) from which the ancient rulers spoke to the people.

Upsala has an excellent school system, comprising both normal and high schools, a fine hospital, an insane asylum, a royal society of science, a medical association, and an organization for the study of the humanities. The Museum of Northern Antiquities is in the garden of Linnæus. Upsala was formerly an important commercial centre. The trade and manufactures are now unimportant, the town owing its prosperity mainly to the university. Population, in 1901, 23,802.

UPSALA, University of. An institution of learning situated at Upsala, Sweden. In 1477 Pope Sixtus IV. gave permission to establish a Studium Generale at Upsala after the model of Bologna and lectures were begun the same year. In 1566 Eric XIV. established a chair of Greek. King John III. established four new professorships, but as the professors refused to assent to the King's Catholicizing acts, the university was closed. It was not until 1593, when the Reformation again gained a strong foothold in Sweden, that the university was reëstablished, with two faculties, theological and philosophical. Gustavus Adolphus endowed the university munificently, thus assuring its material independence. The Gustavianum, one of the oldest buildings, dating from the reign of this monarch, is still extant. In 1902 the university consisted of the faculties of theology, law, medicine, and philosophy. The attendance was 1388. The library, which was enriched considerably by the collections of Gustavus Adolphus, contains over 300,000 volumes and 12,500 pamphlets.

UPSHUR, ŭp′shẽr, Abel Parker (1790-1844). An American statesman, born in Northampton County, Va. He studied law under William Wirt (q.v.), and was in 1810 admitted to the bar. In 1824 he was elected to the State Legislature, in 1826 was appointed a judge of the Virginia General Court, and in 1829 was made a member of the convention for the revision of the State Constitution. President Tyler appointed him Secretary of the Navy in 1841, and in 1843 he was transferred to the post of Secretary of State, left vacant by the resignation of Daniel Webster. He was an extreme supporter of States' rights and slavery. His death was caused by the bursting of a gun on board U. S. S. *Princeton.* He published an *Inquiry Into the Nature and Character of Our Federal Government* (1840).

UP′SON, Anson Judd (1823-1902). An American clergyman and educator, born in Philadelphia, Pa., and educated at Hamilton College and Union College. In 1849 he was appointed professor of rhetoric and moral philosophy at Hamilton, and from 1853 to 1870 was professor of logic and rhetoric there. He then became pastor of the Second Presbyterian Church in Albany. He was appointed professor of sacred rhetoric and pastoral theology at Auburn Seminary in 1880, and in 1887 became professor emeritus. In 1890 he was made chancellor of the University of the State of New York.

UP′TON, Emory (1839-81). An American soldier, born at Batavia, N. Y. He graduated at West Point in 1861; served as aide-de-camp on the staff of General Tyler, and while so doing was wounded in the battle of Bull Run; fought in the Peninsular campaign and in the Maryland campaign; and was commissioned colonel of the 121st New York volunteers on October 23, 1862. He was engaged in the Battle of Fredericksburg; commanded a brigade of the Sixth Corps at Gettysburg, Rappahannock Station, and Mine Run, and in the Wilderness campaign and part of the Richmond campaign. At Spottsylvania in May, 1864, he was wounded while leading the assaulting column of twelve regiments of the Sixth Corps, and as a reward for his gallantry was brevetted lieutenant-colonel of the Twenty-fifth Infantry from 1866. He was wounded at Opequan in the Shenandoah campaign, and for gallant conduct at Winchester was brevetted major-general of volunteers. He later commanded the Fourth Cavalry Division in Gen. J. H. Wilson's operations in Georgia, and for his services in the assault on Selma was brevetted brigadier-general in the Regular Army. After the war he served as lieutenant-colonel of the Twenty-fifth Infantry from 1886 until 1880, when he became colonel of the Fourth Artillery. He was also engaged in preparing a system of tactics for the service, and from 1870 until 1875 was commandant of cadets at the Military Academy at West Point. Not long after his promotion to the rank of colonel his mind became affected and he committed suicide. His published works include: *A New System of Infantry Tactics* (1867; 2d ed. 1874); *Tactics for Non-Military Bodies* (1870); and *The Armies of Asia and Europe* (1878). Consult Michie, *Life and Letters of Major-General Emory Upton* (New York, 1885).

UPTON, George Putnam (1835—). An American musical critic, born in Boston, and educated at Brown University. From 1861 to 1885 he was on the editorial staff of the *Chicago Tribune.* In 1872 he founded and became first president of the Apollo Club. His works include: *Letters of Peregrine Pickle* (1870); *Woman in Music* (1885); *Standard Operas* (1890; 15th ed. 1902); *Standard Oratorios* (1891); *Standard Symphonies* (1892).

UR, ẽr (Heb. *'ūr*, Bab. *Uru*). An ancient metropolis of Southern Babylonia, which has been identified with the modern Mukayyir, generally written Mugheir. This site lies close to the Euphrates, at the point where the canal Shat-el-Hai connects this river with the Tigris, while the Wady Rummein gives it access to Arabia. Hence, it was in a position most eligible for commerce and political greatness, which it enjoyed from the earliest period of Babylonian history. It was the chief seat in Babylonia of the worship of the moon-god Sin, whose massive temple still stands 70 feet above the plain. There are traces of an early dynasty about B.C. 4000, according to one school of chronology, while about B.C. 3000 the kings Ur-Gur and Dungi I. made Ur the capital of "Sumer and Akkad," i.e. Babylonia. Another dynasty, about B.C. 2400 appears, claiming imperial dominion, and from its time there remains an interesting body of contracts, revealing the commercial development of the city. It finally succumbed to Babylon's greatness, but continued a sacred and important place throughout Babylonian history. The biblical passages call it Ur of the Chaldees, and make it the starting point of the migration of Abraham's family westward (Gen. xi. 27-32). As this tradition is preserved in the Priestly Narrative alone, the identification has been doubted by various scholars, who would prefer to find the biblical Ur in the region of the Upper Euphrates. The first examinations of Mukayyir were made by Loftus, and its excavation by J. E. Taylor in 1854. Consult: Rogers, *History of Babylonia and Assyria* (New York, 1901); Hilprecht, *Explorations in Bible Lands* (Philadelphia, 1903). See Abraham.

URABÁ, ōō′rȧ-bä′, Gulf of. The former name for the Gulf of Darien and now applied to the southern portion. See Darien.

URÆMIA (Neo-Lat., from Gk. *οὖρον*, *ouron*, urine + *αἷμα*, *haima*, blood). A disease characterized by convulsions, headache, vomiting, and general malaise, and due to the retention, in the liver and in the blood, of the urea which should be transformed into urates and eliminated with the urine. The symptoms are due to the toxic effect of urea upon the brain and central nervous system. The total daily excretion of urea should be from 300 to 600 grains. If the total remain long under 300, the symptoms of uræmia may follow. Excretion of urea is hastened by the use of the salicylates, purgatives, especially elaterium, hot baths, and cupping over the kidneys.

URAGA, ōō-rä′gȧ. A village in the Province of Sagami, Japan, 15 miles south-southeast of Yokohama. It lies in two divisions on both sides of a narrow harbor. There are two large dry docks. The views in the vicinity are beautiful. Commodore Perry's fleet dropped anchor here on July 8, 1853, and at Kurihama, near by, on July 14th, he met the representatives of the Shogun and delivered President Fillmore's letter. This was the first of the series of events which resulted in the opening again of Japan to foreign intercourse. In 1900 a plot of land was purchased at Kurihama and named Perry's Park, and a monument in his honor was unveiled July 14, 1901. Population, in 1895, 12,719.

U′RAL, ū′ral *or* o͞o′ral, *Russ. pron.* ụ-räl′y′. A river of Eastern Russia, partly on the boundary between Europe and Asia. It rises in the southern Ural Mountains in the Government of Orenburg, and flows first south through one of the eastern longitudinal valleys, then westward around the southern spurs of the mountain system, and finally southward, emptying into the northern extremity of the Caspian Sea after a course of about 1400 miles (Map: Russia, H 4). The rainfall over its basin is but slight, so that the river receives no important tributaries and is unnavigable. The chief towns on its banks are Orsk, Orenburg, Uralsk, and Guriev, the last-named at its mouth.

U′RAL-ALTA′IC. The term commonly employed by anthropologists to designate a branch of the yellow or Asian race, which includes the following groups: Tungusic (Tunguses, Manchus, etc.), Mongolic (Mongols, Kalmucks, etc.), Tataric (Turks, 'Tatars,' part of the Cossacks, Kirghizes, etc.), Finnic (Samoyeds, Finns, Lapps, Magyars, etc.), Arctic (Tchuktches, Koriaks, Kamchatkans, Giliaks, Ainus), and Japanese-Korean. The civilized and more or less Aryanized Finns and Magyars of Europe, the latter intruding Osmanli Turks of Asia Minor, Southwestern Europe, and Northern Africa, the civilized Turko-Tatar States, ancient and modern, of Turkestan and adjacent parts of Central Asia, the Mongol conquerors of China and India, the Asiatic elements of Korean-Japanese culture, etc., represent the capacities, independent and stimulated by contact with other races and peoples, of the Ural-Altaic tribes. In matters of language these peoples possess generally what are called 'agglutinative' tongues, in contrast with the inflecting Aryan and the monosyllabic Chinese and Indo-Chinese forms of speech. But the Finnish language in Europe has been thought by some either to have Aryan traits or to have given birth to Aryan tongues. Some authorities have included the Korean-Japanese with the Sinitic branch, seeing closer relationship between them and the Chinese than the facts warrant. While the location of the earliest home of the Ural-Altaic peoples is still indeterminable with exactness—it was somewhere between the Ural and the Altai—certain centres of dispersion of its subdivisions can be noted: Mongolia, south of the Altai, Turkestan north of the Pamir, the Uralian country, the Baikal region, the Amur Valley, etc. The careful investigations of the Jesup North Pacific Expedition in Northeastern Asia are thought to have shown the existence of long-continued intercommunication and intermigration between America and Asia in the region bounded by the Amur on the one side and the Columbia on the other. It must be said, however, that the facts point as much to transference of peoples and culture from America to Asia as vice versa; indeed, rather more in the former direction. This would be in line with the fact that the presence of the Eskimo (q.v.) in the northeastern corner of Asia now is the only convincing proof we have of the transit of any people from one continent to the other. The variety of the response of the Ural-Altaic peoples to foreign culture is seen in their religions. The uncivilized tribes are mostly devotees of Shamanism, as of old, but the Mongols, Manchus, Buriats, Kirghiz-Kalmuck Tatars, and to some extent Koreans and Japanese are Buddhist, the Bashkirs, Turks, etc., are Mohammedans, the greater part of the Kamchatkans, Tchuvashes, part of the Yakuts and of some other Siberian tribes, are Christians of the Russian (Greek) Church, the Magyars are about three-fifths Catholic and two-fifths Protestant, and the Finns for the most part Lutheran. Consult: Castrén, *Ethnologische Vorlesungen über die altaischen Völker* (Saint Petersburg, 1857); Schott, *Altaische Studien* (Berlin, 1860-72); Mistelli, *Der altaische Sprachtypus* (Basel, 1883); Winkler, *Uralaltaische Völker und Sprache* (Berlin, 1884); id., *Das Uralaltaische und seine Gruppen* (ib., 1885); Grunzel, *Entwurf einer vergleichenden Grammatik der altaischen Sprachen* (Leipzig, 1895).

URALITE. A variety of amphibole derived from pyroxene. Its crystals, when distinct, show the form of the original mineral, but have the cleavage of amphibole. The crystals vary in color from pale to deep green, and are found at various localities, as in the Ural Mountains and at Canaan, Conn.

URAL (ū′ral *or* o͞o′ral) **MOUNTAINS.** A mountain range in Russia, forming part of the conventional boundary between Europe and Asia. It extends in a general north and south direction along the 60th meridian of east longitude from the 65th degree of latitude (from which northward to the Kara Sea the course is northeast) south to the north bank of the Ural River (Map: Russia, K 3). A northern extension reappears beyond the Yugor and Kara Straits to form the main range of the islands of Vaigatch and Nova Zembla, while a southern extension, known as the Mugodzhar Mountains, runs south of the Ural River nearly to the shores of the Sea of Aral. The distance in a straight line between the southern and northernmost extremities of the range is 2000 miles, but the actual length of the somewhat sinuous main ridge is still greater. The Ural Mountains do not form a single range, but constitute rather a broad plateau 45 miles wide in the north and nearly 200 miles wide in the south. This plateau is broken up partly into a number of separate ridges or chains running in various directions, partly into broad dome-shaped masses, though the southern portion divides itself into several parallel north and south branches. The eastern slope is generally the more abrupt, the western falling in broad, flat terraces toward the lowlands. The average elevation of the main crests is not great, scarcely more than 1500 feet. Mount Tel-pos is 5433 feet above the sea. The climate is rather severe, with very cold winters and hot summers. The rainfall is greater on the western slope and in the central and northern portion than in the east and south. The range is a watershed of the Ob in the east, the

Ural in the south, and the Volga and Petchora on the west. The vegetation in the southern portion consists mainly of steppes with isolated oases of trees. The central portion is covered with immense forests of spruce, larch, and firs, which in the north give place to dwarf birch and mossy tundras. Geologically, the range consists of a central longitudinal zone of metamorphic slates, granites, gneisses, and syenites, flanked on either side by sedimentary strata, which are chiefly Carboniferous and Permian in the western, and Cretaceous and Jurassic in the eastern zone. In the southeast there are large Devonian outcrops and intrusions of quartz and porphyry. The Ural Mountains are extremely rich in minerals, which are chiefly confined to the central division, the northern parts being barren. There are rich deposits of iron ore—magnetite, limonite, and red hematite. Nearly 1½ million tons of ore are produced annually and smelted into pig iron on the spot, the vast forests yielding an inexhaustible supply of fuel. Gold is mined both from veins and placers, and other rare metals, platinum, iridium, and osmium, are comparatively abundant. The Urals yield 90 per cent. of all the platinum produced in the world. Precious stones are also mined, as well as copper, silver, mercury, cobalt, nickel, and zinc. Coal beds exist on the western slope, but are not yet mined to any great extent. Asbestos is one of the distinctive mineral products of the mountains. This mineral wealth has given rise to important industries, and a large number of populous towns have sprung up among the mountains, while a considerable agricultural population has also been attracted.

Consult: Ludwig, *Ueberblick der geologischen Beobachtungen* (Leipzig, 1862); Hochstetter, *Ueber den Ural im Ural* (Berlin, 1873); Hiekisch, *Das System des Urals* (Dorpat, 1882).

URALSK, ōō-räl′y'sk. A territory of Russia, lying mostly east of the Ural River, the boundary line between Europe and Asia (Map: Russia, H 5). Area, over 125,100 square miles. The surface generally presents a series of dry steppes and deserts sloping gradually to the Caspian. Much of the interior lies below the level of the Caspian. There are many salt lakes, and only the Ural (q.v.) and the Emba (during a part of the year) reach the Caspian, the other streams being lost in the lakes or in the sand. Uralsk is scantily watered, and there are places where even wells are lacking. The climate is continental, the influence of the Caspian Sea being confined to the coast region. The temperature is subject to wide fluctuations, and the precipitation is slight. In the winter the snowstorms are very destructive. Uralsk contains little cultivable land, and agriculture is of secondary importance, the chief occupations being stock-raising and fishing. The fisheries along the Ural and the coast of the Caspian Sea are among the most extensive and the best regulated in Russia. The value of the fish, caviar, fish oil, and other fish products exported from the territory exceeds $1,500,000. The population was 691,887 in 1901. Capital, Uralsk.

URALSK. The capital of the Territory of Uralsk, in Southeastern Russia, at the confluence of the Ural with the Tchagan, 980 miles southeast of Moscow (Map: Russia, H 4). It is a well laid out town with an industrial school for Kirghizes and a natural history museum. It is the commercial centre of the province. Population, in 1897, 38,919. The town was founded at the beginning of the seventeenth century.

URA'NIA (Lat., from Gk. *Οὐρανία*, *Ourania*, the Heavenly One, from *οὐρανός*, *ouranos*, heaven, sky; connected with Skt. *Varuṇa*, Varuna, god of the sky and waters, from *var*, to cover). One of the Muses (q.v.). In the later division of functions among the Muses, she became the guardian of Astronomy, or rather of the astronomical epic, such as was written by Aratus. She seems to be indicated in the groups of Muses by the globe.

URANINITE. A mineral uranium oxide usually found in the form of botryoidal or compact masses and often containing such impurities as silica and the oxides of iron, lead, calcium, and magnesium. It is opaque, grayish, greenish, or brownish black in color, with a sub-metallic lustre, and has a conchoidal fracture. It occurs often with ores of silver and lead, in Bohemia, Saxony, Hungary, Turkey, etc. See also Radium; Polonium; Radioactivity.

URANIUM (Neo-Lat., named after the planet Uranus). A metallic element discovered by Klaproth in 1789. It is found chiefly as an oxide in the mineral uraninite or pitchblende, which occurs at various localities in Norway, Saxony, Cornwall, and the United States, and also in various other minerals, but in smaller quantities. An important source of uranium compounds in recent years is the uran-ochre from Cornwall, England. The metal itself may be obtained by reducing uranous chloride by sodium or potassium in a crucible packed with charcoal, which is slowly heated to redness in a furnace.

Uranium (symbol, U; atomic weight, 239.59) is a hard silvery-white metal with a specific gravity of 18.68. It melts at a bright red heat. It combines with oxygen to form a dioxide and a trioxide, which unite with bases to form uranous and uranic salts. Perhaps the most important of the salts is sodium uranate, known as uranium yellow, that is used for painting on glass and porcelain, as well as in making the fluorescent yellow 'uranium glass.' The two oxides combine to form a green uranoso-uranic oxide that is also formed when uranium is burned in the air. This oxide is used sometimes to produce a black glaze on porcelain.

URANIUM RAYS. Certain radiations discovered by Professor Becquerel in 1896 to be emitted by the salts of uranium and the metal itself, and not to obey the laws of light or ether waves. This radiation has been shown by Rutherford to consist of two quite distinct groups of rays. Both affect photographic plates, both ionize gases (see Ionization), and both penetrate many bodies which are opaque to light; the two groups are distinguished by their different penetrative powers, and consequent different ionizing powers. The more penetrating rays have less ionizing power and are deflected by a magnet and by an electrostatic field, much more than the other rays, but in an opposite direction. There are several other 'radio-active' substances, as such bodies are called, which emit radiations like uranium: thorium and its salts, polonium, radium, and actinium. The radio-activity of thorium oxide was discovered independently in 1898 by Madame Curie and G. C. Schmidt; M. and Mme. Curie isolated polonium and radium from pitchblende; and Debierne has isolated actinium from the same ore. These new substances are much more intense in their action than is uranium. (See Radio-Activity.) These radiations are not reflected, refracted, diffracted, or polarized. See X-Rays.

U'RANUS (Lat., from Gk. Οὐρανός, *Ouranos*, heavens, sky). In Greek theogony, the husband of Gæa, the Earth, and, according to Hesiod, father of the Titans, Cyclopes, and Hecatoncheires. Legend represented him as dethroned and mutilated by his son Cronos. (See Saturn.) From his blood, which fell upon the earth, sprang the Gigantes, while the part which fell into the sea was washed about until from the foam which gathered rose Aphrodite. Uranus was never an object of worship, but rather, like Cronos, a conception formed from the cult of Zeus for the purpose of a constructive theogony. Among the Romans Cælus appears in myth as a translation of the Greek name, but not as a deity of the Roman religion.

URANUS. The next to the outermost member of the solar system. Its mean distance from the sun is 1,782,000,000 miles; sidereal period, 84 years; eccentricity not quite $\frac{1}{20}$ or about the same as that of Jupiter; inclination to the ecliptic, 46′. It is about 66 times greater than the earth in volume and 15 times in mass, and its density and surface-gravity respectively are 0.22 and 0.9. In the telescope the planet appears as a greenish disk of about 4″ diameter. The greenish tinge is explained as due to some unidentified substance in the planet's atmosphere. Because of its immense distance, astronomers have been unable to gain much information concerning it. Spots and belts have been seen, but they are too faint to warrant any positive assertion, and the time of rotation of the planet is unknown. Uranus was accidentally discovered by Sir William Herschel on March 13, 1781, and was named 'the Georgium Sidus' and 'Herschel,' but these names soon fell into disuse and the name of Uranus, suggested by Bode, finally prevailed. Herschel announced the discovery as that of a comet, and its planetary nature was not demonstrated until three or four months later by Lexell, of Saint Petersburg. Before its detection by Herschel, Uranus had been recorded no less than 20 times as a fixed star, 12 times by Lemonier alone. These observations when compared with more recent ones showed that the planet was wondering from its track. The attempts made to account for these irregularities led to the discovery of Neptune (q.v.).

Uranus has four satellites:

NAME	Distance from planet in miles	Sidereal period
Ariel	120,000	2d 12h 29m
Umbriel	170,000	4d 8h 27m
Titania	280,000	8d 16h 57m
Oberon	375,000	13d 11h 7m

Óberon and Titania were discovered by the elder Herschel, January 11, 1787, the other two were discovered by Lassell, October 24, 1851. They are estimated to vary in size from 200 to 500 miles in diameter. The plane of their orbit is inclined 82.2° to the plane of the ecliptic and their motions, like that of the satellite of Neptune, is retrograde, i.e. from east to west. See Planets

URASHIMA TARO, ōō'rȧ-shē'mȧ tä'rō. In Japanese legend, the story of a fisher-boy who was taken down on the back of a tortoise into the palace of Riu-gu, or the realm of the dragon-king of the world under the sea, and there in blissful dalliance knew nothing of the flight of time. Returning to the earth for a brief visit to his parents, he finds all strange in his native village, enters the old cemetery, and, against the express orders of the sea-king's daughter, opens the casket she has given him, only to find himself an old man soon to die. This is a favorite theme with native artists. The legend is one of the oldest in the language, and is first found in writing in the *Manyōshiu*, "Collection of a Myriad Leaves of Poetry," of the seventh and eighth centuries. The official annals give A.D. 477 and 825 as the dates of his disappearance and return. His tomb, with his fishing-line and the casket he had received from the dragon-king's daughter, are still shown in a temple at Kanagawa, near Yokohama. The myth of Urashima is the Japanese version of the Oriental legend of the Seven Sleepers, represented in America by the story of Rip Van Winkle.

URATYUBE, ōō'rȧ-tyōō'be. A town in the Territory of Samarkand, Russian Turkestan, 55 miles southwest of Khodjend (Map: Asia, Central, L 2). It is surrounded by a wall and has a Russian quarter. The chief articles of trade are horses and camel-wool cloth. Population, in 1897, 20,837, chiefly Uzbegs. Uratyube was founded, according to local tradition, by Cyrus. It was taken by the Russians in 1866.

UR'BAN. The name of eight popes. Urban I., Saint, Pope 222-230. His pontificate, coming under the reign of the Emperor Alexander Severus, was little disturbed by external persecution. The schismatic movement fostered by the self-willed rigorist Hippolytus still continued; but Urban, like his predecessor Calixtus (or Callistus) I., set himself firmly against it.—Urban II., Pope 1088-99, originally Othon by name. He was Archdeacon of Auxerre, and then entered the Monastery of Cluny, where he became prior. Gregory VII. called him to Rome and made him Bishop of Ostia. His election to the Papacy was contested by the Imperial candidate, Guibert of Ravenna, under the name of Clement III., and the first years of his pontificate were a time of constant strife. Urban II. successfully prosecuted the struggle of the Papacy against the Emperor Henry IV., which had been inaugurated by Gregory VII. In 1094 he excommunicated Philip I. of France for his matrimonial infidelity. He presided at the famous Council of Clermont in 1095, which gave the impulse to the Crusades. The most important event of the last years of his pontificate was holding a council at Bari in 1098, at which many Greek bishops were present, and in which the addition of the word *filioque* to the creed was discussed. He died in the close of 1099, just at the time when the First Crusade, which he had organized, terminated in the successful occupation of Jerusalem.—Urban III., Pope 1185-87, Umberto Crivelli. Before his elevation to the Papacy he was Archbishop of Milan. He was an opponent of Frederick Barbarossa. The Emperor besieged the Pope in Verona, but was recalled to Germany by tidings of revolt there, and Urban was on the point of excommunicating him when he died near Ferrara, it is said of a broken heart, on hearing of the capture of Jerusalem by Saladin.

URBAN IV., Pope 1261-64, Jacques Pantaléon. He was the son of a shoemaker of Troyes, and rose by his talents and virtues to high positions in the Church, becoming titular Patriarch of Jerusalem in 1255. He was elected Pope at Viterbo, and spent the whole of his pontificate there and at Orvieto, being excluded from Rome by the power of Manfred, natural son of the Emperor Frederick II., against whom he incited Charles of Anjou to take up arms. He preserved a strict neutrality between the rival candidates for the Empire, and in the difficulties between Henry III. of England and his barons took the side of the King. The nomination of numerous French cardinals led to the preponderance of that party, and so ultimately to the great schism. Consult: Dorez and Guiraud, *Les régistres d'Urbain IV.* (Paris, 1892), and a biography by Georges (ib., 1865).—URBAN V., Pope 1362-70, Guillaume de Grimoard. The cardinals could not agree upon one of their own number, and therefore elected him, then Abbot of Saint Victor at Marseilles. This was at the time of the Papal residence at Avignon, whence Urban III. sent a legate to reduce his rebellious subjects in Rome. In 1367, however, he resolved to return thither in person. Finding the Papal city in a condition all but ruinous, and having endeavored with little success to repress the disorder of the times, he returned to Avignon in 1370. Here he died less than a month after his return, leaving the reputation of great personal piety and zeal for the interests of religion. Consult: Magnan, *Histoire d'Urbain V.* (2d ed., Paris, 1863); Kirsch, *Die Ruckkehr der Päpste Urban V. und Gregor XI. von Avignon nach Rom* (Paderborn, 1898).

URBAN VI., Pope 1378-89, Bartolommeo Prignano. At the time of his election he was Archbishop of Bari. On the death of Gregory XI., who had brought back the seat of the Papacy from Avignon to Rome, Prignano was elected in a conclave held under circumstances of great excitement, owing to the apprehension on the part of the populace of an intention to elect a French pope and again abandon Rome. The most important aspect of his pontificate is that relating to the Great Schism (see SCHISM, WESTERN), which arose out of the conflicting claims to the election. While the candidate of the French cardinals took up his residence at Avignon, under the name of Clement VII., Urban occupied the Papal seat in Rome. After a dispute with Charles, King of Naples, whom he had himself crowned, he died of a fall from his horse, though there were the usual suspicions of poison. —URBAN VII., Pope 1590, Giovanni Castagna. He had been a member of the Council of Trent in its last period, and then for several years nuncio in Spain. Elected to succeed Sixtus V., he died twelve days later, before he could be consecrated.—URBAN VIII., Pope 1623-44, Maffeo Barberini. He was born in Florence 1568, educated at Rome and Pisa, and destined for an ecclesiastical career. After serving twice as nuncio to France, he was made cardinal in 1606. Urban VIII. was guilty of nepotism; but his administration was, on the whole, vigorous and enlightened. He was the founder of the celebrated College of the Propaganda, and to him Rome is indebted for many public works. Some of the early stages of the Jansenist controversy (see JANSENISM) fall within his pontificate. In the Thirty Years' War he sided with France against the Emperor and Spain. In his pontificate the Duchy of Urbino was annexed to the Papal dominions.

URBAN'A. The county-seat of Champaign County, Ill., 128 miles south by west of Chicago; on the Cleveland, Cincinnati, Chicago and Saint Louis Railroad, and a branch of the Wabash (Map: Illinois, D 3). It is the seat of the University of Illinois (q.v.), opened in 1868. The public library has more than 8000 volumes; and there are also the Champaign County Teachers' and Pupils' Library, and the Illinois State Laboratory and Natural History Library. Other prominent features include the County Court House, the Municipal Building, and the Masonic Temple, and Crystal Lake Park. Urbana is the centre of a rich farming section, and manufactures brick and tile, lawn mowers, iron novelties, and suspenders. The Cleveland, Cincinnati, Chicago and Saint Louis Railroad maintains extensive shops here. The government is vested in a mayor, chosen biennially, and a unicameral council. Urbana was chartered as a city in 1855. Population, in 1890, 3511; in 1900, 5728.

URBANA. The county-seat of Champaign County, O., 47 miles west by north of Columbus; on the Erie, the Cleveland, Cincinnati, Chicago and Saint Louis, and the Pittsburg, Cincinnati, Chicago and Saint Louis railroads (Map: Ohio, C 5). It is the seat of Urbana University (Swedenborgian), and has a public library. Urbana is surrounded by a productive farming region, and is of considerable industrial importance. Furniture, bicycle rims, and strawboard are the leading manufactures. The government is vested in a mayor, chosen biennially, and a unicameral council. Urbana was laid out in 1805, and for a time in 1812 was the headquarters of the Northwestern Army. It was the home of the famous Indian fighter Simon Kenton. Population, in 1890, 6510; in 1900, 6808.

URBAN SERVITUDES (from Lat. *urbanus*, relating to a city, from *urbs*, city). Easements or rights existing for the convenience or benefit of houses or other buildings, over lands or buildings belonging to a different owner. The term is employed to distinguish such servitudes from those established for the benefit of land only, which are known as rural servitudes. The most important urban servitudes are: The right to support—that is, of resting joists and other timbers on an adjoining building; the right to have rain drip from the eaves of a building on another's land or building; the right to establish and maintain windows overlooking another's land; the rights of air and access. Consult Washburn on *Easements*. See EASEMENTS.

URBINO, o͞or-bē′nō. A city in the Province of Pesaro e Urbino, Italy, situated on a hill amid the eastern outliers of the Apennines, between the Metauro and the Foglia, 25 miles southwest of Pesaro (Map: Italy, G 4). The streets are narrow and tortuous, but gorgeous views are obtained of the mountains and the Adriatic. The house in which Raphael was born is now fitted up as a museum, and belongs to the 'Reale Accademia Raffaello.' The new cathedral is interesting for its paintings. In the Church of Santo Spirito are noteworthy pictures by Luca Signorelli, and in the San Domenico are good reliefs by Luca della Robbia. The Oratorio della Confraternità di San Giovanni Battista is a splendid structure. The famous ducal palace was erected in the fifteenth century. It is rich in interesting sculptures and decorations, and has a collection of Roman inscriptions and a biblical picture gallery. The city has a free university, founded in 1671, and an academy of fine arts. The celebrated library has been removed to Rome. Urbino manufactures silks, majolica, bricks, lime, oil, and cheese. There are in the vicinity sulphur and travertine quarries. Population (commune), in 1881, 16,812; in 1901, 18,307.

Urbino, the ancient Urbinum, was an important city under the Romans. It became very prosperous in the fourteenth century. Federigo da Montefeltre, who ruled from 1444 to 1482 and who was elevated by the Pope to the dignity of Duke of Urbino in 1474, maintained a magnificent court, built the palace, and made the city a centre of science and art. During the sixteenth century, under the Della Rovere family, Urbino was important in the manufacture of majolica. It was a Papal possession from 1626 to 1860.

URDANETA, o͞or'dȧ-nä'tȧ. A town of Luzon, Philippines, in the Province of Pangasinán, situated 27 miles southeast of Lingayen (Map: Luzon, D 3). Population, about 16,600.

URDU, o͞or'do͞o. The speech of the Mohammedan population of Central Hindustan, and a sort of *lingua franca* for almost all the peninsula. See HINDUSTANI LANGUAGE AND LITERATURE.

URE, ANDREW (1778-1857). A Scotch chemist, born at Glasgow. He studied at Glasgow and Edinburgh. In 1802 he became professor of chemistry and natural philosophy in the Andersonian Institution at Glasgow; took an active part in the establishment (1809) of the Glasgow Observatory, and was appointed its first director. In 1830 he removed to London, and in 1834 he was appointed analytical chemist to the Board of Customs. He published a number of valuable works, his two dictionaries remaining for many years the standard books of reference: viz. his *Dictionary of Chemistry* (2 vols. 1821), and *A Dictionary of Arts, Manufactures, and Mines* (1837 and several later editions). Among his other works may be mentioned the *Systematic Table of the Materia Medica* (1813); *A New System of Geology* (1829); the *Philosophy of Manufactures* (1835); and *The Cotton Manufacture of Great Britain Compared with That of Other Countries* (1836 and 1861).

UREA (Neo-Lat., from Gk. *οὖρον*, *ouron*, urine), or CARBAMIDE, $CO(NH_2)_2$. An organic substance which derives its name from its having been originally discovered in urine, of which it forms the most important and characteristic ingredient. Pure urea, which has been allowed to crystallize slowly, occurs in white, glistening, streaked, four-sided prisms; but when the crystallization is rapid or disturbed, it separates in small white silky needles. It is devoid of smell, has a coolish, bitter taste, like that of saltpetre (which it closely resembles in its external form), and is very slightly deliquescent. It is readily soluble in water and alcohol, but only slightly in ether. Pure urea melts at 132° C.; dry urea may be sublimed without decomposition by heating in vacuo between 120° and 130° C. If heated, under ordinary pressure, above these temperatures, it is decomposed with formation of ammonia, cyanuric acid, biuret, and carbonic acid; the formation of biuret is represented by the following chemical equation:

$$\underset{\text{Urea}}{2CO(NH_2)_2} = \underset{\text{Biuret}}{NH_2CONHCONH_2} + \underset{\text{Ammonia.}}{NH_3}$$

The formation of cyanuric acid ($C_3H_3N_3O_3$) takes place indirectly, probably through the combination of biuret with cyanic acid. If heated with water at 120°, or if boiled with dilute mineral acids, urea combines with water, yielding ammonia and carbonic acid according to the following equation:

$$\underset{\text{Urea}}{CO(NH_2)_2} + 2H_2O = \underset{\text{Carbonate of Ammonia.}}{(NH_4)_2CO_3}$$

A similar change takes place at ordinary temperatures in urine exposed for some time to the air. Here the transformation is effected through a process of fermentation caused by certain micro-organisms producing, when killed, an enzyme that hydrolyzes urea with great rapidity. This enzyme is probably secreted also by the mucous membrane of the bladder in certain inflammatory conditions, the fermentation then taking place while the urine is still in the bladder.

The following are some of the most important of the compounds of urea: *Nitrate of urea*, $CO(NH_2)_2.HNO_3$, and *oxalate of urea*, $2CO(NH_2)_2.H_2C_2O_4$, are readily crystallizable salts, formed by the direct addition of the respective acids to a moderately strong solution of urea. As nitrate of urea requires eight parts of cold water, and is still more insoluble if an excess of free nitric acid is present, and the oxalate is more insoluble than the nitrate, while urea dissolves in its own weight of water, these salts may be employed to test for and approximately determine the quantity of urea. Among the compounds of urea with metallic oxides, those which it forms with the oxides of mercury are especially interesting, and have been completely examined by Liebig. A result of his researches is his celebrated method, which is now in universal use, of determining the amount of urea volumetrically. The following are other accurate methods of determining urea quantitatively: (1) Knop-Hüfner's method consists in decomposing urea into nitrogen and carbonic acid, with sodium hypobromite, and determining the volume of nitrogen produced from which the amount of urea can be readily calculated. (2) An excellent method devised by Bunsen consists in heating urea in a sealed glass tube with barium chloride, which breaks up urea into carbonic acid and ammonia, the former combining with barium chloride to give the insoluble barium carbonate which is readily isolated, dried and weighed; the weight of barium carbonate gives the weight of carbonic acid produced in the decomposition, and hence, by a simple calculation, the weight of urea decomposed. The presence of urea may be readily detected by means of the biuret reaction. It has been mentioned above that when urea is decomposed by heating, biuret is produced along with several other products of decomposition. Now, when biuret is dissolved in water, then some caustic soda and a little dilute copper sulphate solution added, a characteristic pink coloration is produced. To detect urea, therefore, the dry substance submitted for examination, or the residue left on evaporating a solution, is heated for some time at 150° C., then dissolved and treated with caustic soda and copper sulphate, a pink coloration produced proving the presence of urea.

Urea was discovered in urine in 1773, and it was the first organic compound produced artificially in the chemical laboratory—a synthesis of vast importance in the history of chemistry. (See CHEMISTRY.) It was then (1828) obtained by Wöhler (q.v.) by heating a solution of ammonium cyanate, the transformation taking place according to the following chemical equation:

$$NH_4OCN = CO(NH_2)_2$$

Ammonium cyanate Urea.

Urea has since been made artificially in a variety of ways; for instance, by treating ammonia with phosgene gas (carbonyl chloride), the following reaction readily taking place:

$$COCl_2 + 4NH_3 = CO(NH_2)_2 + 2NH_4Cl$$

Phosgene gas Ammonia Urea Ammonium chloride.

This synthesis is important inasmuch as it explains the structure of urea, the molecule of the latter evidently consisting of one carbonyl (CO) group and two NH_2 groups; therefore, urea is considered as the diamide of carbonic acid [$CO(OH)_2$] and is chemically called *carbamide.*

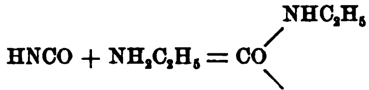
Urea is best prepared in the laboratory by heating phenyl carbonate with ammonia:

$$(C_6H_5)_2CO_3 + 2NH_3 = CO(NH_2)_2 + 2C_6H_5OH.$$

It may be obtained from urine by evaporating to a small volume and adding nitric acid; the nitrate of urea thus obtained is purified by crystallization from nitric acid, decomposed with barium carbonate, and the urea set free is dissolved out of the mixture thus obtained with alcohol.

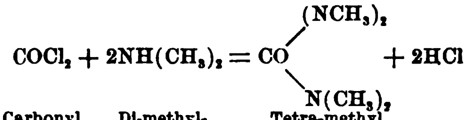
Urea occurs more abundantly in the urine of carnivorous than in that of herbivorous animals. Small quantities of urea are present also in the urine of birds. The average amount of urea normally excreted by the human adult in a day is 33 grams, the quantity varying between 22 and 35 grams. Urea is also a constituent of the fluids of the eye, of the sweat, and, in minute quantity, of the blood and of the liquor amnii (of the fœtus). There can be no doubt that it is a final product of the regressive metamorphosis of the living tissues, or of their disintegration into simpler compounds, by means of which the final elimination of the worn-out structures is effected. In what way this process of disintegration takes place in the animal body is not known; though various hypotheses have been advanced in explanation of this important phenomenon. Since urea is readily produced from ammonium cyanate and is with equal readiness transformed into ammonium carbonate (see above), it may be that the decomposition of proteids in the body gives rise first to the formation of one or both of these substances, which are subsequently changed into urea. Such explanations, however, are rather vague; for, although cyanogen compounds are manufactured for practical purposes chiefly from nitrogenous animal refuse, the nature of the chemical transformations taking place during the process is not understood. The cyanate hypothesis is attractive inasmuch as the transformation of cyanogen compounds into urea might serve as a source of much energy, cyanogen compounds possessing great molecular energy, while urea possesses much less energy and is much more stable.

UREAS, THE COMPOUND. A large class of organic substances, for the knowledge of which chemistry is mainly indebted to A. W. Hofmann. It is stated in the article on UREA (q.v.) that that important substance can be obtained by the action of ammonia either on cyanic acid (synthesis of urea by heating an ammonium cyanate solution), or on phosgene gas (carbonyl chloride). Similar transformations take place if, in place of ammonia, compounds are employed which are derived from ammonia by replacing hydrogen in the latter by alcohol radicles, such as methyl (CH_3) or ethyl (C_2H_5). In these cases, however, not urea itself, but a series of compound ureas are obtained, which are said to be derived from urea by substituting an alcohol radicle for hydrogen. These compound ureas are very similar in their chemical behavior to urea itself, and, like urea, form salts with acids. Most of the ureas are crystalline solid substances. Those, however, which are derived by replacing *all* the hydrogen of urea are liquids that boil at high temperatures and distil without decomposition. *Ethyl urea* and *tetra-methyl urea* are formed by the above methods, according to the following chemical equations:



$$HNCO + NH_2C_2H_5 = CO\begin{cases} NHC_2H_5 \\ NH_2 \end{cases}$$

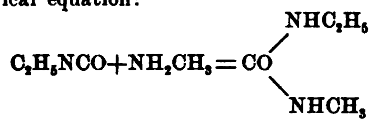
Cyanic acid Ethylamine Ethyl-Urea.



$$COCl_2 + 2NH(CH_3)_2 = CO\begin{cases} (NCH_3)_2 \\ N(CH_3)_2 \end{cases} + 2HCl$$

Carbonyl chloride Di-methyl-amine Tetra-methyl urea.

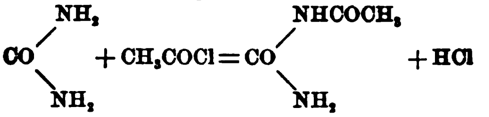
Certain compound ureas may be obtained by using ethereal salts of cyanic acid; thus *symmetrical methyl-ethyl urea* is obtained by the action of methylamine on ethyl cyanate, the reaction taking place according to the following chemical equation:



$$C_2H_5NCO + NH_2CH_3 = CO\begin{cases} NHC_2H_5 \\ NHCH_3 \end{cases}$$

Ethyl cyanate Methyl-amine Methyl-ethyl urea.

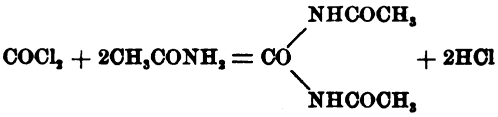
Another important series of compound ureas is obtained by substituting for hydrogen in urea the radicles of organic acids. These ureas are called *ureides.* One of the hydrogen atoms of urea can be replaced by an acid radicle by the direct action of the chloride of the acid radicle on urea; thus *mono-acetyl urea* is formed according to the following equation:



$$CO\begin{array}{l}\diagup NH_2\\ \diagdown NH_2\end{array} + CH_3COCl = CO\begin{array}{l}\diagup NHCOCH_3\\ \diagdown NH_2\end{array} + HCl$$

Urea Acetyl chloride Acetyl urea.

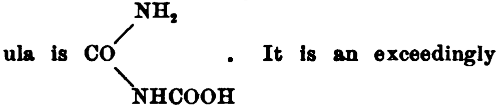
Other methods, however, must be employed for the purpose of introducing more than one acid radicle; thus symmetrical *di-acetyl urea* is obtained by the action of acetamide upon carbonyl chloride, the reaction taking place according to the following chemical equation:

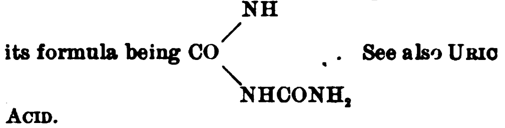


$$COCl_2 + 2CH_3CONH_2 = CO\begin{array}{l}\diagup NHCOCH_3\\ \diagdown NHCOCH_3\end{array} + 2HCl$$

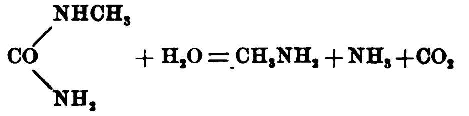
Carbonyl chloride Acetamide Di-acetyl urea.

Among the important ureides is that of carbonic acid, called *allophanic acid.* Its formula is $CO\begin{array}{l}\diagup NH_2\\ \diagdown NHCOOH\end{array}$. It is an exceedingly weak acid, its alkaline salts being decomposed even by carbonic acid. The substance biuret, formed by heating urea somewhat above 150° C. (see UREA), is the amide of allophanic acid, its formula being $CO\begin{array}{l}\diagup NH\\ \diagdown NHCONH_2\end{array}$. See also URIC ACID.





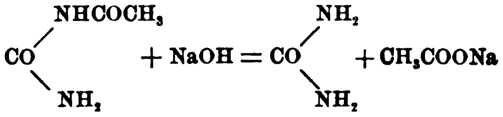
When the alkyl ureas (i.e. the compound ureas formed by replacing hydrogen in urea by alcohol radicles) are boiled with alkalies, decomposition ensues resulting in the formation of amines, ammonia, and carbonic acid. Methyl urea, for instance, is thus hydrolyzed according to the following chemical equation:



$$CO\begin{array}{l}\diagup NHCH_3\\ \diagdown NH_2\end{array} + H_2O = CH_3NH_2 + NH_3 + CO_2$$

Methyl urea Methylamine.

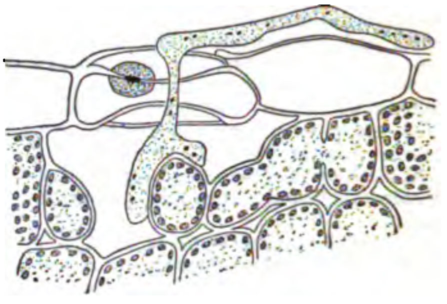
The ureides are more or less readily saponified by the action of alkalies; acetyl urea, for instance, being decomposed according to the following equation:



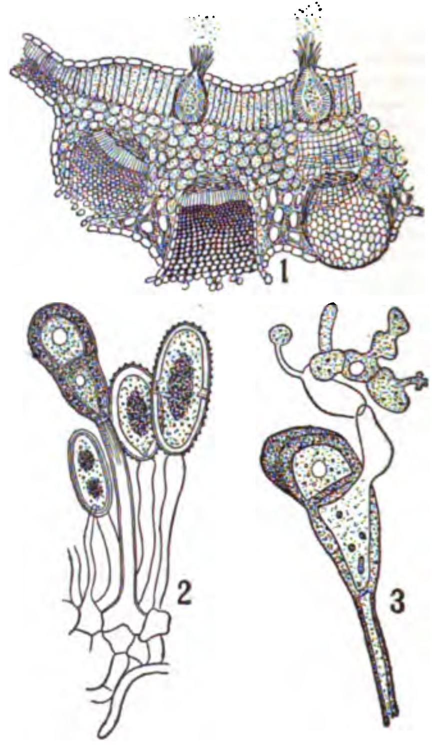
$$CO\begin{array}{l}\diagup NHCOCH_3\\ \diagdown NH_2\end{array} + NaOH = CO\begin{array}{l}\diagup NH_2\\ \diagdown NH_2\end{array} + CH_3COONa$$

Acetyl urea Urea Sodium acetate.

UREDINALES, ū-rĕd'ĭ-nā'lēz (Neo-Lat. nom. pl., from Lat. *uredo*, blight, blast, from *urere*, Skt. *uṣ*, to burn). A group of fungi familiarly called 'rusts' which live as parasites on flowering plants. It includes very many species, which have complicated and diverse life-histories, but are identified by the teleutospore stage, this being normally a resting period in the life history. The teleutospores are formed after a period of active vegetation and previous to some unfavorable season, as winter. They are one to several-celled, and exhibit such a variety in structure that they serve to distinguish the various genera. After the return of a favorable season each cell of the teleutospore produces a short filament (promycelium), each of whose cells, generally four in number, develops a small spore (sporidium) which serves to infect the proper host. There are some rusts, confined to one host, that never produce more than two forms of spores (teleutospores and sporidia), that alternate with one another. Most rusts, however, have other forms of spores. Conspicuous among them are the uredospores, somewhat similar to



GERM TUBE OF A RUST ENTERING A LEAF THROUGH A STOMA.



RUST.

1, Section of leaf of barberry with cluster cups (æcidia) below and spermogonia above; 2, uredospores and one teleutospore; 3, germinating teleutospore with four-celled promycelium.

teleutospores. They are one-celled, and are formed during the vegetative season before the teleutospores. They are especially conspicuous on some species of Puccinia that grow on oats and wheat, and most of the so-called 'rust' of these cereals is due to the development of immense numbers of uredospores collected in spots and lines along the leaves and stems. The most complicated life-histories, however, include still another form of fructification (æcidium or 'cluster-cup'), in which the spores are found in parallel chains at the bottom of a cup-like structure. The cluster-cups are generally found on a different host plant from the teleutospores, so that such rusts must depend on two hosts for the completion of their life-history. For example, in the well-known wheat rust (*Puccinia graminis*) the sporidia germinate on the barberry, producing there the cluster-cups (æcidia); while the æcidial spores are carried to wheat, oats, and other cereals, where several generations of uredospores (red rust) may be developed. The uredospores, being scattered, germinate on other individuals, spreading the rust very rapidly. Finally, at the end of the season teleutospores (black rust) are formed. Another interesting life-history is that of the apple rust. (See Apple, paragraph *Diseases*.) Uredospores may survive unfavorable seasons and propagate rust the following year. This probably accounts for the abundance of wheat rust in the Western United States and Australia, where there are no wild barberries. In these regions the barberry (cluster-cup) phase of the life-history is omitted, and the uredospores, or perhaps the sporidia, germinate directly upon the wheat. The rust is due to certain species of Puccinia whose cluster-cups are on plants other than the barberry.

Consult: Engler and Prantl, *Die natürlichen Pflanzenfamilien* (Leipzig, 1887—); Plowright, *British Uredineæ and Ustilagineæ*.

URE′NA (Neo-Lat., from *uren*, the native Malabar name). A genus of herbs of the natural order Malvaceæ. The bark is very fibrous; and the fibre of *Urena lobata* and *Urena sinuata*, weeds common in most parts of India, is used as a substitute for flax in making cordage and paper stock. It is strong and fine and in many ways resembles jute, for which it is a good substitute. *Urena lobata* grows in various parts of the United States, particularly in Florida, where it has often been mistaken for ramie.

U′RETER (Gk. *οὐρητήρ*, *ourētēr*, ureter, urethra, from *οὖρον*, *ouron*, urine). One of two canals by which the urine is conveyed from the pelvis of the kidney (q.v.) on either side to the base of the bladder. Each ureter is about 18 inches in length, and enters the bladder in so slanting a direction as to prevent regurgitation. When a concretion is formed in the kidney, the ordinary and most favorable event is that it should descend through the ureter to the bladder. The passage of a stone through this tube gives rise to a series of violent symptoms, consisting of sudden and most severe pain, first in the loins and groin, subsequently in the testes (in the male) under the thigh; the testes may be retracted spasmodically. Coincident with the pain there are violent sickness, faintness, and collapse, which may last two or three days, and are only relieved when the stone reaches the bladder. The treatment consists in the warm bath, and the inhalation of chloroform or opium in large doses (both of which serve to allay spasm and deaden pain), and the free use of diluents to wash down the concretion. After the subsidence of the attack constitutional measures must be employed for the control of the existing diathesis.

URE′THANE (from *ur-ea* + *ethane* or *ethyl*). A useful unofficial hypnotic drug, chemically ethyl carbonate. It is made by the interaction of urea nitrate and ethyl alcohol. It occurs in colorless, odorless crystals with a slightly saline taste. It is readily soluble in water, alcohol, ether, or chloroform. A pure hypnotic, with no analgesic or depressing effect, it gives a quiet, natural sleep in from 15 to 45 minutes after its administration. It is also used as an antispasmodic in convulsive disorders, and in cases accompanied by coma may be given hypodermically.

URE′THRA (Lat., from Gk. *οὐρήθρα*, *ourēthra*, passage for urine, from *οὖρον*, *ouron*, urine). The canal by which the urine is discharged from the bladder. The male urethra is about nine inches long, and its office is to conduct the seminal fluid, secondarily to discharge the urine. It is divided into three parts: (1) the deep or prostatic urethra, which extends from the outlet of the bladder (with which it is continuous) through the prostate gland, being the part into which the seminal ducts open; (2) the membranous urethra, less than an inch long, extending from the prostate forward; and (3) the cavernous, or spongy, or penile urethra, extending through the erectile tissue to the end of the penis. The female urethra is less than two inches in length, and opens externally between the upper margin of the vaginal entrance and the clitoris. The urethra is lined by a continuation of the mucous membrane of the bladder, and in the male is extremely sensitive. See Gonorrhœa; Stricture.

URFAH, ṳr-fä′, or **ORFA.** The modern name for Edessa (q.v.).

URFAHR, o͞or′fär. A town in the Crownland of Upper Austria, on the left bank of the Danube, opposite Linz (q.v.), with which it is connected by an iron bridge. It manufactures spirits and machinery. Population, in 1900, 12,827.

URFÉ, ṳr′fā′, Honoré d' (1568-1625). A French pastoral romancer, born in Marseilles of noble family. Urfé was educated for the Church, but married his sister-in-law, Diane de Château-mourand (1600). On the fall of the League he withdrew to Savoy and began to write in the pastoral style suggested by the Spanish *Amadis de Gaul*, which had been translated into French at the instigation of Francis I. (1540-8), and by the Greek pastoral romances which were rendered into French early in the sixteenth century. Fiction of this character had made a timid appearance in France before Urfé, for instance, in Fumée's *Du vray et parfait amour* (1599). It had already acquired its great masterpieces in Italy (Poliziano's *Orfea*, 1471 or 1472; Sannazaro's *Arcadia*; Tasso's *Aminta*, 1573; Guarini's *Pastor Fido*, 1590), in England (Spenser's *Shepherd's Calendar*, 1570); and in Spain (Monte-mayor's *Diana*, 1542; Gil Polo's *Diana Enamorada*, 1564, and Cervantes's *Galatea*, 1581). All these romances were popular in France, but Urfé's *Astrée* was the first that became a sort of social breviary for a generation. It is a novel of 5155 pages. Its first two volumes appeared in 1610, the third in 1619, the posthumous fourth and fifth in 1627, with other unofficial continuations. Of this interminable treatise on the verb *aimer*, Urfé borrows his pastoral scenes from the *Diana*, his warlike episodes from *Amadis*, and from the Greeks and Latins some episodes and much of his story-telling art; but he is superior to them all in character-drawing, in good humor, and in the higher social aim of his work. In the subtle differentiation of his lovers, Urfé is a not unworthy forerunner of Racine and Marivaux, unapproached by any novelist of his century but Madame de Lafayette. Urfé was a sort of realistic idealist; he chose the scene of his own birth, the banks of the Lignon, for the scene of his novel, and his conversations are lively, far beyond the wont of his time. His aim throughout is the refinement of society, and here its influence is hard to overestimate. The Hôtel de Rambouillet seems to have been organized in its imitation. *Astrée's* popularity was astounding. Bishops like Camus, saints like Francis de Sales, joined with realistic novelists like Sorel to sound the praise of this 'exquisite work.' La Fontaine, the scholarly Huet, the sprightly Fontanelle, the cynic La Rochefoucauld, all rejoiced in it. For two generations it was an accepted book of reference on deportment and breeding. In Germany, in 1624, a princely and aristocratic coterie, on organizing an *Académie des vrais amants*, assumed the names of the characters of the *Astrée*.

Consult: Bonafous, *Etude sur l'Astrée et sur H. d'Urfé* (Paris, 1846); Körting, *Geschichte des französischen Romans in 17ten Jahrhundert*, vol. i. (Oppeln, 1885).

URGA, o͞or'gȧ (Chin. *K'ulun*). The capital of Northern Mongolia, situated on the Tola River and the highway leading from Kiakhta (q.v.) to Peking, 175 miles south of Kiakhta (Map: China, C 2). It consists of the Mongolian town, inhabited mostly by lamas, and of the Chinese town, a few miles distant, where the Chinese and Russian merchants live. In the Mongolian town is situated the residence of the head of the Lamaist Church in Mongolia. There are also numerous temples surrounded by the houses of the lamas. In the Temple of Maidary is a colossal gilt statue of that divinity, over 33 feet high. During the religious festivals the town is visited by great numbers of pilgrims. Population, 30,000, including about 10,000 lamas.

URI, o͞o'rē. A canton of Switzerland, bounded by the Canton of Schwyz on the north, Glarus and Grisons on the east, Ticino on the south, and Valais and Unterwalden on the west (Map: Switzerland, C 2). Area, 415 square miles. The region consists of the narrow valley of the Reuss, surrounded by offshoots of the Bernese Alps on the west, the Glarus Alps on the east, and the Saint Gotthard group on the south. Many of the peaks exceed 10,000 feet. The climate is raw. Uri is primarily a pastoral canton, and exports chiefly dairy products. The principal manufactures are dynamite and parquet floors. The legislative authority is exercised directly by the people assembled in the Landsgemeinde. The canton is represented by one member in the Federal Council. Population, in 1900, 19,732, nearly all German-speaking Roman Catholics. Capital, Altdorf (q.v.).

Uri, first mentioned in 732, passed in the thirteenth century to the Hapsburgs. It gradually obtained its independence and in 1291 formed the 'perpetual league' with Schwyz and Unterwalden. In the fifteenth century the Val Leventina (now a part of Ticino) was acquired by Uri. The canton took part in the Sonderbund (q.v.).

URI. Another name for the Limpopo (q.v.), a river of South Africa.

U'RIAN, *Ger. pron.* o͞o'rē-än, SIR. A name, like the modern 'Mr. Blank,' once used to designate one whose real name was either unknown or unmentionable. It occasionally occurs in German and English literature before the nineteenth century, and is sometimes used of Satan. In Wolfram von Eschenbach's *Parzival* it is applied to the evil-minded Prince of Punturtois.

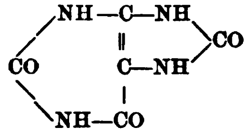
URIC ACID (from Gk. *οὖρον*, *ouron*, urine), $C_5H_4N_4O_3$. A compound of carbon, hydrogen, nitrogen, and oxygen, which forms a loose white powder or scales consisting of minute crystals devoid of smell or taste, only very slightly soluble in water (1 part requiring about 15,000 parts of cold and 1600 of boiling water), and quite insoluble in alcohol and ether. It is soluble without decomposition in strong sulphuric acid, and it may be thrown down from this solution by the addition of water. It is also soluble in the carbonates, borates, phosphates, lactates, and acetates of the alkalies, extracting from these salts a part of their base, with which it forms acid urates. Litmus paper is reddened by its moist crystals, or by a hot aqueous solution. The acid is not volatile, and by dry distillation is decomposed into carbonate of ammonia, urea, cyanuric acid, hydrocyanic acid, etc. Uric acid acts as a very weak dibasic acid, forming with bases two series of salts, the neutral and the acid, of which the former are the more soluble. Among the most important are the acid urates of sodium, potassium, lithium, and ammonium. The urate of lithium is more soluble than any other urate, and hence lithia water is an important therapeutic agent in converting uric acid and the more insoluble urates into a soluble salt in the living body. The urates are frequently called 'lithates,' and the acid itself 'lithic acid.'

Uric acid is widely distributed throughout the animal organism. It occurs not only in the urine of man and carnivorous animals, but is the chief constituent (either free or in combination) of many calculi occurring in the kidneys or bladder, and of numerous urinary sediments. The urinary secretion of birds and reptiles consists almost entirely of urates, which are also found in the excrements of caterpillars, butterflies, beetles, etc., and of many mollusks. Moreover, in very minute quantities, it occurs as a urate in healthy blood, in which fluid it has been found in excess in gout and Bright's disease, and is a constituent of the aqueous extract of the spleen, liver, lungs, pancreas, and brain. The *chalk-stones* occurring about the smaller joints and in the lobes of the ear of gouty patients consist mainly of urate of soda.

The best and most ready mode of obtaining uric acid on a large scale is from guano, or from the excrements of snakes or fowls, which consist largely of urates. For this purpose the mass is boiled with potash, which expels any ammonia that is present, and a stream of carbonic acid is then passed through the strained potash solution, which throws down acid urate of potash. This precipitate is dissolved in water, and decomposed by hydrochloric acid, which throws down the uric acid in minute crystals. The form in which this acid crystallizes is liable to great variations. Sometimes we have flat tablets resembling whetstones, or sections with a double knife through biconvex lenses; at other times, more or less perfect rhombic tablets, and sometimes hexagonal plates. barrel-shaped prisms, and toothed crystals. It is, however, difficult to identify uric acid crystals by direct inspection; so that, to prove the presence of uric acid, tests of a chemical nature must be applied. The so-called murexid reaction constitutes an excellent test: the substance submitted for examination is treated with a little strong nitric acid, and the mixture is evaporated to dryness at a gentle heat; the residue is moistened with a trace of ammonia, which, if uric acid was present in the original substance, produces a brilliant purple coloration; a drop of caustic soda changes the color to a reddish blue that disappears on warming the solution. The test is based on the fact that warming with nitric acid converts urea into purpuric acid, the acid ammonium salt of which—called murexid—has a brilliant reddish-purple color.

By the oxidation of uric acid two series of interesting products are obtained. If nitric acid is used as the oxidizing agent, uric acid splits up into urea and *alloxan* (a ureide). If, instead of nitric acid, potassium permanganate is employed, uric acid breaks up into carbonic acid and *allantoin* (another ureide). Alloxan can be readily transformed into parabanic acid (the ureide of oxalic acid), and from the latter urea and oxalic acid can be obtained with equal readiness. On the other hand, allantoin can be converted, by a series of simple reactions, into urea allanturic acid (glyoxyl urea), parabanic acid (oxalyl urea), and hydantoic acid, the latter being closely allied to hydantoin (glycolyl urea). The substituted ureas (ureides) obtained from uric acid may also be prepared directly from urea. (See UREAS, COMPOUND.) It is, therefore, clear that uric acid and urea are chemically closely related to each other. In mammals nitrogenous substances are disintegrated mainly into urea; in birds the main product of disintegration is uric acid. The formation of both urea and uric acid takes place most probably in the liver. The urine of mammals sometimes contains allantoin, hydrated parabanic acid, oxalic acid, and other products, which are obtained in the laboratory by oxidizing uric acid.

The products of decomposition of uric acid were first thoroughly investigated, in a series of celebrated researches, by Liebig and Wöhler. Then the chemical relationship of urea and uric acid was clearly established. It has since been shown that uric acid is a di-ureide, i.e. a substitution product containing two molecules of urea. After much painstaking research, carried on by some of the best chemists of the century, it was possible to demonstrate the true chemical constitution of uric acid, and finally Horbaczewsky succeeded in preparing this important organic substance by a synthetic method; Behrend and Roosen subsequently discovered another synthesis of uric acid, which is relatively simple and perfectly well understood in the light of our knowledge of the constitution of uric acid. The chemical constitution of uric acid is represented by the following structural formula first proposed by Medicus:



Uric acid.

URICO'NIUM, or **VIR'ICO'NIUM.** An ancient Roman city of Britain, the site of which is about four miles to the east of Shrewsbury, and partly occupied by the village of Wroxeter. It is mentioned by Ptolemy as existing in the beginning of the second century of our era, and it is probable that there was a Roman station here before A.D. 70. The traces of the ancient wall show that it had a circumference of about three miles, and through it ran the great Roman road now known as Watling Street. Exploration of the remains began in 1859. On the north side of the old wall was probably the Basilica, and on the south the public baths. A few inscriptions and numerous small objects, such as coins, brooches, hairpins, pottery, sculptures, etc., found in the ruins are in the museum at Shrewsbury, and some of the buildings excavated have since been covered. The human remains found in the excavations show that the city was sacked and burned by enemies, probably the West Saxons, in the sixth century. Of this, however, there is no historic record. The ruins seem to have remained with little change, except the gradual process of decay, till about the twelfth century, when they were used as material for other buildings. Consult J. C. Anderson, *The Roman City of Uriconium at Wroxeter* (London, 1867).

URIEL (Heb. *Ūriēl*, Light of God). One of the seven archangels, who personified light and had his dwelling in the sun. He appears in Milton's *Paradise Lost* and Longfellow's *Golden Legend.*

U'RIM AND THUM'MIM (Heb. *ūrīm wĕtummīm*). The name given to two objects, perhaps pebbles or stones in the shape of dice, kept in the oracle-pouch that hung upon the breast of the Jewish high priest (Ex. xxviii. 30: see EPHOD). They were used to obtain an oracular decision revealing the Divine will. While we do not know the precise manner in which this decision was obtained, analogy from similar customs among ancient nations makes it probable that the stones were drawn by lot out of the pouch, and, according to the one drawn, an affirmative or negative answer to a question was given. An entirely satisfactory explanation of the two mysterious names has not yet been furnished, but all the evidence points in favor of a connection with two Babylonian stems (*u'uru* and *tamu*), from which are derived *urtu*, 'decision' (used chiefly of oracular decisions), and *tamitu*, 'oracle,' which occur in the religious literature of Babylonia. The two words would thus be almost synonymous, and this view is supported by the consideration that they are so used in the Old Testament (e.g. Deut. xxxiii. 8, according to the Septuagint text), and that Urim at times is used without Thummim (e.g. Num. xxvii. 21 and I. Sam. xxviii. 6), which shows that the one word conveyed the idea without the help of the other. The early explanations, such as 'light and perfection' or 'light and truth' (Luther's view), are generally rejected as purely fanciful by critical scholars, who hold that the use of the Urim and Thummim belongs to the realm of primitive religious rites, and that its persistence to so late a period as that of the compilation of the Priestly Code (Ex. xxviii. 30) is due to the strong hold that it had taken upon the Hebrews. It should be added, however, that the notice in the Priestly Code, where the Urim and Thummim are described as a part of the high priest's costume, without reference to their practical use, marks the transition to the symbolical view taken in the later Jewish theology of their significance as tokens of the revelation and guidance granted to Israel through its representative, Aaron. Consult the articles in the Hastings *Bible Dictionary* and the *Encyclopædia Biblica*, and Muss-Arnolt, "The Urim and Thummim," in the *American Journal of Semitic Languages*, vol. xvi. (Chicago, 1900).

URINE (Lat. *urina*, urine; connected with Gk. *οὖρον*, *ouron*, urine. Skt. *vāri*, *vār*, water, Av. *vāra*, rain, Icel. *ūr*, drizzling rain, AS. *wer*, sea). The fluid which is secreted by the kidneys, stored in the bladder, and evacuated through the urethra in the act of micturition. The epithelium lining the tubules of the kidneys elaborates from the blood urea and other products of retrograde metamorphosis, and a transudation or osmosis of water occurs from the interior of the convoluted blood vessels into the cavity of the tubules.

In a healthy human being, urine is a clear yellowish or amber fluid of a salty taste and a peculiar aromatic odor, normally acid, and with a specific gravity of about 1.020, and generally containing some mucus. In 24 hours such a person discharges about 50 fluid ounces, or 1500 cubic centimeters, of urine. The amount of the several urinary constituents passed in 24 hours are as follows, according to Parkes:

	Grams
Water	1500.000
Total solids	72.000
Urea	33.180
Uric acid	0.555
Hippuric acid	0.400
Kreatinin	0.910
Pigment and other substances	10.000
Sulphuric acid	2.012
Phosphoric acid	3.164
Chlorine	7.000
Ammonia	0.770
Potassium	2.500
Sodium	11.090
Calcium	0.260
Magnesium	0.207

These constituents, other than water, appear in the urine as (1) inorganic salts, including sodium chloride; calcium chloride; potassium and sodium sulphates; sodium, calcium, and magnesium phosphates; traces of silicates; alkaline carbonates; nitrates in small quantity; traces of iron. (2) Nitrogenous crystalline bodies, including urea, uric acid, kreatinin, xanthin, hypoxanthin, and occasionally allantoin; hippuric acid, ammonium oxalate; and rarely taurin, cystin, leucin, and tyrosin. (3) Non-nitrogenous bodies, including lactic, succinic, formic, oxalic, and phenylic acids; and rarely sugar in minute amount. (4) Pigments, including urobilin, purpurin, and indican. (5) Other bodies, including ferments from the various digestive fluids of the body. (6) Gases, rarely, in very small quantities, chiefly nitrogen and carbonic acid.

The acidity of normal urine is due to the presence of the acid sodium biphosphate. At times the urine of digestion is alkaline, and frequently urine decomposes rapidly and becomes alkaline. Upon standing and cooling, it frequently becomes cloudy from the urates, and a sediment of pink urates occurs; or in other cases an increase of oxalate of ammonium, together with mucus, forms a thick precipitate or deposit. This occurrence by no means indicates disease of the kidneys, as is claimed by ignorant quacks. Among the abnormal constituents of urine are blood, pus, epithelium from bladder, kidney, ureter or vagina, spermatozoa, albumin, fibrin in the form of 'casts,' fats, sugar, etc., during various conditions or diseases. In Bright's disease (q.v.) albumin and casts are generally found.

Urea is determined most easily by a test with hypobromate of potassium. The total excretion per day should be between 300 and 600 grains. Uric acid generally precipitates in a few days if the urine be allowed to stand. It may be determined by a hydrochloric acid procedure. Sugar is generally detected by using a solution of sulphate copper, which is reduced and precipitated in the form of the orange-colored oxide in the presence of glucose. Albumin responds to boiling or the nitric acid test, either of which causes a permanent cloud in the urine if albumin be present. Phosphates cause a white cloud on boiling the urine, which is dissolved and cleared away by adding a drop of acetic acid. Chlorides, ammonia, and urates have their special chemical tests.

THE URINARY DEPOSITS are of rare beauty and interest under the microscope. Besides blood, pus, and epithelial cells occurring during grave illness, several crystals are found in ordinary urine with slight variations in health. After standing for a time at a moderate temperature, amorphous granular matter precipitates in most urine, soluble by heat, and composed of the urates of calcium and magnesium with the acid urates of potassium, sodium, and ammonium. These deposits are probably caused by the excess of phosphoric acid furnished by the acid sodium biphosphate, which decomposes the alkaline urates. After a longer period, of a few days to two weeks, alkaline fermentation supervenes, due to the presence of yeast fungus and mucus. During this process urea is converted into carbonate of ammonium. As this fermentation begins, the uric acid crystals, occurring as red pepper dust in the receptacle, begin to dissolve, while adhering to their fragments we find prismatic crystals of urate of sodium and spheroids of urate of ammonium. When the alkalinity of the urine is established amorphous granules of phosphate of lime appear, together with triangular prisms of triple phosphates of ammonium and magnesium, and octahedral crystals of oxalate of calcium.

These changes may progress in the pelvis of the kidney or in the bladder. Uric acid gravel or calculus is found in either situation, causing much pain and a grave pathological condition, as the changes in the mucous membrane lining either cavity are important. (See CALCULUS.) Uric acid or urate calculi are generally red and quite hard. Oxalate calculi are usually found, when present, in the pelvis of the kidney, and are of such shape and color as to be called 'mulberry' calculi. Phosphatic calculi are white and soft, and often appear as dust. Calcium carbonate, cystin, and xanthin calculi are rare. Calculi may be prevented, and probably phosphatic calculi may be dissolved in the bladder by the use of lithia waters or salicylates. They cause severe inflammatory conditions in most cases. See LITHIC ACID DIATHESIS; PHOSPHATIC DIATHESIS. See MICROSCOPY, clinical and accompanying illustrations. Consult Ogden, *On the Urine* (Philadelphia, 1901).

URINE, INCONTINENCE OF, or ENURESIS. A troublesome affection, far more common in childhood than in more advanced life. The child is in the habit of discharging its urine in bed during sleep. The habit may often be broken by proper domestic management, as withholding any excess of fluids before going to bed, and by waking it and making it discharge the contents of the bladder late at night. The most certain medicinal remedy is belladonna, given under a physician's advice. The various forms of mechanical pressure that have been suggested, with the view of preventing the passage of the urine, cannot be too strongly condemned. Incontinence of urine consists of an easily excited and frequently repeated reflex micturition. It is seen in some cases of cerebral or spinal disease, when it is of a different nature. In these cases the bladder becomes filled, and subsequently formed urine dribbles away, owing to a failure in the nerve mechanism to cause contraction of the muscle fibres in the wall of the viscus.

URINE, RETENTION OF. See RETENTION OF URINE.

U′RIYA LANGUAGE AND LITERATURE (Skt. *Odra, Utkali*). The language and literature of Orissa (q.v.), in Bengal, spoken by about 9,000,000 persons. Like the other modern Aryan languages of India, it is analytic in structure. It seems to be descended from the Utkali or Odra dialect of Prākrit (q.v.). In general Uriya is related to Bengali (see BENGALI LANGUAGE AND LITERATURE), although it resembles Hindi. (See HINDUSTANI LANGUAGE AND LITERATURE.) The vocabulary is largely composed of Sanskrit loan-words, of which Uriya possesses more than any other of its kindred languages. There are no important dialectic divisions. The standard dialect is that of Cuttack. The script, which is derived from the Devanagari (q.v.), is graceful, and noteworthy among the North Indian alphabets in that it is characterized by curves instead of angles. Uriya literature cannot be traced before the sixteenth century. It begins with Upendro Bhanj, the author of more than thirty poems, most of them religious or erotic, although he also wrote two dictionaries. Contemporary with him was Dinkrishno Das, who composed the most famous Uriya poem, the *Rasakallōḷa* (edited at Cuttack, 1897). Most of the literature, however, consists of translations or paraphrases of Sanskrit works, such as the *Rāmāyaṇa* (q.v.), the *Bhagavadgīta* (q.v.), and some of the *Purāṇas* (q.v.), while in later times the tendency has been to translate or adapt Bengali and English books. Consult: Beames, *Comparative Grammar of the Modern Aryan Languages of India* (3 vols., London, 1872-79); Cust, *Modern Languages of the East Indies* (ib., 1878); Sutton, *Introductory Grammar of the Oriya Language* (Calcutta, 1831); Anon., *The First Lesson in Oriya* (Cuttack, 1844); Visvanath Misra, *Easy Guide to Uriya Translation* (ib., 1899); Jagannath Rao, *Utkal Abhidhán: A Dictionary of the Uriya Language* (ib., 1891); Chakravarti, "Notes on the Language and Literature of Orissa," in the *Journal of the Royal Asiatic Society, Bengal Branch*, vols. lxvi.-lxvii. (Calcutta, 1900).

URLICHS, ōōr′lĭks, LUDWIG VON (1813-89). A German archæologist, born in Osnabrück and educated at Bonn. He taught at Bonn from 1844 to 1847, was then called to Greifswald and in 1855 to Würzburg. He wrote on the history of art, *Skopas' Leben und Werke* (1863), *Die Anfänge der griechischen Künstlergeschichte* (1871-72), and *Beiträge zur Kunstgeschichte* (1885); and on Tacitus and Pliny. His "Grundlegung und Geschichte der klassischen Altertumswissenschaft" (1886; 2d ed. 1892), in Iwan Müller's *Handbuch*, is his most important work in classical philology.

URMIA, ōōr-mē′ȧ. A lake and city of Persia. See URUMIAH.

UROCHORDA, ū′rō-kôr′dȧ (Neo-Lat. nom. pl., from Gk. *οὐρά*, *oura*, tail + *χορδή*, *chordē*, chord). A class of chordate animals, the ascidians (q.v.).

U′RODE′LA (Neo-Lat. nom. pl., from Gk. *οὐρά*, *oura*, tail + *δῆλος*, *dēlos*, manifest). An order of the Amphibia which comprises the tailed amphibians, or amphiumes, salamanders, and mud-puppies (qq.v.), in which both fore and hind limbs are always present, and which have teeth in both jaws; and the sirens, in which the hind limbs, maxillary bones, teeth, and eyelids are absent. This order is confined to the north temperate zone, except a few forms that extend along the highlands into Venezuela. About 100 species in seven families constitute the entire list. The geological origin of the group is uncertain; representatives are numerous in the Lower Tertiary strata; and a single Mesozoic specimen is known. Consult Gadow, *Amphibia and Reptiles* (London, 1902).

URQUHART, ẽr′kẽrt, DAVID (1805-77). A British diplomat and political writer. He was born in Scotland, and was educated at Saint John's College, Oxford. In 1835-36 he was secretary of legation at Constantinople. Because of opposition to the Eastern policy of Lord Palmerston, whom he suspected of collusion with the Czar, he resigned his position. After traveling in all parts of the East to obtain further information respecting the commercial and political influence of Russia, he returned to England, and both in his writings and in Parliament (1847-52) openly charged the Palmerston Ministry with betrayal of British interests. His publications include:

Turkey and Its Resources (1833); *The Spirit of the East* (1838); *The Mystery of the Danube* (1844); *Letters and Essays on Russian Aggressions* (1853); and other books bearing on the Eastern question.

URQUHART, or **URCHARD**, Sir THOMAS (1611-60). An English author. He belonged to an ancient family of Cromarty in Scotland. He was educated at King's College, Aberdeen, and traveled in France, Spain, and Italy. He was on the Royalist side in the Revolution; was knighted by Charles I. in 1641; and fought at the battle of Worcester. He was taken prisoner and was imprisoned in the Tower and then in Windsor Castle, but was soon released on parole. Of his last years little is known. He is said to have died abroad in an uncontrollable fit of laughter on the restoration of Charles II. He is still known for his excellent translation of Rabelais (two books of *Gargantua* in two vols., 1653; reissued with the continuation by P. A. Motteux in Bohn's Library, London, 1897, and in Tudor Translations series, London, 1899). Of great interest is *The Jewel*, in which is described a universal language (1652). In his *Promptuary of Time* (1652) he traced his family back to the red earth from which God created Adam. He also published *Epigrams, Divine and Moral* (1641); *The Trissotetras; or a most Exquisite Table for Resolving all manner of Triangles*, and other curious books.

URQUIZA, o͞or-kē'thȧ, JUSTO JOSÉ (1800-70). A South American soldier and politician, born at Arroyo de la China, Entre Rios, Argentina. He was educated by the Jesuits and attained great prominence in his native province as an adherent of the Federal Party. In 1844-45 he fought with sanguinary distinction in Uruguay, and in 1846 was elected Governor of Entre Rios, attaining soon to dictatorial power, and devoting his energies largely to his own enrichment. In 1851 he took the field against Rosas (q.v.), the dictator of Buenos Ayres, whose ambition was directed against the autonomy of the other Argentine States, formed an alliance with Brazil and Uruguay, and entering the latter country in June, forced Oribe, the general of Rosas, to capitulate. Urquiza then crossed into Buenos Ayres, and at Monte Caseros, February 3, 1852, defeated Rosas, who was compelled to flee. In 1853 he was elected President of the Argentine Confederation, which included all the States excepting Buenos Ayres, and by his victory at Cepeda, October 23, 1859, forced that State, too, to lend its adhesion. His term of office ended in the same year. Very soon afterwards Buenos Ayres revolted, and Urquiza, at the head of the forces of the Confederation, was defeated by General Mitré at Pavón, September 17, 1861. He subsequently became Governor of Entre Rios. He was assassinated by political enemies on his estate at San José, near Concepción.

UR'SA MA'JOR (Lat., greater bear) AND **UR'SA MI'NOR** (Lat., lesser bear). Two celebrated constellations in the northern hemisphere of the heavens. Ursa Major was distinguished as early as the time of Homer by the names *Arktos*, 'the Bear,' and '*Hamaxa*,' 'the Wagon.' The Roman name *Ursa* was a translation of the Greek *Arktos;* the Romans also called the seven bright stars the *Septentriones*, 'the seven plowing oxen.' The common names throughout Europe for these seven stars are the 'Plow,' 'Charles's Wain,' the 'Wagon,' evidently derived from the classical epithets above mentioned; and the 'Dipper,' from the resemblance to that utensil. The remarkable group of stars in the hinder part of the Great Bear, being within 40° of the North Pole, never sinks below the horizon of any place in a higher northern latitude than 40°. It contains a considerable number of stars, many of which are easily visible by the naked eye; but of these, only one (α) is of the first magnitude, two (β and γ) of the second, and eight (among which are δ, ε, δ, and η) of the third. Of the seven stars constituting the 'Dipper,' α and β are known as the 'Pointers,' because a line drawn through them points directly at the *pole-star* (q.v.).

Ursa Minor is less prominent in the heavens. The star α in the extremity of the tail of the Little Bear, at present the pole-star (q.v.), is the brightest in the constellation, though only of the second magnitude.

URSIDÆ. The family of the bears (q.v.).

URSI'NUS, *Ger. pron.* o͞or-sē'nụs (Latinized translation of his German name Bär), ZACHARIAS (1534-83). A Reformed theologian. He was born at Breslau, and studied at Wittenberg under Melanchthon, at Geneva under Calvin, and at Paris. He became professor at Heidelberg 1561, and teacher at Neustadt-on-the-Hardt in 1578. With Olevianus he drew up the Heidelberg Catechism, and wrote in its defense. His collected works appeared at Heidelberg in 3 vols. (1612 et seq.) Consult Sudhoff, *Olevianus und Ursinus* (Elberfeld, 1857).

URSO, ụr'sō', CAMILLA (1842-1902). A French violinist, born at Nantes, France. She studied with Massart in Paris, and, about 1852, played in New York, Boston, Philadelphia, and other American cities. She was most successful, especially in concerts with Alboni and Sontag. She returned to France after having toured Canada, and in 1866 returned to New York.

URSUA, o͞or-so͞o'ȧ, or **ORSUA**, PEDRO (c.1510-61). A Spanish soldier and explorer in South America, born in Ursua, near Pamplona, Navarre. About 1544 he went to New Granada, where he became Governor in 1545, and in 1547 and again in 1549 marched to the northeast in search of Eldorado, making several settlements, among them Pamplona. In 1559 he was sent by the Viceroy of Peru to search for Eldorado or the Kingdom of the Omaguas, on the southern Amazon, or more probably to rid the country of the many soldiers of fortune then in Peru. These enlisted eagerly, and one of them, Lope de Aguirre (q.v.), after the expedition had sailed down the Moyobamba and the Huallaga, formed a conspiracy, the outcome of which was the assassination of Pedro.

UR'SULA, SAINT. A saint and martyr of the Roman Catholic Church. She is held in especial reverence at Cologne, the reputed place of her martyrdom. October 21st is her day in the Church's calendar, and the date of her martyrdom is variously given as 237, 283, and 451. The official date, however, is 237. According to the simplest form of the legend, Ursula was the daughter of a British king, Deonatus. She was called Ursula from Ursa, 'bear'—signifying that she was intended to kill the bear, i.e. the devil. Her hand was asked in marriage by a "certain most ferocious tyrant," for his son. The tyrant threatened to sack the country if his suit were not granted. Ursula, in consequence of a vision, in which she was shown her future martyrdom, asked for a respite of three years, during which time she with ten chosen maidens, each with 1000 attendants, should visit shrines and holy places to honor their virginity. Another condition was that her betrothed, Ætherius, should become a Christian. This large company of virgins set sail, and with a favoring breeze were carried to Thiel in Guelderland, on the Waal. Thence they sailed on the Rhine by way of Cologne to Basel, where they left their ships and proceeded overland on foot to Rome. Returning to Basel, they embarked on their ships, only to be attacked by Huns at Cologne and slaughtered. They were buried by the inhabitants of Cologne with great honors, and a church was built over their remains. A late addition to the story says that Attila wished to reserve Ursula for himself. Upon her indignant refusal, he became enraged and shot her through the breast with his arrows.

The controversy over this legend has continued for many hundred years. The conservative element in the Roman Catholic Church considers it probable that there was at one time a massacre of virgins at Cologne by the Huns, but that the details of the story as given at the present time are mediæval fabrications. The rationalists outside of the Church follow Schade's theory that the story of Ursula is only a Christianizing of an old German myth, and that Ursula is really Freya, called in Swabia 'Hörsel,' with the same attributes as the moon divinities in other lands. Still another solution is that one of Ursula's companions was named Undecimilla, which might easily be read *undecim milia* (eleven thousand).

Bibliography. Consult: Crombach, *Vita et Martyrium Sanctæ Ursulæ et Sociarum* (Cologne, 1547); Schade, *Die Sage von der heiligen Ursule und den elftausend Jungfrauen* (Hanover, 1854). For controversial replies to Schade: De Buck, *Acta Sanctorum* (Brussels, 1858); Kessel, *Ursula und ihre Gesellschaft* (Cologne, 1863).

URSULINES. A religious Order for women in the Roman Catholic Church, particularly devoted to the education of girls. They take their origin from Saint Angela Merici (q.v.). A rule, in twenty-five chapters, was projected by Angela, and finally approved (1536) by the Bishop of Brescia, Cardinal Francis Cornaro. Angela was herself chosen as the first superior, in the year 1537, the community even at that time numbering as many as seventy-six sisters. In the year 1565 a house was opened at Cremona; and with the approval of Popes Gregory XIII. and Clement VIII., it was spread over many dioceses of Italy. It was warmly encouraged by Saint Charles Borromeo, and at his death there were no fewer than eighteen convents of the Order in his diocese, comprising above 600 nuns. Soon afterwards it was established in France (1584). They were introduced into Savoy by Saint Francis de Sales in 1635; and in 1639 a convent was opened in Quebec. About the same time they were introduced into Germany—at Vienna, in 1660, and at Freiburg, Kitzingen, and Prague soon afterwards—where they have continued to teach with great success. They now number 300 convents and 7,000 nuns and are found in all parts of the world. The Ursuline Sisters have several educational establishments in Ireland, in England, Scotland, Canada, and twenty-four in the United States with thousands of pupils. Consult: Postel, *Histoire de Sainte Angèle Merici et de tout l'ordre des Ursulines* (Paris, 1878); Sainte-Foi, *Annales de l'ordre de Sainte Ursule* (Clermont-Ferrand, 1858); *Les Ursulines de Québec* (Quebec, 1868).

URTICACÆ (Neo-Lat. nom. pl., from Lat. *urtica*, nettle, from *urere*, Skt. *uṣ*, to burn). A natural order of about 40 genera and 450 species of dicotyledonous under-shrubs and herbs, natives of almost all parts of the world. Some species furnish valuable fibres. The chief genera in the order as restricted are: Urtica, Urena, Laportea, Pilea, Bœhmeria, Maoutia, and Parietaria. See Bœhmeria; Nettle.

URTICARIA (Neo-Lat., from Lat. *urtica*, nettle), Hives, or Nettle Rash. An eruption of the skin, coming out quite suddenly, and consisting of firm, round, convex, or lenticular elevations of the skin, from a quarter of an inch to an inch in diameter, at first pink, and soon becoming white in the centre. These are called pomphi or wheals. They are scattered or closely crowded over the part affected, and are not symmetrical. In the acute form of the disorder the wheals arise rapidly and subside in a few hours or a day at longest. In the chronic form they last longer and recur frequently. Urticaria is accompanied with intense itching.

The causes may be both local and general. Among the local causes are direct irritants such as the poison of the stinging nettle (whence the name), the stings of bees and wasps, contact with jellyfish and certain caterpillars. A popular form of urticaria is due to the bites of fleas and bugs. General or systemic causes may be the eating of shellfish, pork, sausages, mushrooms and some fruits, such as strawberries; certain drugs, as copaiba, cubebs, quinine; general disorders, such as gout, indigestion, asthma, and in women pregnancy, menstruation, and lactation. Sometimes no cause can be found except general nervous irritability. Treatment must depend on the cause, which should be sought for and removed. Acute cases, due to articles of diet, may be relieved by an emetic, if vomiting and diarrhœa do not occur spontaneously. In the chronic form, which is often very stubborn, if the urticaria can be traced to any article of food, this should be eliminated. The digestion must be regulated, and general disorders, such as gout, treated with appropriate remedies. For the severe itching a burning alkaline bath or lotions, or mild solutions of carbolic acid or other antiseptics, may be used locally. Scratching must be avoided, since it only aggravates the affection. Where the hives are the result of nervous irritability the general health must be built up.

U'RUBITIN'GA (from Braz. *urubu*, vulture + Tupi *tinga*, white, beautiful). A large hawk of the genus Urubitinga, several species of which exist in tropical America. All have bluish black plumage, marked with white on the rump and tail. One species, the Mexican black hawk (*Uru-*

bitinga anthracina), may be found in Arizona. These hawks nest in large trees, and lay white eggs.

URUGUAY, *Sp. pron.* o͞o'ro͞o-gwī'. A river of South America. It rises on the west slope of the Brazilian Coast Range, and flows first westward on the boundary between the States of Santa Catharina and Rio Grande do Sul, then southwest between the latter State and Argentina, and finally southward between Argentina and Uruguay, emptying into the Plata estuary (Map: America, South, D 5). Its total length is about 1000 miles. The greater part of its course lies on the plateau, and the upper portion, known as the Pelotas, passes through a densely forested wilderness. The banks are generally high as far as Salto, 200 miles from the mouth of the river, and at that point navigation is obstructed by a series of rocky reefs and rapids, which become falls at low water. Below Salto the land on the western bank is low and level, and periodically inundated. The Uruguay here connects by lateral branches with the Paraná. For the last 100 miles the river is very broad, and really forms the head of the Plata estuary, though the name Uruguay is continued to the Paraná confluence. The river is navigable for large sea-going vessels to Paysandú, about 150 miles, and for smaller vessels to Salto, while barges navigate the stream 300 miles above the rapids.

URUGUAY. The smallest of the South American republics, bounded on the north by Brazil, on the east by Brazil and the Atlantic Ocean, on the south by the Atlantic Ocean and the Rio de la Plata, and on the west by the Uruguay River, the boundary line between Uruguay and Argentina. Its area, including some small islands off the coast and in the Plata, is 72,151 square miles.

TOPOGRAPHY AND MINERALS. The most elevated portions of Uruguay lie in the north and northwest, where a few sharp ridges attain a height of nearly 2000 feet. Along the Uruguay River are found table lands of moderate elevation, resembling the neighboring pampas of Argentina, though higher. The southeastern coast portion is low and marshy, with sandy stretches bordering the ocean, while the interior is composed of rolling plains diversified in the north and northwest by low ridges of hills. Here extensive forest regions also occur, especially near the rivers; while the southeastern portion is largely covered with grass. The hills rest upon an old crystalline foundation of gneiss and granite, with some sandstone, Tertiary and ancient eruptive rocks, and possibly Paleozoic strata. The maritime and river coast of Uruguay from Chuy to Santa Rosa is 685 miles long. After the Rio de la Plata and the Uruguay the Rio Negro, wholly within the republic, is the most important river, and for a portion of its course is navigable for small craft. On the northeastern frontier Lake Mirim, though belonging entirely to Brazil, affords an outlet to the surrounding district. But little advantage has been taken of the mineral wealth of the country, though it is certain that iron, zinc, lead, sulphur, antimony, and coal exist, and profitable gold washings. Marble and other building stone quarries are in operation, and some precious stones are sent abroad.

CLIMATE, FLORA, AND FAUNA. The almost peninsular position of Uruguay gives it a delightful climate, with temperature ranging from 32° to 88° F. Occasionally in the lowlands the temperature rises to 100° in February, while frosts are common in the upland regions, where occasional snows also occur at long intervals. Rains are plentiful throughout the year, but the greatest precipitation occurs in May and in October. During the winter months cold storms, known as *pamperos*, blow from the southwest. In its flora and fauna Uruguay in the northern part resembles Southern Brazil, and in the southern part its neighbor Argentina. See ARGENTINA and BRAZIL.

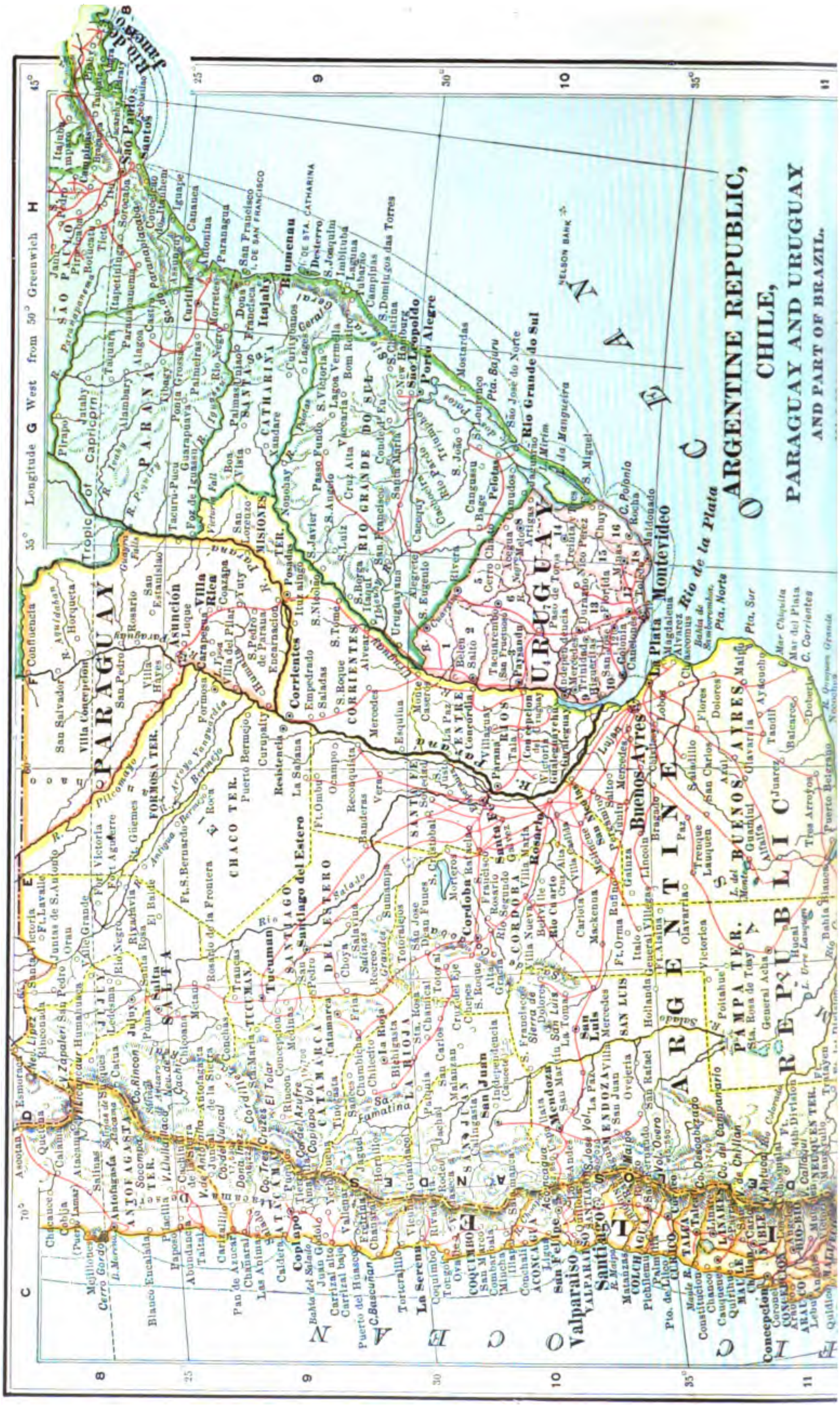
INDUSTRIES. During recent years there has been a steady advance in argricultural production. Public companies facilitate the purchase of land by settlers. Up to 1880 most of the breadstuffs were imported, but since 1885 corn and wheat have become important articles of export. About 1,400,000 acres are in cultivation, of which 750,000 are in wheat. The grazing industries of Uruguay are, however, the chief reliance of the inhabitants. In 1901, 6,326,601 head of cattle were reported. The sheep industry is likewise of growing importance. In 1901 the number of sheep was reported as 17,624,548, and the exports of wool for 1900, 26,755 tons. The chief manufacture is flour. There are *saladeros* for the production of jerked and salted meats for foreign shipment, and the Liebig Company establishment has a branch at Independencia for the manufacture of beef extracts. In the season of 1900 these industries slaughtered 698,900 cattle. In 1901 there were 575,361 horses in the country. On an average about 70,000 grams of gold are extracted annually. The gold mines are in the northern region.

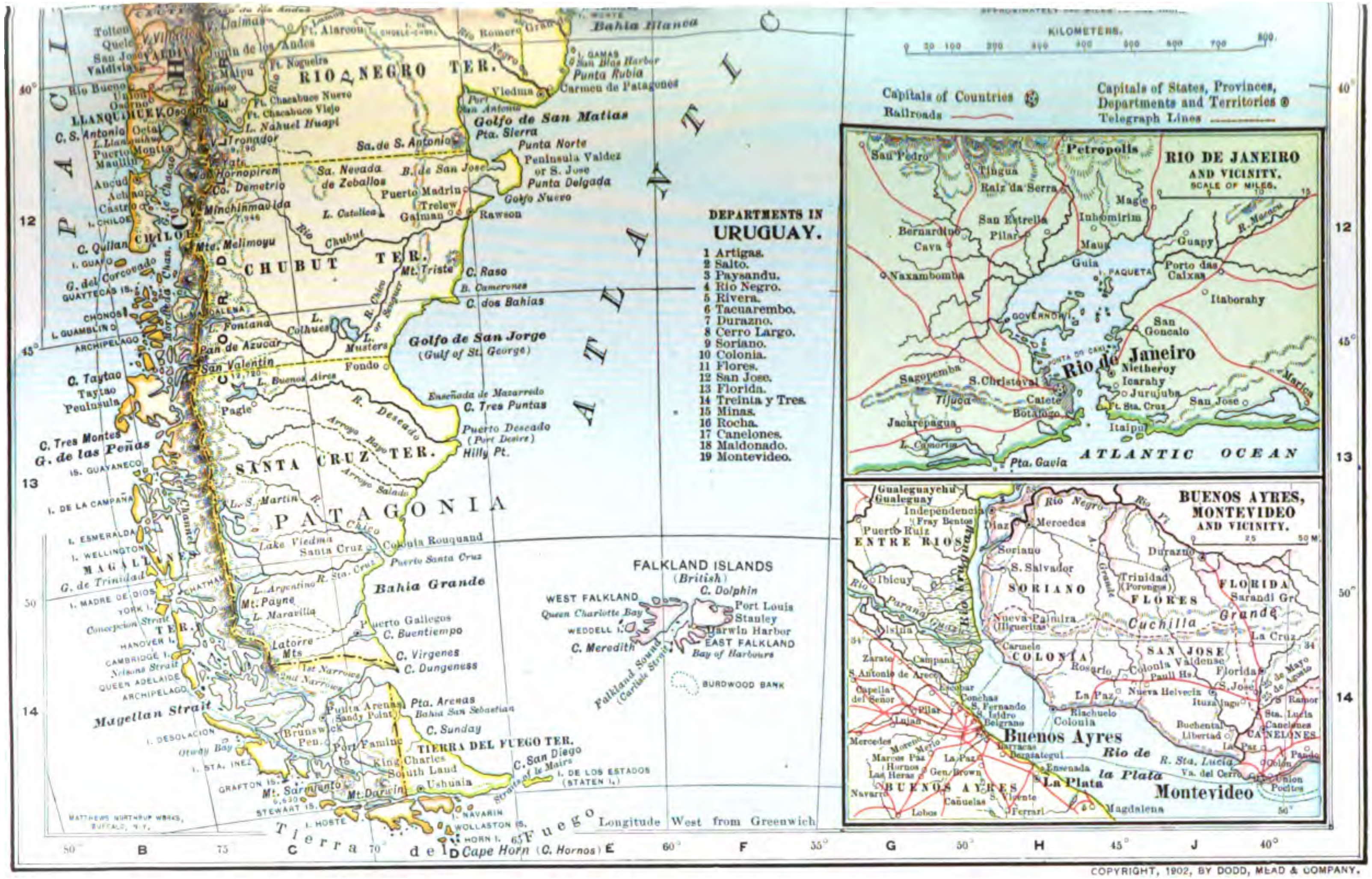
TRANSPORTATION AND COMMERCE. In 1901 the railway mileage of the Republic was 1210 miles, 602 of which bore a Government guarantee of 3½ per cent. on the capital involved in its construction. The rivers are largely utilized for inland communication, and in addition there are some 2250 miles of national highways and 3100 miles of departmental roads and paths for local traffic. In 1901 the twenty-five Uruguayan steamers had a net tonnage of 10,037. For foreign tonnage, see MONTEVIDEO, which is the chief port, and, owing to its recent improvements, one of the best on the coast. The value of the special foreign trade in merchandise is as follows:

	1897	1899	1901
Imports.............	$19,512,216	$25,652,788	$23,691,932
Exports.............	29,319,573	36,574,164	27,781,126

The leading imports include foodstuffs, textiles, machinery, ironware, and jute; the exports, preserved meats, hides and horns, tallow, cattle, beef extracts, and agricultural products.

GOVERNMENT. The Constitution dates from July 18, 1830. The legislative department consists of a Senate, composed of one member from each of the nineteen departments, and of a Chamber of Deputies composed of 69 members—one for every 3000 voters. The executive power is vested in a President, chosen by a majority vote of the Assembly in joint session, for a term


ARGENTINE REPUBLIC,
CHILE,
PARAGUAY AND URUGUAY
AND PART OF BRAZIL.
Longitude G West from 50° Greenwich H
PARAGUAY
URUGUAY
ARGENTINE REPUBLIC
CHILE
PARANA
SANTA CATHARINA
RIO GRANDE DO SUL
SÃO PAULO
Asuncion
Montevideo
Buenos Ayres
Rio de la Plata
Rio de Janeiro
Santos
São Paulo
Porto Alegre
Corrientes
Cordoba
Rosario
Santa Fé
Tucuman
Mendoza
Santiago
Valparaiso
Concepcion
La Serena
Copiapo
Antofagasta
Tropic of Capricorn
OCEAN
ATLANTIC
PACIFIC



COPYRIGHT, 1902, BY DODD, MEAD & COMPANY.

of four years, and assisted by a Cabinet of five members, and in a Vice-President, who acts as the presiding officer of the Senate. Each territorial department is ruled by an executive, appointed by the President, and an administrative council, chosen by popular election. The supreme judicial power is vested in national courts of appeal, of which there are three for civil cases, two for commercial cases, and one for treasury cases. Montevideo (q.v.) is the capital.

FINANCE. In 1890 the Republic suffered from a financial panic which caused a great falling off in the revenue. The statistics for expenditure are not available, but the revenues for 1897-98 were reported to amount to $16,271,298, and for 1900-01, to $17,902,599. The larger portion is derived from customs, the sum being estimated at $10,000,000 for 1901-02. The budget for 1901-02 (estimated) balanced at $16,161,000. More than half the expenditures are for national obligations; $2,300,000 were set off for the Ministry Government. The foreign debt in 1902 was over £21,000,000. The internal debt is about one-fifth of this amount. The monetary standard is gold, and the peso, valued at $1.034, is the unit of exchange. There are no national gold coins in circulation, but foreign coins take their place. The Bank of the Republic, established in 1896 with a capital of $10,000,000, has the right to issue bank notes, redeemable in gold or silver, to the value of half its stock.

For ARMY and NAVY, see article ARMIES and NAVIES.

POPULATION. The population was estimated as follows, in 1901, the table including a list of the departments with their areas:

DEPARTMENTS	Area, square miles	Population
Artigas	4,392	27,001
Canelones	1,833	86,735
Cerro-Largo	5,765	37,236
Durazno	5,525	38,111
Flores	1,745	16,180
Florida	4,675	45,248
La Colonia	2,195	51,563
Maldonado	1,590	27,035
Minas	4,795	37,152
Montevideo	256	273,665
Paysandú	5,115	44,411
Rio Negro	3,270	23,127
Rivera	3,795	25,349
Rocha	4,280	30,428
Salto	4,865	45,754
San José	2,690	42,181
Soriano	3,565	38,851
Tacuarembó	8,115	38,789
Treinta y Tres	3,685	25,800
Total	72,151	954,616

The foreigners numbered 97,415, chiefly from Brazil, Italy, Spain, and Argentina. The natives show a greater admixture than is the case with those of Argentina, and are very conservative, especially in the north, where there is a large Brazilian element.

EDUCATION AND RELIGION. The University of Uruguay, at Montevideo, has a faculty of about 100 instructors and over 400 regular students. There are also a school of art, an industrial school, a museum and a library, and a military school. The Government contributes annually about $700,000 toward the maintenance of about 600 public elementary schools, enrolling about 55,000 pupils. In addition there are over 300 private schools of this grade with about 22,000 pupils. Notwithstanding a compulsory education law, the school attendance is only about 8 per cent. of the total population. Roman Catholicism is the State religion, but there is complete toleration of other sects.

HISTORY. The natives of the "Banda Oriental," the region to the northeast of the Plata River, for many years prevented any exploration of the interior, and in 1580 forced the garrison to abandon the only fort established in their territory, on the San Salvador River. In 1603 a powerful Spanish force, intended to protect a colony, was defeated, and it was not until the year 1624 that the first settlement which became permanent was founded, at Santo Domingo de Soriano, on the Rio Negro. The Portuguese of Brazil claimed this region as a part of their territory, and their outposts crept down the coast from Rio de Janeiro, until, in 1680, they established themselves at Sacramento, not far distant across the river from Buenos Ayres. The local Spanish officials profited by the commerce between this city and the Portuguese, and for fifty years no very serious efforts were made to drive them away. In 1723 the Portuguese fortified the heights surrounding the Bay of Montevideo and apparently planned to enter into more active competition with Buenos Ayres. This aroused the Spaniards, who promptly organized an expedition which forced the surrender of the Portuguese works at Montevideo, where a colony of families from Buenos Ayres was established. Intermittent conflicts between the two claimants fill the annals of the remainder of the eighteenth century, resulting in the ultimate establishment of the Spanish rule. In 1807 the English fleet under Popham captured Montevideo, but their occupation ended with the failure of the attack on Buenos Ayres. The inhabitants of Uruguay promptly joined those of Argentina in the revolt against Spain in 1810, and established an independent confederation under the Protector Artigas (q.v.); the Spaniards were driven from Montevideo in 1814. The country was weakened and demoralized by the efforts to drive out the Spaniards, and the Portuguese in Brazil, perceiving their opportunity, revived their claim to the territory. They captured Montevideo and drove Artigas into the interior, until he was forced to take refuge in Paraguay. Uruguay was annexed to Brazil as the Cisplatine State. The Uruguayan patriots established headquarters across the Rio de la Plata in Buenos Ayres, watching for an opportunity to revive the struggle. This came in 1825, when an insurgent force was organized which won several engagements and shut the Portuguese up in their coast strongholds. In February, 1828, the Brazilians were decisively defeated, and in August peace was concluded and the independence of Uruguay was recognized. In 1830 the República Oriental del Uruguay was organized, and for five years the country enjoyed comparative quiet under the Presidency of Fructuoso Ribera. In 1835 he was succeeded by Manuel Oribe and soon a political conflict broke out between the two, terminating in civil war. Ribera made himself the leader of the Gauchos (q.v.) constituting the great mass of the non-Indian population, while Oribe represented the interests of the great landowners. In 1838 Ribera succeeded in overthrowing Oribe, who thereupon turned for aid to Rosas (q.v.), the dictator of Buenos Ayres. With the aid of Argentina's troops Oribe repeatedly defeated his rival, but could not make himself master of Montevideo, which was besieged from 1842 to 1851. In the latter year the party of Ribera concluded an alliance with Brazil, and the State of Entre Rios, which, under Urquiza, had broken away from the Argentine Confederation. Oribe was overthrown, and the party of Riberas, after a short interval, was restored to power. In 1854 Venancio Flores was elected President, but was forced to resign in the following year. There ensued a period of utter disorder marked by close successions of elections and insurrections until, in 1864, Brazil intervened to restore order, and in the following year brought Flores back to power. An alliance with Brazil and Argentina was concluded in the same year, directed against the dictator Lopez (q.v.) of Paraguay. This war, which brought ruin upon Paraguay, terminated in 1870. Flores was assassinated early in 1868, and five years later José-Ellauri was legally elected President. During his administration many public works were undertaken, and the transatlantic cable laid, with the result that the national finances became complicated.

In May, 1875, Pedro Varela became President, to be succeeded a year later by Colonel Latorre. Numerous changes, at irregular intervals, followed. President Idiarte Borda, who was elected in 1894, was assassinated in 1897, and was succeeded by Juan Lindolfo Cuestas, who, in spite of some attempts at revolution, retained power till 1903. In March of that year he was succeeded by José Batlle y Ordoñez.

Bibliography. Murray, *Travels in Uruguay* (London, 1871); Diaz, *Notice historique* (Paris, 1878); Bauza, *Historia de la dominacion español en la Uruguay* (Montevideo, 1880); Ramon Lopez Lomba, *La républica oriental del Uruguay* (ib., 1884); Van Bruyssel, *La république orientale de l'Uruguay* (Brussels, 1889); Vincent, *Round and About South America* (New York, 1890); De Saint-Foix, *La république orientale de l'Uruguay* (Paris, 1892); Arreguine, *Historia del Uruguay* (Montevideo, 1892); Aranjo, *Compendio de la geografia nacional* (ib., 1894); Julio Silva y Autuna, *Comercio exterior de la républica Oriental del Uruguay, Años 1887-94* (ib., 1895); Keane, *Central and South America* (London, 1901); *The Uruguay Republic: Territory and Conditions* (London, 1888).

URUMCHI, ṳ-rōōm′chê. The capital of the Province of Sint-siang, in Sungaria, Chinese Empire, and the seat of the Chinese administration of Eastern Turkestan, 320 miles east of Kulja (Map: Asia, H 4). It derives its strategic importance from its position on the only road leading from Sungaria to Eastern Turkestan which is available for heavy artillery. The population, which is supposed to have been 200,000 at the beginning of the nineteenth century, is now estimated at 30,000.

URUMIAH, ōō′rōō-mē′yȧ, **OROOMIAH**, or **URMIA**. A city of Persian Armenia (included in the Province of Azerbaijan), 70 miles southwest of Tabriz and 10 miles west of Lake Urumiah (Map: Persia, B 2). It lies amid attractive mountain scenery. The American, French, and Anglican missions have headquarters here, and have founded several institutions, including Urmia College, a college for priests and deacons, and Fiske Seminary. The district produces fruit, cotton, and tobacco, and there are important dyeing and weaving interests. Population, estimated at from 30,000 to 50,000. Urumiah is reputed to be the birthplace of Zoroaster. It was for a long time the pilgrimage city of his followers.

URUMIAH, Lake. The largest lake in Persia, situated in the northwestern corner of the country, 170 miles west of the Caspian Sea (Map: Persia, B 2). It is about 80 miles long, with an average breadth of 20 miles, and occupies part of a level basin inclosed by mountains and lying at an altitude of over 4000 feet. The lake is fed by several streams of considerable size, but it has no outlet. It is consequently very saline, so much so that fish cannot live in it; the shores are covered with salt incrustations. The lake is very shallow, the mean depth being 6 feet, and the maximum about 40 feet. The surrounding region is very fertile, and is covered with vineyards, orchards, and gardens.

URUS (Lat. *urus*, Gk. *οὖρος*, *ouros*, wild ox, from OHG., AS. *ūr*, Ger. *Auer-ochs*, whence the English *aurochs*, designating a different animal, the European bison; connected with Skt. *usra*, steer, reddish). A wild ox (*Bos primigenius*) which anciently inhabited the forests of Central Europe, and is described by Cæsar as common in the Hercynian Forest, and of great size, swiftness, and fierceness. The probability is that the urus was the wild original of the domestic ox, by way of the small or long-fronted ox (*Bos longifrons*), which was the earliest known domesticated ox in Europe. The urus survived in Germany until the twelfth century, and is sometimes wrongly identified with the aurochs (q.v., under Bison).

US'BEGS. A people of Russian Turkestan. See Uzbeks.

USE AND OCCUPATION. In law, a phrase employed to denote the beneficial enjoyment of real estate by a person with the owner's consent, but without any definite or enforceable agreement as to the amount of rent to be paid. The landlord is entitled to recover a reasonable amount for the 'use and occupation' of the premises. See Landlord and Tenant; and consult the authorities there referred to.

USEDOM, ōō′*ze*-dôm. An island belonging to the Province of Pomerania, Prussia, situated at the mouth of the Oder River (Map: Prussia, E 1). Together with the island of Wollin, it separates the Stettiner Haff from the Baltic Sea. It is divided from the mainland on the west by the outlet of the Peene River. Length, 33 miles; area, 158 square miles. It is extremely irregular in shape. It is level and generally fertile save for some sand dunes. Its farm lands and forests are productive. Fishing and commerce also engage the attention of its inhabitants, who number about 35,000. In summer the sea baths attract a large number of visitors. Swinemünde is the principal town.

USE-INHERITANCE. The Lamarckian principle of the transmission by heredity of characters acquired during the lifetime of the individual; they are contrasted with congenital characters. That slight lesions are not transmitted was apparently proved by the experiments of Weismann in docking the tails of white mice for nineteen generations, and his finding that such a mutilation was not transmitted. At the present time the alleged transmission of mutilations or various lesions, as tattooing or flattening of the head, is not proved. On the other hand, the Lamarckian principle of the inheritance of characters formed by adaptation to changes in the physical environment, changes of climate, as well as those resulting from use or disuse, or any kind of external stimulus, although denied by Weismann and his followers, have not been disproved. Adaptation to a different medium from that of their ancestors, as in the case of birds and insects, is the result of use-inheritance. Very obvious examples are the cetaceans where, by change from terrestrial to aquatic habits, the legs have been converted into fin-like members. Another instance is the acquired habit of pointing in the pointer breed, cases being known of young dogs pointing without having been trained. The habit of holding the tail erect is an acquired one in dogs, as the wolf and fox never elevate the tail. The senile expression of the face in children of old parents is claimed to be an example of such inheritance. Such examples as these prove that, as Eimer states, every character formed by the functional activity of the animal is an acquired character. The changes begin during the lifetime of the individual, become transmitted (or at least the tendency), until after a number of generations, the new conditions becoming permanent, the new characters are formed, and these are preserved by use-inheritance.

The experimental proofs of use-inheritance have accumulated sufficiently to prove that, where the changed climate, or temperature and moisture or dryness of the air, remain the same, the new characters are transmitted. In plants, where use or disuse do not come into play, the changes of station, of climate, temperature, soil, and nutrition, when permanent, result in the formation of new varieties and species, according to the Lamarckian principle. It is maintained that the transmission of acquired characters, structural, physiological, and mental, is demanded by the theory of evolution. Weismann's objection to use-inheritance is that modifications of the animal are acquired anew in every individual life and cannot be transmitted. It remains to be seen whether this criticism will withstand the mass of data now being accumulated. Consult the writings of Lamarck, Darwin, Koelliker, Eimer, Cope, Herbert Spencer, Galton, Hyatt, Weismann, Standfuss, Fischer, Packard, Piepers, Kidd, and others. See EVOLUTION; HEREDITY.

USENER, o͞o′*ze*-nĕr, HERMANN (1834—). A German classical philologist, born at Weilburg-on-the-Lahn. He became professor at the University of Bonn in 1866. His work has covered many fields, both literary and philosophical. Especially important are his studies in the history of religion. His published works include *Anecdoten Holderi* (1877), *Altgriechischer Versbau* (1887), *Epicurea* (1887), *Dionysius Halicarnensis de Imitatione*, etc. (1899), *Dionysii Ars Rhetorica* (1895), *Dionysii Opuscula* (ed. with Radermacher, vol. I., 1899), *Religions geschichtliche Untersuchungen* (1888), *Götternamen* (1896), *Sintflutsagen* (1899), etc.

U′SERTE′SEN. The name of three kings of Egypt of the Twelfth Dynasty. USERTESEN I., the Σεσόγχωσις of Manetho, was the son and successor of Amenemhat I. (q.v.), the founder of the dynasty. His reign of 44 years began about B.C. 1976, but for the first ten years he ruled as co-regent with his father, and for the last two years of his life his son, Amenemhat II., was associated with him on the throne. According to a leather roll, written in the time of Amenophis IV., the temple of the sun at Heliopolis was rebuilt in the early part of Usertesen's reign. One of the two granite obelisks erected by Usertesen before this temple is still standing; it is 66 feet in height and is the oldest obelisk in Egypt. (See OBELISK.) At Tanis three finely executed granite statues of the King have been found. A stele was discovered by Champollion at Wadi Halfa, near the second cataract of the Nile, containing a list of eleven Nubian tribes conquered by Usertesen, and an inscription at Beni Hassan records an expedition to Nubia in the King's forty-third year. The remains of Usertesen's pyramid tomb are still to be seen at Lisht, about 30 miles south of Cairo. —USERTESEN II., the fourth King of the dynasty, was the son of Amenemhat II., and the grandson of Usertesen I. He reigned for nineteen years, from about B.C. 1896, including a co-regency of three years with his father. A painting in a tomb at Beni Hassan, which depicts a number of Asiatics visiting the Nomarch Chnumhotep in the sixth year of Usertesen II., has been supposed to represent the arrival in Egypt of Abraham or of the sons of Jacob, but there is no evidence in support of either theory, and both are equally improbable. Statues of Usertesen II. and of his Queen, Nofret, were found at Hieraconpolis and at Tanis respectively. The pyramid tomb of the King is at Illahun. Manetho calls this King Sesostris and ascribes to him the conquest of the world, but there is no evidence that Usertesen II. ever conducted any foreign wars. (See SESOSTRIS.)—USERTESEN III., the son and successor of Usertesen II., reigned for at least 26 years from about B.C. 1883. His chief energies were directed to the subjugation of Nubia; and to protect the southern frontier of his kingdom, he built two strong forts at Semneh and Kummeh, about 40 miles south of the second cataract of the Nile. Near Semneh the King set up, in the eighth year of his reign, a boundary stone with the injunction that no negro should pass it except such as came into Egypt for the purpose of peaceful traffic. He was, however, compelled to undertake two subsequent expeditions against the Nubians in the sixteenth and nineteenth years of his reign, before the country was finally subdued. Usertesen III. built a temple at Heracleopolis (q.v.) in his fourteenth regnal year. His tomb is probably the more northerly of the two brick pyramids at Dahshur known as the Black Pyramids. Consult: Wiedemann, *Aegyptische Geschichte* (Gotha, 1884-88); Petrie, *A History of Egypt* (New York, 1899); Budge, *A History of Egypt* (ib., 1902).

USES. A technical term employed to denote equitable rights to the benefits and profits of real estate, the legal title to which is in a person other than the beneficiary of the 'use.' The introduction of the doctrine of uses was the result of the attempts of the English clergy to evade the effects of the Statutes of Mortmain, and to enjoy the gifts of the pious. To do this, land was conveyed to a third person, with the understanding or an express declaration that it was to be held *to the use of* the religious person or corporation intended to be the real donee. When this practice was first introduced, this obligation could only be enforced by threats of excommunication from the Church. Afterwards the Chancellor, who was usually appointed from the clergy, assumed jurisdiction over such conveyances, and employed the power of the courts of equity to enforce the *use*. This effect of such conveyances aroused the hostility of the King and great lords of the realm, which culminated in the enactment of the famous statute of 27 Henry VIII. c. 10, commonly known as the Statute of Uses. This act provided, in effect, that where a conveyance was made under the circumstances above described, the beneficiary should receive the legal estate as well as the right to the profits, etc., and also be liable to the lord for the feudal duties. The statute only temporarily accomplished its purpose, as the courts of equity speedily evolved the law of 'trusts,' which were practically the same as 'uses,' but under a different name. However, the statute had the important effect of making possible the creation of legal estates to begin in the future without making them legal remainders. The system of conveyancing made possible by the Statute of Uses was finally superseded by the practice of transferring property by deeds of 'bargain and sale.' The law of uses, as modified by the Statute of Uses, became a part of the common law of the United States, and still obtains in many States, but has been expressly abolished in a few jurisdictions, including New York. Consult Gilbert, *Law of Uses and Trusts* (3d ed., London, 1811), and the authorities referred to under REAL PROPERTY; also see TRUST.

USHAK, o͞o-shäk'. A town of the Vilayet of Brusa, Asia Minor, Turkey, 125 miles east-northeast of Smyrna (Map: Turkey in Asia, C 3). It is noted for its carpet manufactures. Population, in 1900, 13,084 (estimated).

USH'ANT. An island in the Atlantic Ocean, belonging to the Department of Finistère, France, 13 miles west of the northwest end of Brittany (Map: France, A 3). To the French it is known as the Isle d'Ouessant. Area, 6 square miles. The shores are rocky. Ushant has modern fortifications, and is used for military purposes. Naval battles between the French and English occurred off the island in 1779 and 1794. Population, in 1901, 2717, mostly pilots and fishers.

USHAS, ụsh'ȧs (from Skt. *vas*, *uš*, to burn; connected with Gk. 'Ηώς, *Eōs*, Lat. *Aurora*, Lith. *auszrà*, dawn, and ultimately with Eng. *east*). In Vedic India, the goddess of the dawn. The Rig-Veda devotes twenty hymns to her, and alludes hundreds of times to her as the divine personification of the morning light. The fiery steeds or ruddy cows that draw her shining car represent clouds and beams of light that issue from the stall of darkness as she throws open the portals of day. Born each day, and therefore ever young, she reminds mankind of the transitoriness of human life, and by her return day after day she stands as a symbol of the divine order in heaven. The sky is her father; night is her sister; the sun, her lover and spouse; and the twin Asvins, as embodiments of the transition of light and darkness at the dawn and evening twilights, are her kin. The sacrificial fire kindled at daybreak is a signal of her approach (see AGNI), and she then arouses the worshiper to prayer. She answers his petitions by bestowing riches, long life, offspring, glory and renown, in fact, all the blessings that belong to daily life. In the post-Vedic period the importance of Ushas is lost, and now she is a mere name in the Hindu mythology. Consult: Macdonell, *Vedic Mythology* (Strassburg, 1897); Hopkins, *Religions of India* (Boston, 1895); Wilkins, *Hindu Mythology* (2d ed., London, 1900).

USH'ER, JAMES. A British archbishop. See USSHER.

USHUAIA, o͞o'sho͞o-ä'yȧ. The capital of the Territory of Tierra del Fuego, Argentina, on the southern coast of the island of Tierra del Fuego, on the Beagle Channel (Map: Argentina, D 14). It is a miserable native village, whose inhabitants, through the efforts of English missionaries, speak English better than Spanish.

USKUP, ụs-kụp', **USKUB,** or **SKOPLIE.** The capital of the Vilayet of Kossovo, European Turkey, 160 miles northwest of Saloniki, on the Vardar River (Map: Balkan Peninsula, C 4). In 1900 it carried on a trade of nearly $5,000,000. The chief articles of commerce are opium, grain, live stock, fruit and tobacco. Leather and dyestuffs are the principal manufactured products. Population, about 40,000.

USNEA, ŭs'nē-ȧ (Neo-Lat., from Ar. *usuah*, moss). The small genus of lichens typical of the family Usneëi. The species are generally grayish or straw-colored and pendulous, and from their resemblance to southern or Spanish moss (Telandsia) are often called tree-mosses. They are most common upon trees in cool regions, but also grow upon rocks. Popularly they are called beard-moss, hanging-moss, and necklace-moss. See Colored Plate of MOSSES AND LICHENS.

US'SHER, JAMES (1580-1656), Archbishop of Armagh, commonly considered the most learned prelate of the Irish Protestant Church. He was born in Dublin, January 4, 1580. In 1593-94 he entered Trinity College, Dublin, where his predilection for history soon revealed itself. In 1601 he was ordained deacon and priest, and was appointed preacher of Christ Church, Dublin. In 1607 he was chosen to the chair of divinity, a post which he held for thirteen years. He made numerous visits to England and became acquainted with the most distinguished scholars of the age. In 1613 his first publication appeared, entitled *De Ecclesiarum Christianarum Successione et Statu*, which was designed as a continuation of Bishop Jewell's *Apology*. In 1615 he was appointed by a convocation of the clergy held at Dublin to draw up a series of articles relating to the doctrine and discipline of the Irish Protestant Church, in which the doctrines of predestination and reprobation (of which Ussher was an unflinching apologist) found prominence. These and other views, such as that bishops were not a different order from presbyters, implied in the studied omission of all reference to such distinction, that the Sabbath should be strictly enforced, and that no toleration should be granted to Catholics, laid him open to the charge of Puritanism. Nevertheless, King James promoted him to the Bishopric of Meath and

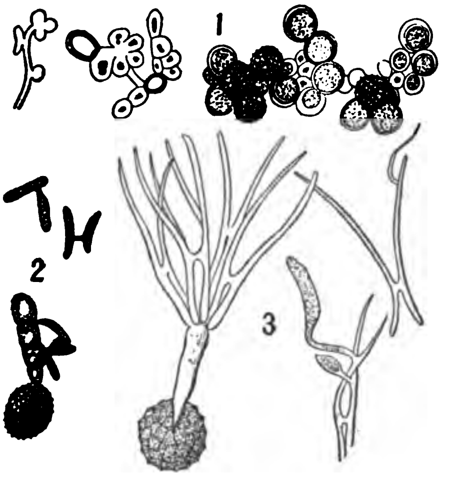
Clonmacnoise in 1621 and in 1623 constituted him a Privy Councilor of Ireland. In 1624-25 he was raised to the highest ecclesiastical dignity in the kingdom, the Archbishopric of Armagh. In 1632 Ussher published *Veterum Epistolarum Hibernicarum Sylloge*, a collection of letters out of several ancient MSS., concerning the state of the Irish Church from 592 to 1180; in 1638, *Immanuel, or the Mystery of the Incarnation;* in 1639, *Britannicarum Ecclesiarum Antiquitates*, an account of the British Church from the first planting of Christianity to the end of the seventh century; in 1641, *The Judgment of Doctor Rainololdes touching the Originall of Episcopacy confirmed;* and *The Originall of Bishops.* When the Civil War broke out, Ussher, who was in England at the time, espoused the side of the King, refused to sit, when nominated, among the assembly of divines at Westminster, and made himself obnoxious to the Parliament by the sermons which he preached at Oxford. When the fortunes of the King began to decline, Ussher left Oxford; his property and revenues in Ireland were seized, and after a residence in Wales and elsewhere, he came to London, where in 1647, in spite of his Royalist sympathies, he was chosen by the benchers preacher of Lincoln's Inn, a post which he retained till his death at Reigate, March 21, 1656. Cromwell ordered his remains to be interred with great magnificence in Erasmus's Chapel in Westminster Abbey.

Ussher's chief works, besides those already mentioned, are his edition (1644) of the *Epistolæ* of Polycarp and Ignatius; his treatise *De Romanæ Ecclesiæ Symbolo Apostolico Diatribe* (1647); *Dissertatio de Macedonum et Asianorum Anno Solari* (1648); and *Annals of the Old Testament* (1650-54), a chronological work. After his death there were published (from his numerous MSS.) *Chronologia Sacra*, etc. (Oxford, 1660), by which and his *Annals* for these chronological calculations long appeared in the inner margin of the Bible in the Authorized Version, he is most widely known. The most frequently reprinted work attributed to him is the posthumous *Strange and Remarkable Prophecies and Predictions of James Ussher* (London, 1678; new ed. 1825). A collected edition of Ussher's works, in 71 vols., with a new biography, was published at Dublin in 1841-64 by C. R. Elrington and J. H. Todd. Consult also the *Life* by Carr (London, 1895), and W. B. Wright, *The Ussher Memoirs* (Dublin, 1889).

USSURI, ōō-sōō'rė. A right-bank tributary of the lower Amur (Map: Asia, N 4). Its headstreams rise to the northeast of Vladivostok. After a course of 90 miles it receives the Sungachi, which drains Lake Khangka. The Sungachi and, below their confluence, the Ussuri, form the boundary between Manchuria and the Russian Maritime Province, a navigable waterway 478 miles in length. The general course of the Ussuri is northeasterly, and it joins the Amur in 48° 16′ N., 134° 53′ E., at the village of Kazakevicheva, a little west of Khabarovsk. For a large part of its course the Ussuri is paralleled by the Russian railway connecting Khabarovsk and Vladivostok.

UST-BYELOKALITVENSKAYA, ōōst byĕ'lō-kä'lĕt-vĕn'skȧ-yȧ. A Cossack settlement in the Province of the Don Cossacks, southeastern Russia, on the Donetz, about 70 miles northeast of Tcherkask. Population, in 1897, 18,039.

USTILAGINALES, ŭs'tĭ-lăj'ĭ-nā'lēz (Neo-Lat. nom. pl., from Lat. *ustilago*, plant of the thistle kind, from *urere*, Skt. *uṣ*, to burn). A group of parasitic fungi commonly called 'smuts,' and found on flowering plants, whose floral parts and ovaries especially are subject to the attack. Some smuts are very destructive, as corn smut (*Ustilago maydis*) and the stinking smut of wheat (*Tilletia tritica*). The vegetative mycelium of the smut is inconspicuous until the season is well advanced and the ovary should begin to ripen. Then the ovary and the adjoining floral parts become filled with the fungal filaments, causing grotesque malformations. At the end of the season this mycelium becomes transformed into immense quantities of resting spores (chlamydospores) that probably correspond to the teleutospores of the rusts (Uredinales, q.v.). These escape as a black powder, and survive the winter, germinating with the return of spring. The spore develops a short filament (promycelium), which exhibits far greater variation of structure than in the rusts. Numbers of minute spores (sporidia) are developed by the promycelium, and, falling upon the seedlings and young plants of the proper host, germinate, sending the germ tubes through the stomata into the tissues.



USTILAGINALES.

1, Development of spores; 2 and 3, germination of spores promycelia, and fusing sporidia; 2, Ustilago; 3, Tilletia.

For a general account of the Ustilaginales consult: Engler and Prantl, *Die natürlichen Pflanzenfamilien* (Leipzig, 1887), and Plowright, *British Uredineæ and Ustilagineæ.*

UST-MEDVYEDITZA, ōōst mĕd-vyĕd'ĭt-sȧ. A Cossock settlement in the Province of the Don Cossacks, Southeastern Russia, situated on the right bank of the Don, near its confluence with the Medvyeditza. Population, in 1897, 15,999.

USTYUG VELIKY, ųs-tyųk′ vyĕ-lyĕ'kė. A town in the Government of Vologda, Russia, situated at the junction of the Sukhona with the Yug, 303 miles northeast of Vologda (Map: Russia, G 2). Population, in 1897, 11,309.

USUFRUCT (Lat. *ususfructus*, from *usus*, use, from *uti*, OLat. *olti*, to use, connected with *avere*, to crave, Skt. *av*, to promote, protect, like, Gk. *οἶτος*, *oitos*, fate, portion + *fructus*, fruit, from *frui*, to enjoy). At civil law, a life interest in property, usually established by legacy, but capable of being established by contract. It is also created by law, especially in modern civil legislations, many of which give usufruct to parents in the property of minor children and to the surviving spouse in the estate of the deceased husband or wife. (See PARENT AND CHILD; SUCCESSION; and TESTAMENT.) Usufruct is regarded as a servitude (q.v.), the general right of ownership (*proprietas*) being attributed to the reversioner, i.e. the person who is to take the property on the termination of the usufruct. The usufructuary has the exclusive right to possess, use, and enjoy the property, either in person or through a vendee or lessee. He must, however, use it *salvâ substantiâ*, i.e. the property must not be injured; nor may he change the character or mode of use. For the restoration of the property in unimpaired condition the usufructuary must ordinarily give security to the owner. Usufruct may be established not only in land and buildings, but also in 'non-consumptible' movables, i.e. in such movables as can be used without impairment of substance. In consumptibles, true usufruct is impossible; but for the purpose of carrying out the intentions of testators the Roman jurists developed the so-called 'quasi-usufruct,' in which the property is appraised and the usufructuary gives security that the sum at which it is valued shall be paid, after his death, to the holder of the reversionary interest.

USUMACINTA, o͞o'sụ-mȧ-sēn'tȧ. A river of Central America. It rises in the mountains of Southern Guatemala and flows in a winding northwest course through that country and Mexico, emptying into the Gulf of Campeche on the boundary between the Mexican States of Campeche and Tabasco (Map: Central America, B 2). Its length is about 400 miles, and it is navigable a short distance from the sea. In its middle course it forms the boundary between Mexico and Guatemala. Its upper course, which is through a little known forest region, was made by treaty the boundary between the two republics, and a dispute as to which was the main headstream nearly led to a war in 1895.

USURY (OF., Fr. *usure*, from Lat. *usura*, use, employment, interest, from *uti*, to use). Literally, money paid for the use of money, i.e. interest; but in the Middle Ages, when such payments were prohibited, the word obtained an evil sense, and when in modern times the taking of interest again became permissible, usury acquired its modern meaning, i.e. interest in excess of a fair return, and, particularly, in excess of a legally determined maximum. The establishment of such a maximum was general in the ancient world; at Roman law it varied, at different periods, from 12 per cent. to 6 per cent.; and when the taking of interest was legalized in the modern world, similar limitations were introduced. In England the act of 37 Henry VIII., c. 9, fixed the limit at 10 per cent. This was repeatedly lowered until, by the act of 12 Anne, c. 16, it was fixed at 5 per cent. By these laws usurious contracts were made wholly invalid and usury was an indictable offense. In most European countries (as in the Roman law) usurious contracts were invalid only as regarded the excess of interest, and contracts in which the lender assumed special risks (e.g. bottomry bonds) were not subjected to limitation of rate.

In the eighteenth century the usury laws were attacked by economic writers as arbitrary and unwise. It was pointed out that in all credit transactions there was an element of risk; that the risk varied greatly and might, in many cases, justify the taking of interest beyond the legal maximum; and that the effect of usury laws was to impose upon borrowers a higher rate of interest than they would otherwise be required to pay, in order that the lender might insure himself against the additional risk to which he was subjected by the illegality of the contract. In consequence of these arguments, limitations upon the rate of interest were generally repealed in the nineteenth century. In England this was done by the act of 17 and 18 Victoria, c. 90. In France, however, the usury laws were repealed only as regarded commercial contracts.

Adam Smith defended usury laws because they made it more difficult for spendthrifts to borrow money; and in the latter half of the nineteenth century, in connection with the general reaction against *laissez-faire* doctrines, the complete freedom of contract established by the repeal of the usury laws was in its turn condemned by many economists. It was urged that in many cases borrowers were at the mercy of lenders and that they should be protected against extortion of unreasonable interest. This theoretical reaction has affected modern European legislation. In Germany, by a law of 1880, "any person who, by exploiting the necessity, the frivolity, or the inexperience of another, causes to be promised to himself or to a third person, for a loan or for deferred payment of a debt, pecuniary advantages which so exceed the ordinary rate of interest that under the circumstances they are in striking disproportion to the debt," is punished with imprisonment up to six months and fine up to 3000 marks. In England, by an act of Parliament passed in 1900, it is provided that professional money-lenders shall be registered, and that their contracts shall be subject to judicial revision when the rate of interest appears under the circumstances to be unreasonable. In the United States this latest form of legislation against usury, in which it is left to the courts to determine what is, in each case, a reasonable rate, has not as yet been imitated. In more than one-fourth of the States and Territories (Arizona, California, Colorado, Connecticut, Florida, Maine, Massachusetts, Montana, Nevada, Rhode Island, Utah, Washington, Wyoming) the parties may agree upon interest above the legal rate. In the remainder of the States and Territories a legal maximum is established for interest on loans and 'forbearances' or deferred payments (see table in article INTEREST), but the legal results of contracting for a higher or usurious rate are very varied. In Georgia, Indiana, Kentucky, Louisiana, Maryland, Michigan, New Hampshire, New Mexico, Pennsylvania, Tennessee, Vermont, and West Virginia the creditor can recover principal and lawful interest, losing only the excess. In Kansas his claim is reduced by double the excess. In Alabama, the District of Columbia, Idaho, Illinois, Iowa, Mississippi, Missouri, Nebraska, New Jersey, North Carolina, Ohio, South Carolina, South Dakota, Texas, Virginia, and Wisconsin, the lender recovers the principal only; but in Idaho and Iowa the interest which the lender loses is paid by the borrower to the school fund. In Arkansas, Delaware, Minnesota, New York, North Dakota, and Oregon, the usurious contract is wholly invalid, and the lender is unable to recover the principal; but in Oregon the principal which he loses is paid by the borrower to the school fund. In some of these States money actually paid on a usurious contract cannot be recovered by the lender; but the general rule is to the contrary; and in some States the actual receipt of usurious interest exposes the lender to further penalties, e.g. twice the excess in South Carolina, three times the excess in New Hampshire and Wisconsin, and twice the interest paid in New Mexico and North Carolina. In some other States the lender is liable to prosecution and fine or imprisonment, but such prosecutions are rare. In Delaware any person may bring action against a lender who has received usurious interest, and if successful, will receive one-half of the principal of the debt, the other half going to the State.

Not infrequently special contracts are exempted from the operation of the usury laws, either because special risks are assumed by the lender, or on grounds of commercial interest. In several States corporations are not permitted to plead usury.

Usury laws are, in general, strictly construed. Whenever the law declares a usurious contract invalid, mortgages, trust deeds, and all forms of surety are also invalidated; but the courts do not assume that a legislature has intended to avoid the contract as regards the principal of the debt, or as regards the legal interest, unless such penalty is expressly imposed; nor is penalty, as distinguished from the protection of the borrower, incurred by merely stipulating for usurious interest, but only by receiving it.

In interstate cases (conflicts of law, q.v.), the question whether a contract is or is not usurious is governed by the law of the place where the contract was concluded, unless a different place was expressly or impliedly indicated as the place of performance. When a debt has been contracted in one State to be paid in another, and the rate of interest stipulated is usurious in one of the States, but not in the other, some of the courts apply the local law which will uphold the contract. Penalties in the strict sense (as distinguished from the legal protection given to the borrower) are not enforced outside of the jurisdiction in which they are imposed. See INTEREST.

Consult: Turgot, *Mémoire sur les prêts d'argent* (1741); Bentham, *Defense of Usury* (London, 1787); Von Stein, *Der Wucher und sein Recht* (1880); Caro, *Der Wucher; eine socialpolitische Studie* (1893); Murray, *History of Usury* (Philadelphia, 1866); Webb, *A Treatise on the Law of Usury* (1899).

UTA (Neo-Lat., from the Territory of *Utah*). A genus of iguanid lizards, several species of which are numerous on the Southwestern plains of the United States, one of which (*Uta Stansburiana*) is one of the most beautiful and graceful of American lizards. It is blackish brown above, marbled with lighter dots, and banded with yellow below. Its long, slender tail has a crest of large vertically set scales. This genus combines structural characteristics of Sceloporus and Holbrookia.

UTAH, ū′tä *or* ū′tạ (named from the Ute or Utah tribe of Indians). A Western State of the United States, called by the Mormon settlers *Deseret*, a word taken from the Book of Mormon and signifying 'Industry.' It lies between latitudes 37° and 42° north, and longitudes 109° 4′ and 114° 4′ west, and is bounded on the north by Idaho and Wyoming, on the east by Colorado, on the south by Arizona, and on the west by Nevada. Its shape is that of a rectangle 345 miles long from north to south, and 270 miles wide. The rectangle is indented in the northeast by a corner of Wyoming, but all the boundaries of the State are formed by lines of latitude and longitude. The State has an area of 84,970 square miles, including 2780 square miles of water. It ranks eighth in size among the States.

TOPOGRAPHY. Utah is divided into two parts by the Wasatch Range, which enters it near the middle of the northern boundary and runs southward, gradually curving toward the southwestern corner. The range forms the eastern boundary of the Great Basin, to which the western part of the State belongs. The Wasatch is a lofty and rugged mountain mass broken by deep and picturesque gorges, and reaching at several points an elevation of over 12,000 feet. It sends out a number of spurs to the east, and along the northeastern boundary runs a cross range known as the Uintah Mountains, the loftiest range in the State, with four peaks over 13,000 feet high, among which is Gilbert Peak, the highest point in Utah, with an altitude of 13,687 feet. The eastern half of the State is a plateau with an average elevation of 6000 to 8000 feet. It is broken by a number of isolated mountain groups, such as the Henry, Abajo, and La Sal Mountains, from 11,000 to over 13,000 feet in altitude, and cut by the deep cañons of the Colorado and its branches. Western Utah consists of the level basin-floor lying at a nearly uniform altitude of 5000 feet, from which a number of short, parallel, north and south ranges rise from 2000 to 3000 feet above the intervening valleys.

HYDROGRAPHY. Eastern Utah is drained wholly by the Colorado and its main headstream, the Green River. They receive from the slopes of the Wasatch and Uintah Ranges a large number of small streams, but these soon unite into a few branches which, together with the main river, flow in deep cañons far below the plateau floor. The extreme northwestern corner of the State sends its waters to the Snake River, but the entire remaining portion belongs to two of the closed drainage systems of the Great Basin, that of Sevier Lake, which receives the Sevier River, and that of the Great Salt Lake. The latter, the most prominent natural feature in the State, lies in its northwestern portion, and has a length of 80 miles and a width of from 18 to 48 miles. It receives from the south the outflow of Utah Lake through the Jordan River, and from the north that of Bear Lake through the Bear River.

CLIMATE. The climate is of the continental type, with sudden changes and great extremes in summer and winter, although the valleys, being well sheltered, have generally a mild and pleasant climate. The mean temperature for January is 27.9° at Salt Lake City, 24.1° at Snowville in the extreme north, and 35.8° at Saint George in the extreme southwest. For July the mean is 75.5° at Salt Lake City, 69.5° at Snowville, and 83.1° at Saint George. The lowest temperature ever observed at any of the regular stations is 34° below zero, and the highest 115°. The snowfall is light, but in the mountains the winters are very severe, and the summits are capped with perpetual snow. The rainfall throughout the State is insufficient for the needs of agriculture, and irrigation is everywhere necessary. The average precipitation for the State is 12 inches. The greatest amount falls in the north central portion, the average precipitation at Salt Lake City being 16.2 inches. Elsewhere it is less than 10 inches, falling to 6 inches in the southwest.

SOIL AND VEGETATION. The soil of the valleys, where it does not hold injurious amounts of alkaline deposits, usually contains the elements of fertility, which render it very productive when irrigated. It is at best a sedimentary loam composed of sand and clay, but in some places it is rocky or gravelly. Where not irrigated by artificial canals or natural watercourses the country is arid and treeless, covered with sagebrush on the plains, though the higher slopes are grassy. To the southwest of the Great Salt Lake lies the wide, arid plain known as the Great Salt Lake, or Great American, Desert. For details of the flora and for fauna, see paragraphs under ROCKY MOUNTAINS.

GEOLOGY AND MINERALS. The surface formations of the State are somewhat complicated and irregular in their outcrops. Ancient crystalline rocks appear as the core of the Uintah Mountains in the northeast. They are flanked by narrow outcrops of Jurassic and Cretaceous strata, south of which there is a broad area of Eocene formation. The great plateau forming the southeastern quarter of the State is almost wholly of Jurassic and Cretaceous age. The Wasatch Mountains present in their northern half a narrow ridge of Carboniferous rocks protruding through the Cretaceous and Tertiary strata, but their southern half is formed mainly of great masses of igneous rocks. The isolated ranges of western Utah are of Carboniferous and older Paleozoic formation, yet the basin-floor surrounding them is overlaid by sediment from Lake Bonneville (q.v.), a Pleistocene lake whose remnants still remain in the Great Salt and Sevier lakes. The mineral wealth of Utah includes extensive coal deposits on the eastern slope of the Wasatch and ledges of iron ore in the southwest. Gold is found chiefly in the Oquirrh Range south of the Great Salt Lake, while silver occurs in considerable quantities in connection with the lead and copper ores which are abundant in many of the mountain ranges. Other important minerals found in the State are manganese, deposited in the Triassic sandstone of the eastern plateau, gypsum, rock salt and borax, sulphur, pumice, and asphaltum.

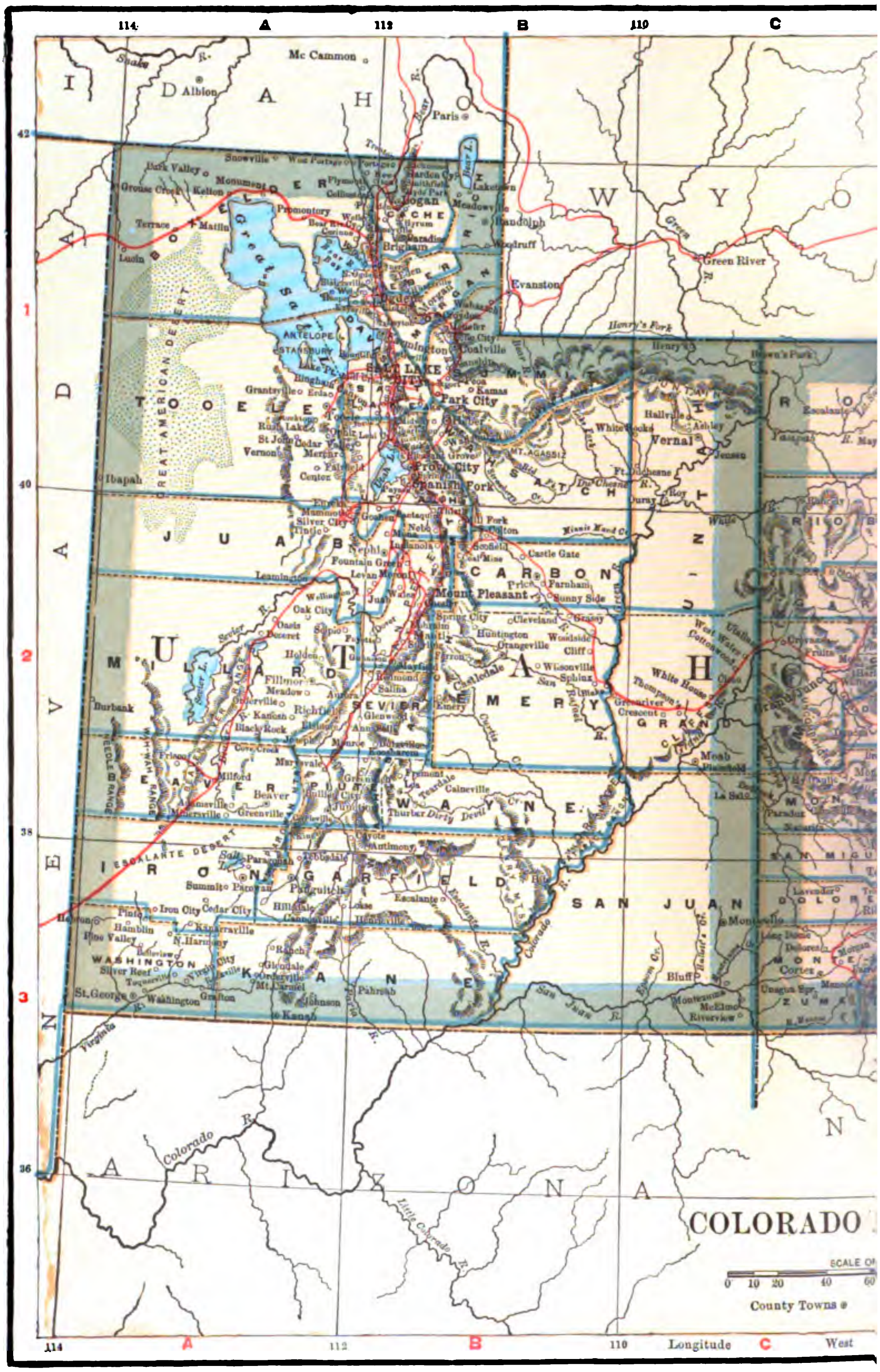
MINING. In 1901 the commercial value of the silver mined was $6,456,480—a decided gain over any preceding year. About two-thirds of this was obtained from lead ores, and the largest part of the remainder from copper ores. The value of the gold produced in 1901 was $3,690,200, which was also much larger than the output for any year excepting 1900. The gold is obtained from quartz mines. The production of lead for 1901, 49,870 short tons, was the largest output reached in any year, and over twice that for 1894. The State ranks third in this production. The output of coal has increased continuously in amount since 1896, being 1,322,614 short tons in 1901, or over three times the yield for the former year. From Carbon County is obtained 95 per cent. of the total product. The production of copper fluctuated about a low figure prior to 1898, in which year the output amounted to only 3,750,000 pounds. But there was a rapid increase following that year, the output in 1901 being 20,116,979 pounds. Increasing quantities are obtained from low-grade ores. The State ranks fifth in copper-mining. Salt is manufactured at Salt Lake, the yield in 1901 being 334,484 barrels, valued at $326,016. Limestone and sandstone, brick and tile, and Portland cement are products of some value.

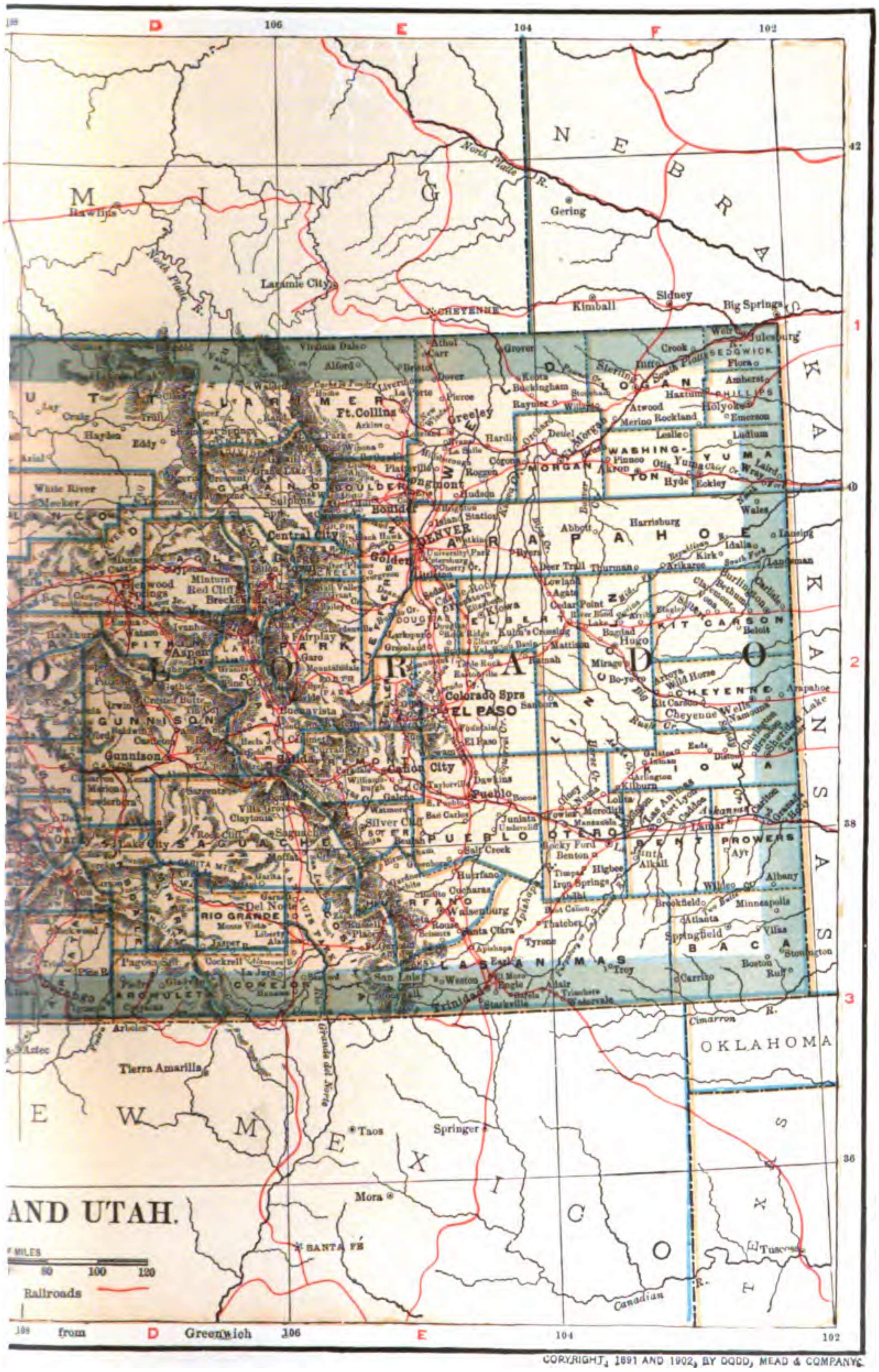
AGRICULTURE AND STOCK-RAISING. Agriculture is the chief occupation. Utah was the first of the Rocky Mountain States to develop this industry. Its success was dependent almost wholly upon irrigation, and it was the first State to demonstrate the possibilities of the irrigation system in the United States. The system has developed under conditions here not found elsewhere, and with much more satisfactory results to those who share its advantages. The planning and control of the system by the Mormon authorities made harmonious coöperation possible, and an economic distribution of the water without disputes over rights to its use. The land was divided into areas convenient for cultivation by a single household, so that there was a remarkable uniformity in the size of irrigated farms, and their average size was much less than for any other State. With the recent occupation of extensive unimproved areas, however, the average size of farms for the State has greatly increased. The average in 1860 was 30.2 acres, in 1880, 69.3 acres, and in 1900, 212.4 acres. The total farm area in 1900 (4,116,951 acres) was over three times that in 1890, and the improved area in 1900 (1,032,117 acres) was nearly twice that in 1890. In general, the northern counties have the largest farms. In 1900, 91.2 per cent. of the farms were owned by their operators.

The western half of the State belongs to the Great Basin, and nearly 90 per cent. of the irrigated land is within this basin. Salt Lake Valley in the north central part of the State contains a large part of the irrigated area. Almost the entire water supply is drawn from streams. Wells afford a very small amount. In 1899 there were 629,293 acres irrigated. Of the 686,374 acres of crops in that year, 537,588 acres were irrigated. Hay is the crop most extensively grown and also the most valuable crop, alfalfa being the principal variety. In 1899, 86.9 per cent. of the alfalfa was irrigated. Wheat and oats are the most widely grown cereals and both made large gains between 1890 and 1900. Of the area in oats 93 per cent. was irrigated, but only 57.4 per cent. of that in wheat. Much attention is given to vegetables, particularly potatoes and sugar-beets. The entire acreage of the latter and 94 per cent. of the former were irrigated. Prior to 1890 little attention was given to orchard fruits,

AREA AND POPULATION OF COLORADO BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Arapahoe	E 2	Denver	4,723	132,135	153,017
Archuleta	D 3	Pagosa Springs	1,209	826	2,117
Baca	F 3	Springfield	2,531	1,479	759
Bent	F 3	Las Animas	1,497	1,313	3,049
Boulder	E 1	Boulder	751	14,082	21,544
Chaffee	D 2	Buenavista	1,224	6,612	7,085
Cheyenne	F 2	Cheyenne Wells	1,787	534	501
Clear Creek	E 2	Georgetown	425	7,184	7,082
Conejos	D 3	Conejos	1,407	7,193	8,794
Costilla	E 3	San Luis	1,746	3,491	4,632
Custer	E 2	Silvercliff	696	2,970	2,937
Delta	C 2	Delta	1,201	2,534	5,487
Dolores	C 3	Rico	1,000	1,498	1,134
Douglas	E 2	Castlerock	889	3,006	3,120
Eagle	D 2	Redcliff	1,586	3,725	3,008
Elbert	E 2	Kiowa	1,852	1,856	3,101
El Paso	E 2	Colorado Springs	2,134	21,239	31,602
Fremont	E 2	Canon City	1,478	9,156	15,636
Garfield	C 2	Glenwood Springs	3,049	4,478	5,835
Gilpin	E 2	Central City	150	5,867	6,690
Grand	D 1	Sulphur Springs	1,873	604	741
Gunnison	D 2	Gunnison	3,277	4,359	5,331
Hinsdale	D 3	Lake City	1,003	862	1,609
Huerfano	E 3	Walsenburg	1,537	6,882	8,395
Jefferson	E 2	Golden	858	8,450	9,306
Kiowa	F 2	Sheridan Lake	1,780	1,243	701
Kit Carson	F 2	Burlington	2,168	2,472	1,580
Lake	D 2	Leadville	393	14,663	18,054
La Plata	D 3	Durango	1,848	5,509	7,016
Larimer	D 1	Fort Collins	4,337	9,712	12,168
Las Animas	E 3	Trinidad	4,802	17,208	21,842
Lincoln	F 2	Hugo	2,553	689	926
Logan	F 1	Sterling	1,733	3,070	3,292
Mesa	C 2	Grand Junction	3,309	4,260	9,267
Mineral	D 3	Creede	880	......	1,913
Montezuma	C 3	Cortez	2,118	1,529	3,058
Montrose	C 2	Montrose	2,290	3,980	4,535
Morgan	F 1	Fort Morgan	1,264	1,601	3,268
Otero	F 2	Lajunta	2,042	4,192	11,522
Ouray	D 2	Ouray	557	6,510	4,731
Park	E 2	Fairplay	2,084	3,548	2,998
Phillips	F 1	Holyoke	677	2,642	1,583
Pitkin	D 2	Aspen	983	8,929	7,020
Prowers	F 3	Lamar	1,602	1,969	3,766
Pueblo	E 2	Pueblo	2,447	31,491	34,448
Rio Blanco	C 2	Meeker	3,249	1,200	1,690
Rio Grande	D 3	Del Norte	1,331	3,451	4,080
Routt	C 1	Hahns Peak	6,980	2,369	3,661
Saguache	D 2	Saguache	2,769	3,313	3,853
San Juan	D 3	Silverton	438	1,572	2,342
San Miguel	C 2	Telluride	1,310	2,909	5,379
Sedgwick	F 1	Julesburg	535	1,293	971
Summit	D 2	Breckinridge	603	1,906	2,744
Teller	E 2	Cripple Creek	551	......	29,002
Washington	F 1	Akron	1,074	2,301	1,241
Weld	E 1	Greeley	3,918	11,736	16,808
Yuma	F 1	Yuma	1,162	2,596	1,729


114
A
112
B
110
C
42
1
40
2
38
3
36
I D A H O
Mc Cammon
Albion
Snake R.
Paris
Bear L.
W Y O
Green River
Evanston
Randolph
Woodruff
Green R.
Henry's Fork
N E V A D A
A R I Z O N A
Colorado R.
Little Colorado R.
Virginia
N
U T A H
BOX ELDER
Snowville
Park Valley
Grouse Creek
Kelton
Monument
Promontory
Terrace
Matlin
Lucin
Great Salt Lake
CACHE
Logan
Hyrum
Paradise
Brigham
WEBER
Ogden
MORGAN
RICH
Laketown
Meadowville
GREAT AMERICAN DESERT
ANTELOPE
STANSBURY
TOOELE
Tooele
Grantsville
Erda
Rush Lake
St John
Vernon
Mercur
Fairfield
Center
Ibapah
SALT LAKE CITY
Coalville
SUMMIT
Kamas
Park City
WASATCH
Provo City
Spanish Fork
Utah L.
UTAH
MT. AGASSIZ
Duchesne R.
Ft. Duchesne
Ouray
Roy
White Rocks
Vernal
Ashley
Jensen
Hallville
UINTAH
JUAB
Eureka
Silver City
Tintic
Nephi
Fountain Green
Levan
Goshen
Indianola
Mount Pleasant
Leamington
CARBON
Castle Gate
Price
Farnham
Sunny Side
Minnie Maud Cr.
Wellington
Oak City
Oasis
Deseret
Scipio
Holden
Fillmore
MILLARD
Meadow
Kanosh
Black Rock
Sevier L.
Sevier R.
Burbank
Spring City
Cleveland
Huntington
Woodside
Orangeville
Ferron
Castledale
Wilsonville
Sphinx
EMERY
San Rafael R.
Green River
Crescent
Thompson
White House
West Water
GRAND
Moab
Richfield
SEVIER
Salina
Redmond
Glenwood
Annabella
Elsinore
Joseph
Monroe
Marysvale
Cove Creek
Frisco
Milford
BEAVER
Beaver
Minersville
Greenville
PIUTE
Junction
Thurber
WAYNE
Caineville
Fremont
Dirty Devil R.
NEEDLE RANGE
WAH WAH RANGE
ESCALANTE DESERT
IRON
Paragonah
Summit
Parowan
Panguitch
GARFIELD
Antimony
Escalante
Escalante R.
Hillsdale
Hatchville
SAN JUAN
Monticello
Bluff
Montezuma
McElmo
Riverview
San Juan R.
Iron City
Cedar City
Pinto
Hebron
Hamblin
Pine Valley
Kanarraville
N. Harmony
WASHINGTON
Silver Reef
Toquerville
Virgin City
St. George
Washington
Grafton
KANE
Orderville
Glendale
Mt. Carmel
Johnson
Kanab
Pahreah
Rockville
Paria R.
COLORADO
RIO BLANCO
Grand Junction
MONTROSE
SAN MIGUEL
DOLORES
MONTEZUMA
Cortez
Mancos
Dolores
Paradox
SCALE OF
0 10 20 40 60
County Towns ●
114
A
112
B
110
Longitude
C
West



COPYRIGHT, 1891 AND 1902, BY DODD, MEAD & COMPANY.

AREA AND POPULATION OF UTAH BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Beaver	A 2	Beaver	2,580	3,340	3,613
Boxelder	A 1	Brigham	5,436	7,642	10.009
Cache	A 1	Logan	1,181	15,509	18,139
Carbon	B 2	Price	1,596	.....	5,004
Davis	A 1	Farmington	285	6,751	7,996
Emery	B 2	Castledale	4,336	5,076	4,657
Garfield	A 3	Panguitch	5,108	2,457	3,400
Grand	C 2	Moab	3,759	541	1,149
Iron	A 3	Parowan	3,284	2,683	3,546
Juab	A 2	Nephi	3,300	5,582	10,082
Kane	A 3	Kanab	4,368	1,685	1,811
Millard	A 2	Fillmore	6,664	4,033	5,678
Morgan	A 1	Morgan	599	1,780	2,045
Piute	A 2	Junction	744	2,842	1,954
Rich	A 1	Randolph	1,050	1,527	1,946
Salt Lake	A 1	Salt Lake City	768	58,457	77,725
San Juan	B 3	Monticello	8,025	365	1,023
Sanpete	B 2	Manti	1,561	13,146	16,313
Sevier	B 2	Richfield	1,880	6,199	8,451
Summit	B 1	Coalville	1,937	7,733	9,439
Tooele	A 1	Tooele	6,901	3,700	7,361
Uinta	C 2	Vernal	5,190	2,762	6,458
Utah	B 1	Provo City	2,123	23,768	32,456
Wasatch	B 1	Heber	4,147	3,595	4,736
Washington	A 3	Saint George	2,457	4,009	4,612
Wayne	B 2	Loa	2,372	.....	1,907
Weber	A 1	Ogden	544	22,723	25,239

but the conditions are favorable to them, and between 1890 and 1900 there was a great increase in every variety of fruit trees. In the latter year there were 715,778 apple trees, amounting to 40.1 per cent. of the total number of orchard trees. Weber and other northwest counties have the largest number of trees. Probably no State in the Union has a larger average yield per acre for all crops than has Utah.

The following table shows the acreage of the principal crops for the census years indicated:

	1900	1890
Hay and forage	388,043	....
Wheat	189,235	84,505
Oats	43,394	22,747
Corn	11,517	5,782
Barley	8,644	6,440
Potatoes	10,433	....
Sugar beets	7,546	....

The plateau region in the eastern half of the State and the valleys of the central region afford sufficient pasturage to support a considerable grazing industry. Every decade since 1850 shows an increase in the number of dairy cows and other cattle, horses, and sheep. Sheep-grazing seems to be assuming the most prominent place. The value of the wool product in 1899 was $2,599,638. The average weight of the fleece increased from 5.0 pounds in 1890 to 6.4 pounds in 1900. The following table shows the number of domestic animals on farms and ranges. In 1890 there were 78,047 head of cattle, 22,243 horses, and 922,730 sheep on ranges which are not included in this table.

ANIMALS	1900	1890
Dairy cows	65,905	45,982
Other cattle	277,785	154,284
Horses	115,884	65,057
Mules and asses	3,004	1,554
Sheep	2,553,134	1,014,176
Swine	65,732	27,046

MANUFACTURES. This industry is confined principally to production for the local market. However, there has latterly been a decided growth in the industry, the value of products (including custom work and repairing) having increased from $8,911,047 in 1890 to $21,156,183 in 1900. In the latter year there were 6615 persons engaged in the industry, and the capital invested was $14,650,948. The most important branch is the smelting and refining of lead ore. The flour and grist mill products in 1900 were valued at $1,829,840, the beet-sugar products at $1,037,355, and the butter and cheese at $713,889. Salt, malt liquors, and boots and shoes are other products of some importance. The value of products of railroad construction and repair shops in 1900 was estimated at $1,306,591. A large number of the industries are centred in Salt Lake City, the value of products for that place in 1900 being $6,109,409.

TRANSPORTATION AND COMMUNICATION. The Union Pacific was the first railway to enter Utah, and since its advent in 1869 the development of the State has been very rapid. The total railway mileage in 1876 was 500; in 1894, 1347; and in 1902, 1875. The most important railway lines are the Rio Grande Western and the Oregon Short Line, extending north and south through the central part of the State, and the Union Pacific, passing through the northern portion. There are no navigable streams.

BANKS. The history of banking in Utah is very uneventful. Private bankers became active toward 1860, and from 1860 to 1870 some banks were organized under the Territorial law. The first national bank was established in 1872 with Brigham Young as its president. Like all the economic activities of the Mormons, the banks were controlled by the Church authorities, and the high development of mutual confidence which characterizes the members of this faith has saved the banks from crises. Even during the hard times of 1893 the banks of Utah all remained solvent. State banks are more numerous and do a much larger business than the national banks. Savings banks have existed since 1873.

The condition of the banks in 1902 is shown in the following table:

	National banks	State banks.
Number	12	29
Capital	$1,680,000	$2,780,000
Surplus	430,000	5,851,000
Cash, etc	1,808,000	4,220,000
Deposits,	8,188,000	26,513,000
Loans	4,356,000	23,805,000

GOVERNMENT. The Constitution of Utah was adopted by a vote of the people in 1895. An amendment may be proposed in either House, and upon receiving the approval of two-thirds of the members elected to each House, it is submitted to the people, and if a majority of the electors voting thereon approve, it becomes a part of the Constitution. In a similar manner a constitutional convention may be called, but the changes proposed by the convention must be submitted to the people for approval. The suffrage and also the right to hold office are granted to women as well as men. Voters must be citizens twenty-one years of age and have resided in the State one year, in the county four months, and in the precinct sixty days. The Constitution admits of laws requiring of voters a property qualification in order to vote special taxes or create indebtedness. All general elections, except for municipal and school officers, are held on the Tuesday after the first Monday in November. Utah sends one member to the National House of Representatives. The capital is Salt Lake City.

LEGISLATIVE. The Legislature meets in biennial sessions, limited to sixty days, except in cases of impeachment. Members receive not more than $4 per day, and mileage limited to ten cents a mile. Representatives are elected for two years and Senators for four years. The latter can never exceed thirty in number, and the former must never be less than twice nor more than three times the number of Senators. The Lower House impeaches and the Senate tries all cases of impeachment.

EXECUTIVE. The Governor, Secretary, Auditor, Treasurer, Attorney-General, and Superintendent of Public Instruction are elected for four years. The Secretary of State and president pro tempore are in the line of succession to the Governorship in case of vacancy, and serve until a new Governor can be elected at the next general election. The pardoning power, unless otherwise provided for by law, rests with a board consisting of the Governor, justices of the Supreme Court, and the Attorney-General. The Governor may call extra sessions of the Legislature, and exercises a veto which may be overruled by a two-thirds vote of the members elected to each House.

Judicial. The Supreme Court consists of three elected judges, but after 1905 the number may be increased to five, who shall serve six years. The State is divided into seven judicial districts (subject to change), in each of which from one to three district judges are elected for four years. Other courts inferior to the Supreme Court may be established by law.

Local Government. The Legislature provides a uniform system of county government. Precinct and township organization, the incorporation, organization, and classification of cities and towns are established by general laws.

Finances. The finances are in a satisfactory condition. At the time of admission into the Union the State assumed the small debt of the Territory, amounting to $700,000, and additional bonds to the amount of $200,000 were issued. The debt remained at the same level, but the 5 per cent. bonds were refunded by 3½ per cent. and 3¼ per cent. obligations. The income of the State is derived mainly from a general property tax and sale of public lands. In 1902 the total receipts were $1,409,256, of which the property tax supplied 65 per cent. and the sale of public lands 27 per cent. The expenditures were $1,349,654, of which almost 50 per cent. were for school purposes. The cash in the treasury on January 1, 1903, was $565,259, more than half being in the school fund.

Militia. In 1900 there were 53,755 men of militia age. The organized militia, in 1901, numbered 526 men.

Population. The population by decades has been as follows: 1850, 11,380; 1860, 40,273; 1870, 86,786; 1880, 143,963; 1890, 207,905; 1900, 276,749. In 1900 the State ranked forty-third among the States of the Union. There were 3.4 inhabitants per square mile. The population is largely limited to the irrigated or mining districts. In 1900 there were 141,687 males and 135,062 females. The foreign born numbered 53,777; Indians, 2623; negroes, 672; Chinese, 572; and Japanese, 417. The English, Danes, and Swedes are the most numerous of the Europeans. Salt Lake City, the capital and largest city, had 53,531 inhabitants in 1900; Ogden, 16,313; Provo City, 6185; and Logan, 5451.

Religion. Utah is the centre of Mormonism. About three-fourths of its population is allied with the Mormon Church. (See Mormons.) In recent years many other denominations have entered the State, of which the Catholics and Methodists are numerically the strongest.

Education. The present public school system was introduced in 1890, superseding in large part the many sectarian institutions then in existence. The control of the public schools is in the hands of the Superintendent of Public Instruction, elected for four years, and a board of education. The expenditures for school purposes in 1902 aggregated nearly $1,460,000. In the census year 1900 the population of school age numbered 106,513, of which 64,925, or about 60 per cent., were in attendance. The illiterates at that date formed 3.1 per cent. of the population ten years of age and over. The report of the State Superintendent for 1902 showed a school attendance of 76,466. The leading institutions are the University of Utah (q.v.), at Salt Lake City; Brigham Young College, at Logan; and the Agricultural College of Utah, also at Logan. A State normal college is maintained in connection with the State University, and there is a branch normal school at Cedar City.

Charitable and Penal Institutions. There is an insane asylum at Provo City. A reform school is located at Ogden, and a penitentiary at Salt Lake City.

History. The first white explorers of Utah were Spaniards, sent by Coronado (q.v.), who reached the Colorado River in 1540. Two Franciscan friars seeking a direct route to the Pacific went from Santa Fe to Utah Lake in 1776. In the winter of 1824-25, James Bridger, a trapper, seeking to determine the course of the Bear River, discovered the Great Salt Lake. Other trappers followed in 1825-26, and established posts in the region. Later immigrants to Oregon and California passed through without halting. The real history begins when the Mormons (q.v.), despairing of peace in Missouri or Illinois, determined in 1846 to move west. The Mexican War was then in progress, and in June, 1846, while the emigrants were encamped at the site of Council Bluffs, Iowa, a Mormon battalion was raised for the conquest of California, which then included the whole southwestern part of the United States. The march of the Mormon people was slow and painful. On July 21, 1847, the advance guard reached the present site of Salt Lake City. Other bands rapidly followed, and by 1852 they numbered 15,000. The United States did not obtain possession of the territory until the Treaty of Guadalupe Hidalgo, in 1848, and did not immediately provide for its government. At first the Church officers were the rulers, but with the coming of non-Mormons in 1849 the State of Deseret was organized, a constitution adopted, and a delegate sent to the United States Congress asking admission. Congress refused to admit the State, but organized the Territory of Utah (September 9, 1850), with boundaries much more extended than at present, and Brigham Young (q.v.) was appointed Governor. He soon quarreled with the other Territorial officers sent out, and the General Assembly adopted the laws of the State of Deseret. In 1854 and again in 1856 admission to the Union was sought. There was constant wrangling, owing partly to the fact that many officers sent out were incompetent and partly because the authorities of the Church were determined to rule at any cost. In 1857 it was determined that Young should be superseded as Governor, and for this purpose it was considered necessary to make a display of military strength, as Young had defied the authority of the United States. A force under General Harney (afterwards succeeded by Colonel Albert Sidney Johnston) started from Fort Leavenworth. Though there was no fighting of consequence, the Mormons, by burning supply trains, disabling and stampeding teams, setting fire to the grass, etc., prevented the entrance of the troops into Salt Lake City until June, 1858. They found the city deserted and ready to be set on fire if necessary. For some years troops were kept in garrison here, but the attention of the general Government was occupied with the Civil War, and little was accomplished, though an act designed to break up polygamy was passed in 1862. Meanwhile the Perpetual Emigration Fund had been organized in 1849 and thousands of proselytes were brought from Europe. The incoming of non-Mormons was viewed with disfavor. See MOUNTAIN MEADOWS MASSACRE.

After the Civil War, the opening of the transcontinental railroad in 1869 brought more 'gentiles,' and further efforts to enforce the laws were made by some officers, but with little success. The Mormon grand juries refused to indict and the other juries to convict. The death of Young in 1877 apparently made no difference in the condition of affairs. It was finally decided that the only way to break the power of the Church was to deprive its members of political power. The Edmunds Bill in 1882 disfranchised all polygamists, and abolished most of the offices in the Territory. Control was given to a commission of five men. Within two years 12,000 were disfranchised and the indignation was so great that troops were sent in 1885 in fear of an uprising. Continued agitation for Statehood brought no result, and meanwhile, after it had been held constitutional that juries might consist entirely of non-Mormons, prominent officials were convicted and sent to the penitentiary. A more stringent act was passed in 1887, the corporation of the Mormon Church, and the Perpetual Emigration Fund were abolished, and their property escheated. By 1890 468 men had been convicted of polygamy, and President Woodruff of the Mormon Church issued a manifesto declaring that the Church no longer countenanced polygamy, and his action was approved by a General Conference of the Church. This was followed in 1891 by the formation of political parties, on national lines, and in 1893 amnesty was declared to all offenders who could show that they had not broken the law since 1890. Congress passed an enabling act for Statehood in 1894, a constitution was formed on March 6, 1895, was adopted in November, and the State was admitted January 4, 1896. The Constitution forbids polgamy and allows woman's suffrage. Since admission it has been claimed that the people are going back to their old practices, and in 1900 Brigham H. Roberts was not allowed to take his seat in the United States House of Representatives, because of a charge of polygamy.

The State has voted in but two Presidential elections. The silver question was the sole issue in 1896, and the vote was cast for the Democratic Silver candidate. In 1900 by a small majority Republican electors were chosen.

GOVERNORS OF UTAH

STATE OF DESERET		
Brigham Young		1849-51
TERRITORY OF UTAH		
Brigham Young		1851-57
Alfred Cumming		1857-61
John W. Dawson		1861
Frank Fuller (acting)		1861-62
Stephen S Harding		1862-63
James Duane Doty		1863-65
Charles Durkee		1865-69
Edwin Higgins (acting)		1869-70
S A. Mann (acting)		1870
J. Wilson Shaffer		1870
Vernon H. Vaughan (acting)		1870-71
George L. Woods		1870-74
S B. Axtell		1874-75
George B. Emery		1875-80
Eli H. Murray		1880-86
Caleb W. West		1886-89
Arthur L. Thomas		1889-93
Caleb W. West		1893-96
OF THE STATE		
Heber M. Wells	Republican	1896—

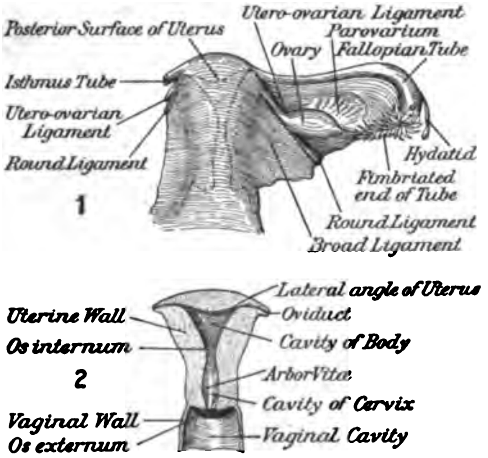
Consult: Nichols, *Mineral Resources of Utah* (Pittsburg, 1873); Bancroft, *History of the Pacific States* (San Francisco, 1889); Jones, *Utah* (New York, 1902); and the works named in the bibliography under the article MORMONS.

UTAH, UNIVERSITY OF. A State institution of learning for both sexes at Salt Lake City, Utah, founded in 1850 as the University of the State of Deseret. After one session it was discontinued until 1867, owing to lack of funds and patronage. A new charter was secured in 1894, when the present corporate title was assumed. In the same year the university received a grant of 60 acres on the Fort Douglas Reservation and the State Legislature appropriated $300,000 for buildings on the new site. The departments are the School of Arts and Sciences; the State School of Mines, established by the State Legislature in 1901; the State Normal School; and a preparatory department. Students are admitted on examination or on certificate from accredited schools. In 1903 the attendance was 745, the teaching force numbered 30, and the library contained 21,300 volumes and 11,500 pamphlets. The value of the university property was estimated at $350,000 and the gross income at $85,000.

UTAH LAKE. The largest fresh-water lake in Utah, situated 30 miles southeast of the Great Salt Lake, into which it discharges through the river Jordan (Map: Utah, B 1). It is about 25 miles long and eight miles wide, and lies on the extreme eastern border of the Great American Basin, at the western base of the Wasatch Range, and at an altitude of 4505 feet. It is surrounded by mountains on all sides, but receives its principal drainage from the east. The chief town on its shores is Provo City.

UTE, ūt, or **U′TAH.** An important tribe of Shoshonean stock (q.v.), who formerly occupied the mountain region of western Colorado and eastern Utah, with portions of the adjacent territory on the north and south, and extended their hunting and raiding expeditions far down into the plains. They were subdivided into bands, of which the principal were the Tabequache, Muache, Capote, Wiminuche, Yampa, and Uinta. They seem to have been the originial nucleus of the Shoshonean stock, as commonly recognized, occupying a central position and having no tradition of any earlier home. They were usually at peace with their neighbors and kindred on the north and west, the Shoshoni, Banak, and Piute, and also assumed a protectorship over the Jicarilla, but carried on constant and relentless warfare with the Navajo and with all the tribes of the plains. They were a restless, warlike, and aggressive people, living entirely by hunting and on wild fruits and roots, and, like other tribes of the same stock, were democratic in their tribal life, with centralized or hereditary chiefship and careless of ceremonial. Their native arts were simple, but by trade with the Navajo and Piute they obtained blankets and baskets, while from the Mexicans, and by raids on other tribes, they procured herds of horses, sheep, and cattle. Their ordinary dwelling was a brush shelter or small tipi. In their family relations the husband seems to have had more importance than among the Plains tribes. The Ute made their first treaty with the Government in 1850, and by various subsequent treaties were limited in range until the entire body, with the exception of the Southern Ute, were removed to the present reservation in Utah. In 1881 they were officially reported to number 3974. In 1901 they had been reduced to 2589, of whom 941 were on the Southern Ute Reservation in southern Colorado, the remainder on the Uinta Reservation in northeastern Utah. Those in Utah were fairly prosperous, while the majority of those remaining in Colorado were in a miserable condition, owing to neglected treaty promises and the desert character of the land upon which they are compelled to live. See Plate of AMERICAN INDIANS, under INDIANS.

UTERUS (Lat., womb). or WOMB. A flattened, pear-shaped organ, lying behind the symphysis of the pubes in the female human being, and constituting her principal generative organ. It consists of a body, a base or fundus, a neck or cervix, and a mouth. It lies in the line of the axis of the outlet of the pelvis (q.v.), with base directed upward and forward, and the neck directed slightly backward. In the unimpregnated condition it is about three inches in length, two in breadth, and one in thickness. On laying it open, or exploring its interior by the introduction of an instrument through the *os uteri*, its cavity is found to be very narrow, and to contain a little mucus. Its walls are nearly half an inch thick, and are mainly composed of muscle fibres running irregularly in all directions except round the *os*, where they make a partial sphincter. This muscular coat, which constitutes the bulk of the organ, is covered externally with a serous coat, derived from the peritoneum, and is lined internally by a mucous coat continuous with that of the canal called the *vagina*, by which the interior of the womb communicates with the outer surface of the body. The neck or *cervix* of the womb is distinguished from the body by a well-marked construction. The mouth, or *os*, projects slightly into the vagina. This opening is nearly round in the virgin, and transverse after parturition. It is of considerable size, and is named the *os uteri externum;* it leads into a narrow canal which terminates at the upper end of the *cervix* in a smaller opening, the *os internum*, beyond which is the shallow triangular cavity of the womb, of which it forms the lower angle, while the two upper angles, which are funnel-shaped, constitute the beginning of the Fallopian tubes, or oviducts, whose apertures are so small as only to admit the passage of a fine bristle. The blood-vessels and nerves enlarge in a very remarkable way during pregnancy, so as to adapt themselves to the increased wants of the organ, which at the ninth month of utero-gestation weighs from two to four pounds. The name *appendages to the uterus* or *adnexa* is given to the Fallopian tubes and ovaries, which are inclosed by the lateral folds of the peritoneum called the broad ligaments. The uterus is suspended in the pelvic cavity in such a way as, by its mobility, to escape concussion from without or disturbance from the varying conditions of the surrounding viscera, while at the same time to allow of its vastly increasing in bulk with comparatively little discomfort when pregnancy occurs. This is effected by several reduplications of peritoneum, containing variable quantities of fibrous and muscular tissue, and known from their form or connection as the *broad*, the *round*, the *utero-sacral*, and the *utero-vesical* ligaments. During pregnancy the uterus increases gradually to the end of the ninth month, when it contracts and expels the fœtus. The organ then atrophies, contracts, and resumes nearly its initial size and shape.



1. Uterus and broad ligament as seen from behind, the latter being spread out. The isthmus tube, the utero-ovarian ligament, and the round ligament of the left side have been cut short. 2. Sectional diagram of the uterine cavity as seen from the front.

The chief functions of the uterus relate to menstruation (q.v.), insemination, gestation, and parturition. See EMBRYOLOGY; FŒTUS; OBSTETRICS; OVARY; STERILITY; UTERUS, DISEASES OF THE.

UTERUS, DISEASES OF THE. The causes of uterine disease may be divided into those which are operative before marriage, those which arise during married life, and those which depend upon child-bearing or its sequels. These causes thus embrace neglect of out-of-door life and physical development; improper dress; imprudence during menstruation; excessive mental strain; the prevention of conception and the production of abortion; the neglect of precautions after childbirth or the failure to repair lacerations occurring during delivery; disease communicated during sexual intercourse; and habitual constipation. Utter disregard of weather or temperature during menstruation and a continuance of the nervous tension of study during this period are grave and undermining agencies. Too great activity after parturition in women heretofore unaccustomed to physical labor interferes with the normal degeneration of the enlarged uterus, a process requiring six weeks for its accomplishment. Tight bandaging, 'to preserve the figure,' results in bending the large uterus back into the hollow of the sacrum and fixing it in a displaced position, which is the reason for subsequent pain, weariness, constipation, and much discomfort. The modern obstetrician is prepared to close lacerations immediately after delivery, to complete the surgical repairs necessary, and to prevent infection through bleeding surfaces. A very fruitful source of uterine disorder lies in the prevention of conception and the procurement of abortion. The resort to drugs locally applied has resulted often in chronic endometritis, and abortions leave a patulous uterine mouth inviting infection, even if hemorrhage has not proved debilitating, or peritonitis has not supervened, or retained shreds of fœtal or placental tissue have not started a fatal septicæmia. Gonorrhœa (q.v.) is a frequent and dangerous cause of uterine disease. Constipation, so often a result of sheer neglect in young women, contributes to displacement of the uterus by the mass of fœcal matter retained in the rectum with resulting dysmenorrhœa, sterility, and endometritis.

Endometritis is an inflammatory affection of the mucous lining of the uterus, and may be confined to either the neck or the body of the viscus, or may affect both. It is caused by exposure during menstruation, direct injury, infection from the vagina (notably gonorrhœal), excessive sexual intercourse, or suppressed menstruation. Its symptoms are pain, weight, and oppression in the pelvic cavity and in the back, frequent griping in the urinary bladder and rectum, burning in the vagina, and a leucorrhœal discharge of an irritating and suppurating character. It may be complicated by similiar disease in adjoining structures. It may last but a few weeks or continue for years.

Chronic metritis, or *hyperplasia*, gives rise to similar symptoms, with dyspepsia, headache, and languor added, besides nausea and vomiting in some cases. The pathological condition present is an enlargement of the uterus through increase of its connective tissue.

Laceration of the cervix of the uterus consists of a tearing in the wall of the neck of the organ during labor. It gives rise to all the symptoms noted under endometritis, and also to neuralgic pains in the uterus and discomfort in walking. It may be unavoidable during delivery, and most frequently occurs as a result of precipitate labor, or manual or instrumental delivery. It is a frequent cause of lifelong suffering and distress, which operative interference, in the vast majority of cases, relieves at once.

Fistulæ are common affections of the uterus, which give great discomfort. A fistula may be an unnatural opening from the bladder into the uterus, from the bladder into the vagina, from the bladder into the rectum, or from the uterus into the rectum. In each case the passage of urine or fœcal matter through an improper channel is a symptom, as well as pain, pruritus, eruptions, and excessive irritation. The operation devised and improved by James Sims (q.v.), after unsuccessful suggestions had been made in France, England, and Germany, has revolutionized the topic and rendered these distressing conditions susceptible to cure.

Displacements of the uterus, while not diseases, give rise to diseased conditions of much moment, by preventing the escape of menstrual blood, by interfering with the uterine circulation, by causing pressure and friction, and by producing sterility. The varieties are anteflexion, in which the uterus is bent forward upon itself; anteversion, in which the whole uterus is tilted forward; retroversion, in which the uterus is tilted backward; retroflexion, in which the uterus is bent backward upon itself; lateroversion and lateroflexion, in which the uterus is tilted or bent upon itself sideways; inversion, in which the fundus of the uterus is turned partly or entirely inside out; and prolapsus, or descent, in which the uterine body slips downward into the pelvis to a lower depth than normal, and even, in the worst degree, causes a protrusion of the cervix at the vulvar orifice.

Menorrhagia is a condition in which menstruation is profuse, and an actual hemorrhage occurs at the menstrual period. *Metrorrhagia* is the occurrence of profuse menstruation or of a hemorrhage from the uterus in the interval between menstrual periods.

Cancer of the uterus is fairly frequent. The symptoms are pain through the pelvis; tenderness upon walking or moving, or during coition; menorrhagia and metrorrhagia; discharge of a very offensive fluid from the uterus; pallor and loss of strength and flesh; and fistulæ. Septicæmia may result from it, as well as cellulitis, peritonitis, phlebitis, and embolism, and metastatic deposits elsewhere. The treatment is amputation of the organ or its complete removal by knife or electro-cautery. All uterine diseases demand treatment at the hands of an intelligent and skillful practitioner. There can be no suggestions for domestic practice in these cases, beyond copious vaginal injections of fairly hot water, thrown against the cervix. Consult Kelly, *An American Text-book of Gynæcology, Medical and Surgical* (Philadelphia, 1900).

U'THER. King of Britain and father, by Igerna, of Arthur (q.v.).

U'TICA. The county-seat of Oneida County, N. Y., 95 miles west by north of Albany; on the south bank of the Mohawk River, on the Erie Canal, and on the New York Central and Hudson River, the New York, Ontario and Western, the Delaware, Lackawanna and Western, the West Shore, the Rome, Watertown and Ogdensburg, and the Mohawk and Malone railroads (Map: New York, E 2). It is finely situated at an elevation of about 430 feet, and is regularly laid out. Noteworthy are the city hall, the United States Government building, the State Armory, the Young Men's Christian Association building, the Utica Free Academy, and the Masonic Home. The Public Library has 30,000 volumes Other collections include the Oneida Historical Society Library with more than 7200 volumes, the Utica Law Library, the Utica State Hospital Medical Library, the Young Men's Christian Association Library, the Deutscher Leserverein, and the Faxton Hall Library. Utica has been termed 'the city of charities' because of the number of its charitable institutions, the value of their property, and the large amount annually expended for their maintenance. The more important of these institutions include the Home for the Homeless, Home for the Aged, Utica Orphan Asylum, Saint Vincent's Protectory, and the City, Homœopathic, Faxton's, and Saint Luke's hospitals. A State lunatic asylum also is here.

Utica is of considerable prominence as a commercial and industrial centre. It is in a rich dairy-farming country and is widely known for its large output of cheese. Hop-growing and the cultivation of roses are other important industries of the surrounding district. In manufacturing Utica ranks eighth among the cities of the State, its various industrial establishments in the census year 1900 having $19,289,502 invested capital and a production valued at $19,550,850. The leading manufactures are men's clothing, hosiery and knit goods, cotton and woolen goods, steam fittings and heating apparatus, foundry and machine-shop products, malt liquors, lumber products, and saddlery and harness. For maintenance and operation the city spends annually about $650,000. The chief items are: schools, $200,000; fire department, $75,000; municipal lighting, $63,000; police department, $41,000; interest on debt, $33,000; streets, $30,000; and garbage removal, $23,000. The net debt in 1902 was $664,085; and the assessed valuation of property (real and personal) was $32,754,592. The population in 1820 was 2972; in 1850, 17,565; in 1880, 33,914; in 1890, 44,007; in 1900, 56,383.

Utica was settled about 1786 on the site of Fort Schuyler, which in 1758 had been erected to control the fording place of the Mohawk. Until 1798, when it was incorporated as a town under its present name, Utica was known as 'Old Fort Schuyler.' It was reincorporated in 1805, and received a city charter in 1832. Its growth was slow until after the completion of the Erie Canal in 1825. Consult: Bagg (editor), *Memorial History of Utica* (Syracuse, 1892); and Brown, Butcher, and Goodale, *Outline History of Utica and Vicinity* (Utica, 1900).

UTICA (Lat., from Gk. *Οὐτική*, *Outikē*, 'Ιτυκή, *Itykē*). An ancient city of Africa, at the northwest extremity of the Gulf of Tunis, and about 20 miles from the city of Tunis. It was one of the oldest Phœnician settlements on the African coast, though the traditional date of its foundation (about B.C. 1100) seems to rest on no good evidence. Like the other Phœnician cities, it acknowledged the supremacy of the Carthaginians, though its position was rather that of ally than subject. It was captured by Agathocles in his invasion of Africa at the beginning of the third century B.C., and played an important part in the Punic Wars. Early submission to Rome in the Third Punic War was rewarded with a large share of Carthaginian territory. In the war between Cæsar and Pompeius it became famous as a rallying point of the Pompeians after the battle of Pharsalia, being occupied by Cato, and the scene of his suicide after Cæsar's victory at Thapsus. Utica became a free city under Cæsar and it received further privileges from Augustus. It was destroyed by the Arabs toward the end of the seventh century. Its rather insignificant ruins lie west of the river known to the ancients as Bagradas. The site of the city was anciently on the shore about 27 Roman miles northwest of Carthage, but on account of changes in the coast line, caused by the river Bagradas, the spot is at present inland.

UTIEL, ōō-tē-âl′. A town of Valencia, Spain, 45 miles west of the city of Valencia (Map: Spain, E 3). The principal manufactures are wine, brandy, silk and linen fabrics, and pottery. Municipal population, in 1900, 11,560.

UTILITARIANISM (from *utilitarian*, from *utility*, from Lat. *utilitas*, usefulness, profit, from *utilis*, useful, from *uti*, to use). The name of the theory of ethics (q.v.) that adopts, as the criterion of right and wrong, of good and bad, the tendency of an action to produce the happiness of mankind. John Stuart Mill claims to have coined the word, which was suggested to him by the use of the term 'utilitarian' in Galt's *Annals of the Parish*.

The doctrine of utility is opposed to all those theories that refer us to some internal sense, feeling, or sentiment, for the test of right and wrong; a test usually described by such phrases as a moral sense, conscience, innate moral distinctions, whence utility is sometimes termed the *external* or objective standard of morality. It is also opposed to the view that founds moral distinctions on the mere arbitrary will of God. Again, it is opposed to the view that the pleasure-giving value of an act to the agent is the test of its goodness or badness (individualistic hedonism).

The utilitarian theory is distinctively a modern theory. All ancient hedonisms were individualistic; i.e. the happiness of the agent and not that of his fellow beings was regarded as the ultimate end of all rational action. This is true even of Christianity in so far as it is hedonistic, for the ultimate appeal in Christianity is to the individual's desire for everlasting happiness, although along with this appeal is another to a benevolent desire for the happiness of one's neighbors. In the Greek hedonistic systems whatever regard is paid to the well-being of others is in the last analysis based on the fact that such consideration for others brings pleasure to one's self. In modern times Hobbes is the foremost representative of this ancient or individualistic hedonism. Hutcheson (q.v.) is perhaps the first writer on ethics who advocated the principle of the 'greatest happiness of the greatest number,' in this way transcending the limitations of egoism (q.v.). There are utilitarian tendencies in Hume (q.v.) and even in Locke. Abraham Tucker (q.v.) is also to be mentioned as one of the early Utilitarians (1705-74). But Paley (q.v.) and Bentham (q.v.), especially the latter, are to be credited with giving such popular expression to this view that it became current in all centres of English thought. With Bentham the theory was used as a foundation, not merely of ethics, but also of political and legal reforms. Having in view the necessity of sacrificing smaller interests to greater, or, at all events, of not sacrificing greater interests to smaller, he described the ethical end as 'the greatest happiness of the greatest number.' He illustrated the doctrine by setting it in opposition to *asceticism*, and to sympathy and antipathy. Asceticism he interpreted to mean the principle that pleasure should be forfeited, and pain incurred, without expectation of any compensation. By the principle of sympathy and antipathy he means "the principle which approves or disapproves of certain actions, not on account of their tending to augment the happiness, nor yet on account of their tending to diminish the happiness of the party whose interest is in question, but merely because a man finds himself disposed to approve or disapprove of them: holding up that approbation or disapprobation as a sufficient reason for itself, and disclaiming the necessity of looking out for any extrinsic ground." According to the utility principle of Bentham, there are "four sanctions or sources of pain and pleasure," the physical, the political, the moral, and the religious. The physical sanction is the groundwork of all the others. "In a word, the powers of nature may operate of themselves; but neither the magistrate, nor men at large, *can* operate, nor is God in the case in question *supposed* to operate, but through the powers of nature." Bentham attempted to work out a calculus of pleasures, in which he took account of the intensity, the duration, the certainty, the propinquity or remoteness, the fecundity (= 'chance of being followed by sensations of the same kind'), the purity, and the extent of pleasures and pain.

Paley advocated a form of utility. He made the will of the Deity, enforced by future rewards and punishments, the impelling motive to duty; but in determining what that will was, in particular cases, he included a reference to the tendency of actions to benefit others.

John Austin, in his *Province of Jurisprudence Determined*, has contributed a lucid exposition and a strong defense of the principle of utility. John Stuart Mill has devoted a separate work to the subject, and may be considered as the ablest champion of the doctrine since Bentham's time. His addition to the theory consists in recognizing a distinction of quality as well as of intensity between pleasures. While Bentham had maintained that "the quality of pleasure being equal, push-pin is as good as poetry," Mill contended that "it is better to be a human being dissatisfied than a pig satisfied," i.e. human discontent is better than swinish pleasures. Since Mill's day utilitarianism has been combined with the theory of evolution to form a basis for morality. Among the English advocates of the combination the best known are Herbert Spencer (q.v.) and Sir Leslie Stephen (q.v.).

The objections urged against hedonism (q.v.) in general bear against utilitarianism. In addition there are arguments which tell against utilitarianism exclusively. Utilitarianism is not practicable for the reason that it is impossible to estimate the pleasures which in the long run will flow from any course of action. Human nature changes very radically in its capacity to get pleasures from certain objects. Time was when the cruel torturing of a captured enemy brought intense delight to a whole tribe, and was regarded with complete indifference by the rest of mankind, with the exception of the victim's fellow-tribesmen. Now such treatment of captives would shock all Christendom. Many jokes and jests that centuries ago were appreciated with great relish would fall flat now in good society, and some of them would inflict considerable discomfort upon the hearers. Gladiatorial combats and bull fights are differently regarded at different times and places. These are only a few of the large number of instances which might be adduced to show how impossible it is to foresee the hedonic effect of actions when a distant future is taken into account. The uncertainties of calculation are great enough when only the pleasure of the agent is concerned (see HEDONISM), but if the pleasures of all mankind, present and future, so far as they are in any way affected by our actions, must be estimated before we can properly pronounce upon the morality of any act, then moral judgment becomes impracticable.

Perhaps, however, the error of utilitarianism can be made most patent by asking the question, why I should seek the greatest pleasure of the greatest number. Unless I desire that end for itself or desire it because the attainment of it conduces to some other desired end, it would be impossible to make me regard that end as good or the pursuit of it as right. The savage is not cosmopolitan in his ethics (hence he is not utilitarian), because he is not cosmopolitan in his sympathies. The normal civilized man is not uniformly cosmopolitan in his ethics (hence he is not a utilitarian), because he is not uniformly cosmopolitan in his sympathies. The average good man cares more for his father and mother, for his wife and children, than he does for strangers. For this reason he does not regard the happiness of a stranger as equally obligatory upon him to pursue as the happiness of some member of his immediate family. But when this ordinary man undergoes an unusual change of heart and comes to care more, say, for the opinion some supernatural being is supposed to have of him than for his own kith and kin, then in order to win that good opinion he may sacrifice the happiness of his family to that of strangers. It is not true, therefore, that we should be benevolent because only thus can we secure the greatest happiness of the greatest number; but, on the contrary, we try to make 'the greatest happiness of the greatest number' an end because we are benevolent. But our benevolence is only a part of our endowment, varying in relative intensity in different persons, and in the same person at different times. In addition to our desire for the well-being of others we have an almost countless number of desires for other objects. The realization of these desires enters into the question of the chief end of man. There is no reason why one desire should be singled out from the complex of desires in order that its realization may be considered the highest good of man—unless this desire is the most imperious of them all and its non-satisfaction conduces more to the agent's discontent with life than any other cause. Now there is no question that without some social features the life of most human beings would be robbed of much of its attractiveness, but there is very little evidence to show that the ordinary man would be greatly disturbed for a long time by any failure on the part of humanity at large to get the greatest amount of happiness possible. And yet, though universal benevolence is not thus a very strong characteristic of our kind at large, still history seems to show that the reach of the average man's sympathetic interests is larger now than in tribal times. But, however much greater it may be now than formerly, free play given to one's impartially benevolent impulses can hardly be regarded as the highest good of man.

Consult: Hutcheson, *Inquiry Concerning the Original of Our Ideas of Virtue or Moral Good* (London, 1725); Tucker, *Light of Nature Pursued* (ib., 1768-74); Bentham, *Introduction to the Principles of Morals and Legislation* (ib., 1789); Paley, *Principles of Moral and Political Philosophy* (ib., 1785); J. S. Mill, *Utilitarianism* (ib., 1863); Sidgwick, *The Methods of Ethics* (ib., 1874); Grote, *Examination of the Utilitarian Philosophy* (ib., 1870); Birks, *Modern Utili-*

tarianism (ib., 1882); T. H. Green, *Introduction to Hume* (Oxford, 1875); id., *Prolegomena to Ethics* (ib., 1883); Watson, *Hedonistic Theories from Aristippus to Spencer* (Glasgow, 1895); Gomperz, *Kritik des Hedonismus* (Stuttgart, 1898); Stephen, *The English Utilitarians* (London, 1900); Albee, *English Utilitarianism* (ib., 1901). See also ETHICS.

UTO′PIA (Neo-Lat., from Gk. *οὐ*, *ou*, not + *τόπος*, *topos*, place). An impracticable scheme of social regeneration, an imaginary state of society, an ideal country where all things are perfect. The term as thus used goes back to the *Utopia* of Sir Thomas More (q.v.), a political romance descriptive of a happy society on an imaginary island. This work originally appeared in Latin at Louvain in 1516 under the title *De Optimo Reipublicæ Statu deque Nova Insula Utopia* and was translated into English by Bishop Burnet. The romance was a disguised exposition of a liberal and rationalistic theory of society, including certain principles that would now be called socialistic. Far from being so unique that it might have been expected to give a generic name to ideal commonwealths, the *Utopia* is only one of a long series of similar dreams. First in order of both time and importance is Plato's *Republic*, the chief thought of which is that ideal justice can be established only in a commonwealth where every individual has that place in the division of labor for which he is fitted by nature, and where all affairs are directed by the men of superior wisdom, whose government should extend even to provision for the nurture and education of children brought into the world under a system of stirpiculture. Plutarch's *Life of Lycurgus* idealizes the socialistic State of the Spartans. Bacon's *New Atlantis* (1624-29) pictures a commonwealth in which all men attain happiness through a regulation of life by science. Campenella's *City of the Sun* (1637) portrays a community where all live together in public buildings, working only four hours a day, and despising idleness. Very different in its ideal of society is James Harrington's *Oceana* (1656), a book which emphasizes the Aristotelian idea of a natural aristocracy among men, and develops fully the thought of personal liberty established under parliamentary government. It exercised a great influence upon the minds of American political thinkers during and after the Revolution. Other Utopias more or less influential have been the *Voyage en Salente* in Fénelon's *Télémaque*; Cabet's *Voyage en Icarie* (1840), a Utopia of the modern proletariat; Bulwer Lytton's *The Coming Race* (1871); Bellamy's *Looking Backward* (1889); William Morris's *News from Nowhere* (1890), in which joy in beautiful work is to be the true social bond; and Hertzka's *Freiland* (1891). Some of the more important works mentioned, excepting Plato's *Republic*, and the nineteenth-century romances, are reprinted in Morley's *Ideal Commonwealths* (1886).

UTRAQUISTS (from Lat. *utraque*, nom. pl. neu. of *uterque*, both, either). A name at first given to all those members of the Western Church, in the fifteenth century, principally followers of John Huss, who contended for the administration of the Eucharist to the laity under both kinds; but in later times restricted to one particular section of the Hussites, although all the members of that sect alike claimed this as a fundamental principle of their Church discipline. See CALIXTINES; HUSSITES.

UTRECHT, ū′trĕkt. *Dutch pron.* ṳ′trĕᴋt. A province of the Netherlands, bounded by the Zuyder Zee and the provinces of North Holland, Gelderland, and South Holland (Map: Netherlands, D 2). Area, 534 square miles. It lies mainly in the Rhine basin and has a low, level surface. Agriculture, dairying, and cattle-breeding are the principal industries. Population, in 1899, 251,034. Capital, Utrecht (q.v.).

UTRECHT. A city of the Netherlands, the capital of the province of the same name. It is situated 22 miles southeast of Amsterdam (Map: Netherlands, D 2). The Rhine separates here into the Old Rhine and the canalized Vecht, and there are also canals traversing the city. Utrecht is a strong outpost of defense for Amsterdam. The site of the former fortifications surrounding the city are (since 1830) lined by water-courses and agreeable promenades. Quaint houses and artistic street scenes are to be seen at every hand, the Gothic being freely in evidence. The famous Gothic cathedral (thirteenth century), rising in the centre of the town, is the most prominent edifice, and marks the spot where the church of Dagobert and of Saint Willebrord stood. It ranked high for architectural beauty until the nave, which has never been restored, fell in in 1674 as the result of a storm, thus separating the tower from the rest of the church. The tower, 338 feet high, was begun in 1321. It has a chime of 42 bells. The graceful Gothic cloisters which merit notice connect the cathedral with the famous university (q.v.). The 'Pope's house,' built by Pope Adrian VI., a native of Utrecht, now contains municipal offices. The splendid archiepiscopal museum is noteworthy for its rare vestments, embroideries, carvings, etc., all representative of Christian art. The Museum Kunstliefde is in the building of the Society of Arts and Sciences, and contains a few notable pictures by Scorel. The art-industrial Museum van Kunstnyverheid, the Fleshers' Hall, and the mint possess some interest. On the east extends the Malieban—a triple boulevard shaded by six rows of large old lime trees. It leads to Hoogeland Park, and to the Antiquarian Museum, which is housed in an edifice of Greek pattern. The museum contains many varieties of antiquities belonging to Roman, Germanic, and mediæval times. The interesting royal Château of Soestdyk, where the reigning family often sojourns, is a few miles to the north.

Besides the university with its numerous collateral institutions, including laboratories and a museum, Utrecht has the only veterinary school in the Netherlands, and an important meteorological observatory. The Historical Society and the Society of Arts and Sciences hold a leading rank. The large university library is in the palace erected for King Louis Napoleon. The military hospital was founded by Napoleon I. Utrecht has manufactures of cloth, woolens, silk, velvet, carpets, carriages, organs, cigars, chemicals, etc. The population in 1901 was 106,800. About one-third of the inhabitants are Catholics. In addition to the Roman Catholic archbishop, Utrecht is the seat of an old Catholic (Jansenist) archbishop.

History. Utrecht was the Roman *Trajectum ad Rhenum*. The Bishopric of Utrecht, founded at the close of the seventh century by Saint Willebrord, rose to importance under the patronage of the German emperors, and the bishops became prominent in their capacity as temporal princes among the feudal lords of the Holy Roman Empire. The city of Utrecht, having become very flourishing, succeeded in emancipating itself from the rule of the bishops. About 1527 the bishopric and city passed into the possession of the Emperor Charles V. In 1559 the see was elevated to the rank of an archbishopric. The Union of Utrecht, a compact joining together the seven provinces which were to form the Dutch Republic, was concluded in 1579. The famous Treaty of Utrecht, terminating the War of the Spanish Succession, was signed here in 1713.

UTRECHT, Peace of. The general designation for a number of treaties which were concluded between the years 1713 and 1715 and brought to an end the War of the Spanish Succession. (See Succession Wars.) On April 13, 1713, peace was signed at Utrecht between France on the one hand and England, Holland, Prussia, Savoy, and Portugal on the other. Spain concluded treaties with England, July 13, with Savoy, August 13, with Holland, June 26, 1714, and with Portugal, February 6, 1715. The treaty between France and Austria was signed at Rastadt, March 7, 1714, and this was adhered to by the Empire at Baden in September. The most important provisions of the various treaties were as follows: Philip V., of the House of Bourbon, was recognized as King of Spain and the Indies, but it was stipulated that the crowns of Spain and France should never be united in the same person. Spain ceded to the Emperor Naples, the Milanese, Sardinia, and the Netherlands; to England, Gibraltar and Minorca; to Savoy, the island of Sicily; to Prussia, Upper Guelderland. France surrendered its hold on Lorraine and gave up Kehl, Breisach, and Freiburg on the right bank of the Rhine, but retained Alsace with Strassburg. To England it ceded Acadia, Hudson's Bay, and Newfoundland, with the reservation of certain rights of fishery on the Banks. Louis XIV. recognized the title of the House of Hanover to the English throne, and agreed to expel the Pretender from France. The Electors of Cologne and Bavaria, allies of France, were restored to their possessions. The Dutch were given the right of garrisoning eight frontier towns in the Austrian Netherlands as a barrier against any future aggressions on the part of France. Their commercial interests were favored by the provision which kept the Scheldt closed to trade. The Prussian King received confirmation of his royal title and the Duke of Savoy was raised to the kingly dignity. (See Sardinia, Kingdom of.) England, in addition to its conquests from France and Spain, received from both valuable trading privileges, and in the so-called Assiento (q.v.) with the latter laid the basis of an extremely lucrative slave trade with Spanish America. The Peace of Utrecht effected the most important political rearrangement in Europe between the Peace of Westphalia and the Congress of Vienna. Though France received far more favorable terms than it might have been forced to accept, Europe was secured from its ambitions by the aggrandizement of its neighbors, Austria and Holland on the north, Prussia on the east, and Savoy on the southeast. With Utrecht the last two Powers definitely entered upon the line of development which was to result in a united Germany and a united Italy in the nineteenth century. From Utrecht dates England's marvelous commercial and colonial growth. Consult *Histoire du congres et de la paix d'Utrecht comme aussi de celle de Rastatt et de Bade* (Utrecht, 1716).

UTRECHT, University of. A national university of the Netherlands, founded in 1636 upon the basis of a 'schola illustris,' established two years earlier by the city and province of Utrecht. During the French occupation in 1672 the university was closed. It was reopened in 1674 with only 22 students, which number, however, increased to about 230 by the early part of the eighteenth century. Nearly one-third of the students came from Great Britain. The university experienced another decline of fortune in 1811-13, as a result of the Napoleonic conquest, but has flourished since its reopening as a royal university in 1815. (For its place in the national system of education, see the section on the *Netherlands* under University.) It is divided into five faculties—theology, law, medicine, mathematics and science, and letters—and had, in 1902-03, 1012 students. There are twenty-one laboratories and clinics, and an observatory, in connection with the university. The library contains about 250,000 volumes, exclusive of pamphlets and dissertations. The annual budget of the university is about 500,000 florins.

UTRERA, o͞o-trā'rȧ. A town of the Province of Seville, Spain, 17 miles southeast of the city of that name, with which it has railway connection (Map: Spain, C 4). The town is situated in a fertile plain sloping to the Guadaira River. It has manufactures of spirits, flour, and soap. Portions of its mediæval walls are still standing. Population, in 1900, 14,318.

UTSUNOMIYA, o͞ot'sụ-nô-mē'yȧ. The capital of the Prefecture of Tochigi, Japan, 66 miles north of Tokio (Map: Japan, F 5). Population, in 1899, 32,069.

UVULA. See Palate.

U'WINS, Thomas (1782-1857). An English painter in oil and water colors, born in London. He began his career as an engraver, and in 1798 he entered the schools of the Royal Academy. At first a water-colorist, after a visit to France in 1817, to paint vintage scenes, he devoted himself also to oils. He was also an illustrator, and in 1820 he went to Scotland to make drawings for Scott's works. In 1824-31 he made studies in Italy for genre folk scenes, upon which his reputation chiefly rests. Uwins was made academician in 1838, librarian of the Academy in 1844, and in 1847 keeper of the National Gallery. Among his paintings in the National Gallery are "Le Chapeau de Brigand," a "Vintage in Southern France," and "Sir Guyon Fighting for Temperance," all in oils. In the South Kensington Museum are, besides a number of oils, and the well-known water-colors "Little Housewife" (1810), "Hay Harvest," and the "Coronation of George IV." For the Queen's Pavilion in Buckingham Palace Gardens he painted a fresco of the "Lady in Comus." Consult: Nevins, *Recollections of Thomas Uwins* (London, 1858); and Uwins, *Memoir of Thomas Uwins* (ib., 1858).

UYEDA, o͞o′yạ̇-dȧ. A town in the Prefecture of Nagano, Japan, situated in the central part of Hondo, 21 miles southeast of Nagano (Map: Japan, F 5). It manufactures chiefly silks. Population, in 1898, 24,114.

UYUK, o͞o-yo͞ok′. A noted archæological site in Asia Minor. See EYUK.

UZ (Heb. *'ūṣ*). The home of the patriarch Job (Job i. 1), as yet unidentified. Job is called one of the Sons of the East (ver. 3), but this indefinite term applies to the inhabitants of the great territory lying between Syria and Mesopotamia and stretching from the Euphrates into the Arabian Desert. His friend Eliphaz (q.v.) came from Teman, doubtless in Edom, and with this agrees the Septuagint colophon to the book, that Uz lies on the border between Edom and Arabia. The neighborhood of Edom as the abode of wise men (cf. OBADIAH) makes a proper scene for the dialogue, while Uz appears in the eponymous genealogy of the Seirites, the aboriginal inhabitants of Edom (Gen. xxxvi. 20 sqq.). On the other hand Uz appears as an Aramaic people, being a son of Aram (Gen. x. 23) or a nephew of Abraham (Gen. xxii. 21). This might place Uz far in the north, and Delitzsch on Assyriological evidence would locate it near Palmyra. Josephus finds Uz in the neighborhood of Damascus (an Aramaic region), and an ancient tradition places Job's home in the Hauran. If the name be associated with the Aramaic tribes, it is to be borne in mind that those tribes were migratory, and geographical terms connected with them most variable. Also the biblical reference may be part of the ancient tradition concerning Job, which the author simply adopted without special intention. Consult the commentaries, especially Wetzstein's note to Delitzsch.

UZ, o͞ots, JOHANN PETER (1720-96). A German poet, born at Ansbach and educated at Halle, where he became the friend of Gleim and Götz. He was in his day prominent in the group of German anacreontic poets. His works include *Sieg des Liebesgottes* (1753), *Versuch über die Kunst stets fröhlich zu sein* (1760), and *Poetische Schriften* (1804). Consult: Feuerbach, *Uz, ein biographischer Versuch* (Leipzig, 1866), and Henneberger, *Briefe von Uz an einen Freund aus 1753-1782* (Leipzig, 1866).

UZ′BEKS. A people of the Oxus basin in Russian Turkestan, scattered over a wide area from the frontiers of the Chinese Empire to the Caspian. They are in part nomadic, but have settled in great numbers in the towns and villages. By language they belong to the Turkic stock, but they have a considerable strain of Iranian blood, and possess many elements of Asiatic Aryan culture. The early home of the Uzbeks appears to have been about the northern end of the Caspian Sea, whence they spread as conquerors in the sixteenth century over Balkh, Khiva, Bokhara, Ferghana, and Khokand.

UZZIAH, ŭz-zī′ȧ (Heb. *'Uzziyyāh* or *'Uzziyyāhū*, Yahweh is my strength), or AZARIAH (Heb. *'Ăzaryāh* or *'Ăzaryāhū*, Yahweh has helped). A king of Judah, son of Amaziah (II. Kings xv. 1-7; II. Chron. xxvi.). The relation of the two names is uncertain. They may be practically synonyms, double names occurring in the Davidic line, or possibly one is a textual corruption of the other. Uzziah is assigned a reign of 52 years, the end of which is variously dated within B.C. 740-737. The Book of Kings simply recounts his piety, and that he was smitten with leprosy in the latter part of his reign, his son Jotham becoming regent. The Chronicler represents Uzziah as a successful warrior, subduing the Philistines, and driving back the Arabians and Ammonites, and so extending his boundaries southward. He added to the fortifications of Jerusalem, fortified the Southland, and zealously developed the royal domains. The stroke of leprosy, however, was due to the pride created by his success; he arrogated the right to offer incense in the Temple, and, when he persisted against the high priest, was stricken with the plague. Uzziah was the contemporary of the northern Jeroboam II. (q.v.); in their reigns the Israelitish kingdoms enjoyed political freedom, and, from the notices of the prophets, seem to have gained power and wealth. Isaiah records that his prophetic vision came in the year Uzziah died. Consult the histories of Israel; also, G. A. Smith, *Isaiah* (New York, 1899).

V

V The twenty-second letter and seventeenth consonant of the English alphabet. Its form corresponds to the Roman V, which answers to the Greek upsilon (Υ, υ), and that in turn was a variation of the Phœnician (*vau*). In Latin *v* and *u* were used indifferently to represent either the consonantal or the vocalic sound. This confused usage extended into Middle English and the letters were not differentiated until the seventeenth century.

Sound and Philological Value. As a phonetic character *v* in modern English is a voiced labiodental spirant. The sound is produced by the audible friction of the breath passing between the edges of the upper teeth and the lips over which they close. The philological sources of the letters are various. When not initial, English *v* may represent (1) Indo-Germanic *bh*, as in English *love*, German *liebe*, Sanskrit *lubh*, 'to desire;' (2) Indo-Germanic *p*, as in English *over*, German *über*, Sanskrit *upari*. In a few words initial *v* in English represents Indo-Germanic *p* = Anglo-Saxon *f*, as in *vat*, Anglo-Saxon *fæt; vane*, Anglo-Saxon *fana; vixen*, Anglo-Saxon *fixen*. In these cases *v* is due to the influence of the Southern English dialect which gave a voiced sound regularly to the older English *f*. As a rule, initial *v* in English is a sign of a loan-word from Latin or French, as in *villa*, *voice*, *vacation*.

As a Symbol and Abbreviation. V in chemistry = *vanadium*. In Roman numerals V = 5; $\overline{\mathrm{V}}$ = 5,000.

VAAL, väl (Dutch, yellow, a partial translation of the native name *Kai Gariep*, 'Yellow River'). The chief tributary of the Orange River in South Africa, regarded by some as the true upper course of the main stream. It rises on the west slope of the Drakensberg, flows west and southwestward on the boundary between the Transvaal and Orange River colonies, and joins the Orange in Cape Colony after a course of between 500 and 600 miles (Map: Cape Colony, K 4).

VAAL RIVER COLONY. The official designation of the Transvaal Colony.

VĀC, väk (Skt., word, voice). In Hindu mythology, the personification of speech, later identified with Sarasvati (q.v.). She is celebrated in one late hymn of the Rig-Veda, which describes her services to gods and mortals on whom she confers life, wealth, and power. A later meteorological interpretation regards her as 'the voice of the mid-air' or the thunder. Still later she is wooed by the celestial singers, the Gandharvas. Certain attempts have been made to compare Vac as 'the divine word' with the Logos or Word of the fourth Gospel (see Logos), but no mutual influence in the two concepts, although indeed similar in certain respects, has yet been shown to exist, and any parallelism between them is apparently due merely to accidental coincidence. Consult: Hopkins, *Religions of India* (Boston, 1895); id., *India Old and New* (New York, 1901); Macdonell, *Vedic Mythology* (Strassburg, 1897); Müller, *Six Systems of Indian Philosophy* (New York, 1899).

VACA, vä'kȧ, Alvar Nuñez, Cabeça de. See Nuñez Cabeça de Vaca.

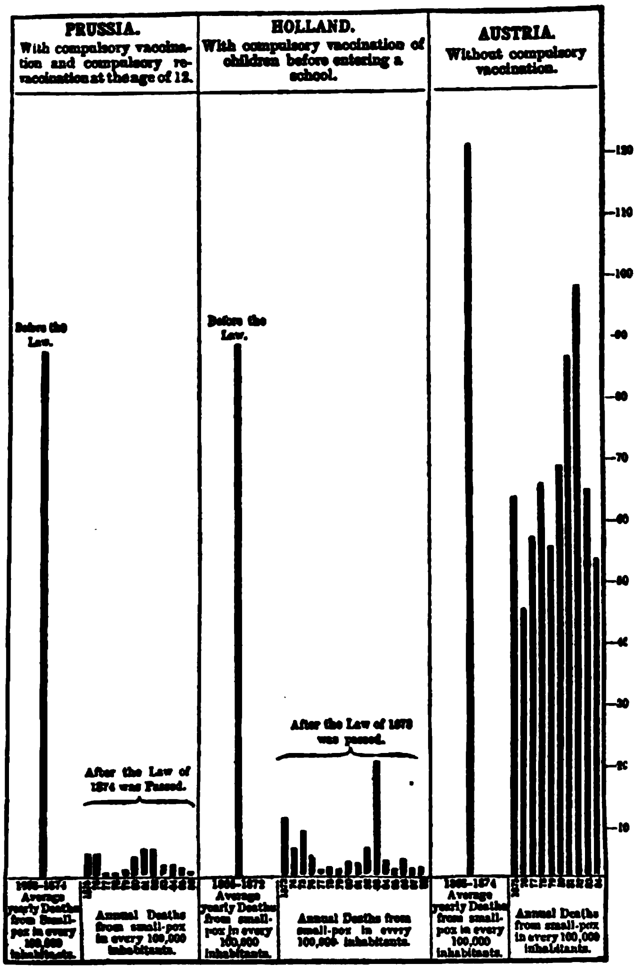
VACANT LOT FARMING. A plan for relieving destitution by permitting those in need to cultivate, under supervision, vacant lots in the city or its suburbs. The scheme originated in 1894 with Hazen S. Pingree, Mayor of Detroit, as a mode of relieving distress during the hard times then prevailing. Several thousand acres of land were offered to the committee appointed by Mayor Pingree, but only 430 acres were accepted. This was prepared for cultivation, and apportioned in small lots among 945 families. Seeds and tools were furnished by the committee, whose superintendent had control of the practical execution of the work. Produce estimated at a value of $12,000 was raised the first year, at an expense to the committee of less than $4000. The pronounced philanthropic as well as financial success of the plan caused its trial in a number of cities during the next year. In New York the work came under control of the Association for Improving the Condition of the Poor. Vacant lots on Manhattan Island being too scattered, offers of land in Long Island City were accepted, and 109½ acres were cultivated. Eighty-four persons held plots averaging seven-tenths of an acre in area. As in Detroit, the chief crop was potatoes. The expenses of the managing committee were $3800 and the total value of crops raised $8800. A feature of the work was a self-supporting coöperative farm of 38 acres. In 1895 vacant lot farms were cultivated in many cities, including New York, Detroit, Boston, Denver, Minneapolis, Omaha, Seattle, and Toledo. It was taken up during the next two years by other cities, including Chicago, Kansas City, and Philadelphia. In the majority of cases the management has been in the hands of private charitable societies, as in New York and Boston. In Denver an independent committee was established; in Philadelphia, the Vacant Lots Cultivation Association has been specially chartered. Finally, the administration has in some instances been in the hands of the municipal authorities, as in Buffalo and in Detroit.

The most important single influence on the success of vacant lot farming is the personality of the superintendent, who must not only be a practical farmer, but must have executive ability, tact in handling people, and commercial knowledge enough to dispose of the crops profitably. The cultivators and their families usually consume a portion of their produce, but the larger part is generally sold in the local market. In most cases land has been lent for the purposes of cultivation, but sometimes, as in Boston, it has been rented. After the initial outlays for preparing the land, supplying seed, tools, etc., have been made, the running expenses do not include much beyond the superintendent's salary. The scheme involves less danger of pauperizing the recipients than do ordinary methods of poor relief, while the work offered is educative in itself. Objection has been raised that it competes unfairly with self-dependent farmers, but while this charge has some weight against vacant lot farming as a permanent establishment, it hardly makes against it as a relief measure in times of economic distress. As a matter of fact financial results have generally been satisfactory. With the return of industrial prosperity, attention to vacant lot farming diminished. Philadelphia is among the few cities in which it has continued to increase. The association cultivated nearly 200 acres in 1902, as against 130 in 1900, and 27 in 1897. The number of persons affected has grown during the same period from 578 to 3775; the value of the total produce in 1902 was $50,000, the total outlay $5557, while the cost per plot sank from $18.25 in 1897 to $7.00 in 1902. The purely educative side of vacant lot farming has recently been developed in the children's 'home gardens,' or city 'farm schools,' which have been started in New York and elsewhere. Consult: New York Association for Improving the Condition of the Poor, *Notes*, vol. i., Nos. 1 and 2 (1895-96); Speirs, Lindsay, and Kirkbride, "Vacant Lot Cultivation," in *Charities Review*, vol. viii., p. 74 (containing bibliography). The Philadelphia and other societies publish reports.

VACATION SCHOOL. A term used, quite arbitrarily, to indicate a school kept in many American cities during the customary summer vacation for the children of the public schools. The term has no reference to the more advanced schools connected with universities and colleges or with popular educational institutions such as the Chautauqua (q.v.), though the motive for the establishment of these more advanced schools may be much the same. The use of the term as well as the institution itself is confined almost wholly to the United States, nor does it have any reference to the ordinary school term as extending through the summer months, as it does in the rural regions of many States. The vacation school is of very recent establishment, save in a few isolated instances, and owes its origin to the work of philanthropic societies in caring for the children of the poor of the larger cities during the extreme heat of the summer. While there are sporadic instances of such schools kept by these societies as early as 1866, when the Old First Church of Boston conducted one, and there are even some instances of school boards providing for such work, as in Newark, N. J., in the same year, the movement has become of importance only since 1898, when the Board of Education of the City of New York took over the schools primarily founded by The Society for the Improvement of the Condition of the Poor. During the summer of 1903 that city provided for 58 such schools, employing 1500 teachers, at a total expense of more than $100,000. At the present time all the large cities of the country and many of the small ones, to the extent of some 200 in all, support such schools. The work of the vacation school is of a much more practical nature than that of the ordinary session and is devoted more to constructive work by the child. Consequently manual training, housekeeping, sewing, together with nature work, local history, and geography, combined with excursions, form a prominent part of the curriculum.

VACCINATION (from *vaccine*, from Lat. *vaccinus*, relating to a cow, from *vacca*, cow; connected with Skt. *vaśā*, cow, from *vāś*, to bellow, or perhaps with *ukṣan*, bull). Inoculation with *vaccina* or cow-pox, to protect the individual against smallpox.

HISTORY. Many years before the time of Jenner it was observed in widely separated localities that accidental infection with cow-pox conferred immunity against smallpox. Immermann quotes Von Humboldt as referring in his travels in the tropics (1803) to the fact that native shepherds in the Mexican Cordilleras believed in the protection afforded by vaccinia against smallpox, and quotes Brun as making a similar statement in reference to the clan of Elihots in Baluchistan. Peasants in different parts of Europe, especially in the southern part of England, in Holstein, Mecklenburg, Hanover, and Saxony were firmly convinced of the fact. In 1763 Dr. Heim, of Saxe-Meiningen, learned through his father, a clergyman, that milkmaids of that country neighborhood asserted their belief in the protective influence of accidental vaccinia against variola. The English physicians Sutton and Fewster, having heard of similar beliefs, inoculated with human smallpox, in 1778, several persons who had been infected with vaccinia, without result. Medical men paid but little heed to their reports, and apparently further experiments were not made by them. A Gloucestershire farmer, Benjamin Jesty, was probably the first European to vaccinate as a preventive. He inoculated successfully his wife and two sons with bovine virus in 1774, having himself secured immunity from variola through accidental vaccinia. It is further reported that Platt, a school teacher near Kiel, vaccinated two children with bovine virus to protect them from an epidemic of smallpox in 1791. But great and lasting credit is no less due to Edward Jenner (q.v.), who in 1768 began a thorough scientific investigation of the matter, and placed the performance of vaccination in its proper place among prophylactic procedures. His experiments were very numerous and accurate. The first mention of individuals occurs in the history of the inoculation on May 14, 1796, of the eight-year-old James Phipps with vaccine virus from a vesicle on the person of a milkmaid, Sarah Nelwes, who had accidentally acquired cowpox. This was probably the first vaccination of a patient with humanized virus of the first generation. Phipps developed a typical case of cowpox, and subsequent attempted inoculation with smallpox virus proved negative. Jenner followed this experiment with an inoculation with bovine virus, and then inoculating from individual to individual for five generations, securing perfect immunity from smallpox in all cases. When both facts were established he put forth his remarkable publication, *An Inquiry into the Causes and Effects of the Variolæ Vacciniæ, Known by the Name of the Cowpox* (1798). This work was translated into Latin and all the European languages and excited much attention, as well as opposition. Vaccinations were frequent and numerous, and many representative and noted physicians declared themselves as advocates of the theory and practice, in England, France, Austria, Italy, Germany, Switzerland, Holland, Norway, Sweden, Russia, Spain, and Portugal. Dr. Pearson, of London, was at the head of a vaccination institute founded in 1799 by the advocates of Jenner's theory. Jenner founded, in 1803, the Royal Institute for the Extermination of Smallpox, which he directed for many years. Both institutions vaccinated people free of charge and supplied virus for other countries. To Luigi Sacco, a physician of Milan, is due credit second only to Jenner's, for a life-long service in behalf of preventive vaccination, equine and ovine inoculation, and retro-inoculation. To Sacco the world owes the final adoption of animal (bovine) virus in place of humanized virus.



STATISTICS OF THE UTILITY OF VACCINATION. During the pandemic of smallpox which raged through Europe from 1870 to 1873 an excellent opportunity was afforded for a test of the utility of vaccination. The greater part of the German army had been vaccinated in childhood, and all upon entering service in the Franco-Prussian War. In the French army regular vaccination had not been practiced, and revaccination was neglected. The mortality in the German army was 450, or 58 men to every 100,000; in the French army the mortality was 23,400. At the same time, in Chemnitz, Saxony, 83.9 per cent. of the inhabitants were vaccinated, 8.9 per cent. were unvaccinated, and 7.3 per cent. had previously had smallpox. Altogether, 5.6 per cent. were attacked by the disease during the epidemic, or one case among every 56.7 of the vaccinated to one among every 2.2 of the unvaccinated. That is, the morbidity for the unvaccinated was 26 times greater than that for the vaccinated (Flinzer). To turn to earlier days, between 1796 and 1802 there died on an average annually of smallpox in Bohemia 7663 people out of a total of about 3,000,000. During a period of twenty-four years after the introduction of compulsory vaccination, there died annually of the smallpox 287 people out of a total population of about 4,250,000. In Berlin there died of variola from 261 to 407 persons annually between 1758 and 1809. After this date, when vaccination became compulsory, there died from this same disease from 2 to 40 persons annually between 1810 and 1869. Neglect of revaccination, the importance of which was not then recognized, raised the mortality from variola in Berlin, during 1870 to 1874, to a yearly average of 160.

During a smallpox epidemic in London in 1863, Buchanan and Seaton made an examination of 50,000 children who were exposed to the contagion. Some of the children had never been vaccinated; the large majority had been vaccinated in various manners and degrees. Of every 1000 children without any mark of vaccination, no fewer than 360 had scars of smallpox; while of every 1000 children who had evidence of vaccination, only 1.78 on an average had any such traces: and with regard to the quality and amount of the vaccination, it was found that, of children having four or more cicatrices, only 0.62 per 1000 had any trace of smallpox; while of those who had a single bad mark, 19 per 1000 were scarred by smallpox. Marson, of London, learned from the study of more than 15,000 cases at the smallpox hospital, that while the unvaccinated died at the rate of 37 per cent., the vaccinated have died at the rate of only 6½ per cent., the mortality among those with four or more scars being only 0.55, while that among those with only a single scar was 7.73 per cent.; so that, while the average risk which vaccinated persons run if they do catch smallpox is about 1-6 of the risk run by unvaccinated persons, well-vaccinated persons run less than 1-70 part of the risk.

Dr. S. W. Abbott, of the Massachusetts Board of Health, states that in 1721 nearly 8 per cent. of the population of Boston died of smallpox. From 1800 to 1840 vaccination limited the disease so far that not over 20 deaths resulted from smallpox in that time. Relaxation of the vaccination law in 1836 led to a larger death rate in 1839 to 1841, when 232 died from the disease in Boston. There were no deaths from variola in that city in 1886 or 1895. The control or eradication of the disease, as the statistics show, bears an exact proportion to the thoroughness of vaccination and revaccination. The preceding table, taken from *The Melbourne Argus*, shows very effectively the conditions in Prussia, Holland, and Austria.

Technique and Course of Vaccination. Virus for vaccination should be procured from well-developed typical vaccine pocks on the abdomen of a healthy young heifer, while they are still in the vesicular stage. The virus may be received upon ivory points or split quills. Another method consists in removing the whole vesicle entire by scraping it from the underlying corium with a spoon, and rubbing this mass with glycerin. The resulting emulsion of pulp is much more active than the dried lymph upon quills. In making use of it, after the person to be vaccinated has taken a bath, the arm or leg chosen for the place of inoculation is washed with carbolic or salicylated cotton, and then with sterile water. Two or three shallow scarifications are made with as many crossing them, the surgeon cutting as deeply as the derma without necessarily drawing blood. After the lymphatic fluid begins to flow from these incisions the vaccine virus is worked into the incisions with the point of the knife or with a very small sterile wooden spatula. After drying thoroughly, the surface is covered with a layer of borated or salicylated cotton, which is to remain on for three days. In the course of 3 to 7 days elevated papules appear, oval or oblong, over the scarifications. These papules are firm, hot, and tender. They are surrounded by a red halo or areola. About the fifth day after their appearance they become vesicles, containing clear fluid, which is vaccine lymph. When humanized virus was used, this was taken from the patient to be used in inoculating another case. These vesicles are called Jenner's vesicles, and somewhat resemble the vesicles of smallpox. Like them, also, they shrink and become umbilicated after the seventh or ninth day; the halo grows darker; pus takes the place of the lymph; pain, itching, swelling, and heat are troublesome. A general fever may be experienced on the fifth day with rapid pulse, rarely slight nausea, and very rarely general malaise. About the ninth or tenth day the pustule dries, and a crust forms. The areola fades. The axillary glands enlarge early at this time and are tender and painful on pressure. Children's symptoms are more pronounced than those of adults. They are fretful, their sleep is broken and their appetite diminished. They have fever, headache, pains in the back, and rarely nausea. The temperature during vaccinia reaches 102.5° F., and rarely runs higher. The crust separates from the arm in 14 days. If the crust be detached by scratching or the chafing of the clothing a second one forms. In all cases scrupulous care must be exercised lest the wound become infected with germs in dust or clothing, or under finger-nails. Serious consequences follow such infection. The wound may be infected with erysipelas, or gangrenous inflammation may set in, causing a very large ulcer. These are not the results of the vaccination, but of subsequent infection; and the same results are often seen following any scratch with a needle or an abrasion upon the hand.

Danger of Vaccination. There is no danger in proper vaccination, if infection is avoided thereafter. All inflammatory reaction beyond that described as occurring in the course of regular vaccinia is due to the introduction of microorganisms by means of dirty instruments or through the admission of dust. There is absolutely no danger of transmitting disease by means of bovine virus. When humanized virus was used there was some danger of transinoculating with syphilis or tuberculosis. Yet this danger was remote, for Councilman is authority for the statement that in the whole history of smallpox there have been collected records of only 50 cases of the conveyance of syphilis through vaccination, with about 700 cases of retransference of the disease. When these figures are compared with the millions of vaccinations performed, the danger may be correctly computed.

Compulsory Laws. Naturally, vaccination, in order to protect, must be universal. All foci from which the disease might spread must be destroyed, and immunity must be secured round about each focus. Every child should be vaccinated during its first year, and all adults should be vaccinated on entering the country, unless presenting sufficient evidence of successful protection previously. Several years after Jenner's discovery, public interest was aroused to a complete understanding of the necessity of compulsory vaccination. . Bavaria established a law making vaccination compulsory in 1807. Other States of the North German Confederation followed, and between 1815 and 1832 similar statutes were enacted in Oldenburg, Baden, Württemberg, Saxe-Gotha, Saxe-Meiningen, and Brunswick. Austria in 1801 made vaccination compulsory for school children, but not generally so till 1886. In 1816 Prussia also enacted an indirectly compulsory law. Sweden's compulsory law was put upon the statute books about 1803. Norway and Denmark followed in 1810. After many vicissitudes and changes, Great Britain's law was enacted in 1867. Scotland put herself on record in 1864. Italy, Holland, and Belgium popularized vaccination very early and needed no law. France's decree of 1809 was inoperative and the country has suffered heavily from the want of a compulsory law. The German Empire framed the Imperial Vaccination Law in 1874, and its provisions deserve study and imitation. It provides: (1) Every child shall be vaccinated within the calendar year of its birth, unless it has passed through an attack of variola. (2) Every pupil shall be revaccinated when 12 years of age, if he has not had variola within the past five years. (3) Every vaccinated person must present himself to the physician who vaccinated him between the sixth and eighth day after vaccination. (4) Medical certificates proving successful vaccination at the legal ages shall be preserved by parents and guardians.

Massachusetts enacted laws to regulate vaccination in 1809. Several States followed the example early, notably Rhode Island. In most of the States local or State boards of health formulate regulations under which vaccination is practically compulsory, acting in unison with school boards in excluding all unvaccinated children from the schools. In several of the United States the constitutionality of statutes making vaccination compulsory has been judicially settled. They are held to be a legitimate exercise of the police power for the protection of the public health. A physician who vaccinates a person without the latter's consent, but who is acting under the authority of such a statute or ordinance, is not liable for assault.

In spite of the testimony received from all over the civilized world, anti-vaccinationists flourish in small bodies here and there, consisting of uninformed and prejudiced people. The anti-vaccination sentiment had become so strong in England, although confined to a small class, that a measure was adopted in 1898 practically annulling the compulsory vaccination bill of that country. The newer measure provides that any parent may refuse to have his child vaccinated and avoid legal penalty if he satisfies the court that he has conscientious scruples as to the benefits of vaccination. The reaction will come, following some future epidemic of smallpox in great Britain in which there is great mortality. The agitation against vaccination has been constant since the days of Jenner. In his time it was claimed that the tendency of the inoculation of vaccinia was to cause bovine characteristics to appear in children; that they developed horns, hoofs, and tails, and bellowed like cattle. Less absurd but equally untenable arguments are presented against vaccination to-day.

REVACCINATION. Jenner believed that the effect of vaccination was perennial: and this belief imperiled the progress of vaccination at one epoch in its history, for vaccinated persons, after several years of immunity, fell victims to smallpox. At one time the mystical number seven seemed to rule the mind, and vaccinia was said to last seven years. In fact, the duration of immunity conferred by vaccination is variable in different people. In a few cases, one vaccination protects for life, and cannot be successfully repeated. In others, a vaccination will 'take' every time it is tried. For safety's sake, a person should be vaccinated every three years, and also whenever threatened by the presence of an epidemic, or when about to travel in a country where smallpox exists or where careful vaccination is not practiced. It is desirable that a careful use be made of a good glycerinated lymph. If this fails, a second trial should be made with vaccine procured from a different source. If this also fails, the person may be considered immune to smallpox for a year.

SUBSTITUTES FOR VACCINATION. It has been claimed from time to time by enthusiasts in sanitation that cleanliness and disinfection will control and prevent smallpox. This is an error, as was abundantly proved in a New Jersey town in 1902-03. Until the microörganism causative in smallpox is discovered and its nature is known, no adequate prophylactic or disinfectant measures will supersede vaccination. Were primary vaccination and revaccination carefully practiced, smallpox would be entirely eradicated. See SMALLPOX.

Consult: Willian, *Vaccine-Inoculation* (London, 1807); Sacco, *Trattato di vaccinazione* (Milan, 1809); Baron, *The Life of Jenner* (London, 1827); *Blue-Book on Vaccination* (ib., 1857); Borne, *Vaccination et revaccinations obligatoires en application de la loi sur la protection de la santé publique* (Paris, 1902); Crandall, "A Century of Vaccination," in *American Medicine* (Philadelphia, Dec. 7, 1901); Immermann, "Vaccination," in *Nothnagel's Encyclopædia of Practical Medicine* (Eng. trans., Philadelphia and London, 1902).

VACH, väch. See VĀC.

VACHEROT, vȧsh'rō', ETIENNE (1809-97). A French philosopher, born at Langres and educated in Paris, where, after having for several years taught at Châlons-sur-Marne, he was appointed, in 1837, superintendent and maître des conférence at the normal school by Victor Cousin, his former teacher, whom he succeeded as professor of philosophy at the Sorbonne in 1839. Through his liberal views and especially by the exposition of his philosophical doctrines in the *Histoire critique de l'école d'Alexandrie* (1846-51), he aroused the most violent opposition of the clergy, and in consequence was suspended from his position of superintendent and, after denying allegiance to the Empire in 1852, was deprived of his professorate. Judiciary proceedings and imprisonment resulted from the publication of *La démocratie* (1859). As mayor of the fifth arrondissement of Paris he rendered important services during the siege and the Commune and in 1871 was elected to the National Assembly, where he at first sided with the Liberals, but afterwards joined the Centre and even lent his support to the Broglie Ministry in its ultramontane aspirations. Although withdrawing from political life after the dissolution of the National Assembly, he continued to voice his opinions in his contributions to the *Revue des Deux Mondes*, the severe anti-republican tenor of which created a sensation. Likewise he accentuated his monarchical tendencies in the columns of the *Figaro* and the *Soleil*. Besides his principal work, *La métaphysique et la science*

(2d ed. 1863), containing the development of his philosophical system, he wrote *Essais de philosophie critique* (1864), *La religion* (1868), *La science et la conscience* (1870), *La politique extérieure de la république* (1881), *Le nouveau spiritualisme* (1884), *La démocratie libérale* (1892), and others. For his biography consult Ollé-Laprune (Paris, 1898).

VACUUM. See Air Pump.

VA'DIA'NUS, Joachim (1484-1551). A Swiss reformer and humanist, whose real name was Von Watt. He was born in Saint-Gall, was educated there and in Vienna, and became instructor in classics at the University of Vienna. He returned to Saint-Gall in 1518 to practice medicine. But his great work there was as a reformer and a friend of Zwingli, and it was largely due to his influence that Saint-Gall in 1525-27 went over entirely to the Protestant Church. He took a prominent part in the religious colloquies of Zurich (1523), and of Bern (1528), and corresponded with Luther and Erasmus. He wrote a *Chronicle* of the Abbey of Saint-Gall, edited by Götzinger with Vadianus's other German works (1875-77), and a *Commentarius in Pomponium Melan* (1518). Consult: Geilsius, *J. v. Watt als geographischer Schriftsteller* (Winterthur, 1865); Preffel, *J. Vadian* (Elberfeld, 1861); and Götzinger, *J. v. Watt* (Halle, 1895).

VADIMO'NIAN LAKE (Lat. *Vadimonius Lacus*). A small circular lake in Etruria, now Lago di Bassano. It is famed as the scene of two Roman victories over the Etruscans: the first in B.C. 309 under the dictator Papirius Cursor, the second in B.C. 283 under the consul Dolabella.

VADUZ, vä'dụts. The capital of the Principality of Liechtensten (Map: Austria, A 3). It is charmingly situated near the right side of the Rhine, at an elevation of 1525 feet, and is on the Feldkirch-Buchs branch of the Austrian State Railway. It is near the Three Sisters (6880 feet). The town has a new Gothic parish church and a castle, which, destroyed by the Swiss in 1499, was rebuilt in 1523-26. The tower of the castle dates from the ninth century. Population, in 1900, 1150.

VAENIUS, *Ger. pron.* vā'nē-ụs; *Lat. pron.* vē'nĭ-ŭs, Otto. See Veen, Octavio van.

VAGA, vä'gȧ, Perino del (1500-47). An Italian decorative painter, born in Florence. His real name was Buanaccorsi. He studied first at Florence under Vaga, and after his removal to Rome he became an assistant of Raphael. As such he assisted in the stucco and arabesque decorations of the Loggia of the Vatican, and executed some of the Scriptural subjects there, which go by the name of 'Raphael's Bible,' and the figures of the planets in the great hall of the Appartamento Borgia, in the Vatican. After the sack of Rome in 1527 he went to Genoa, where he decorated the Doria Palace with stuccoes and frescoes in a style similar to that adopted by Giulio Romano at Mantua, with subjects from classical fables. Later Perino returned to Rome, where he designed a number of façades, hall and church frescoes, and with Daniele da Volterra decorated the Sala Reggia in the Vatican.

VAGANTES, vȧ-găn'tēz (Lat., wanderers). The name given to the itinerant students and clerics of the twelfth and thirteenth centuries, indistinguishable often from the wandering minstrels and clowns who form so picturesque a feature of mediæval life. They are known for the body of satirical literature in Latin which they created, commonly designated as Goliardic literature (q.v.).

VAGARSHAPAT, vȧ-gär'shȧ-pȧt. A village of Russia. See under Etchmiadzin.

VAGINA (Lat., sheath). One of the sexual organs in the female. It is a sheath from four to seven inches long, into which open the uterus and the urethra. It lies behind the bladder and in front of the rectum, and it is lined with mucous membrane. Its external opening is called the vulva, which is formed by the apposition of the two *labia majora.*

VAGRANT. In law, a term of broad application including, in general, all 'idle and disorderly' persons who may become a menace to the public peace or a public burden. The statutes in Great Britain and the United States differ in details, but are elastic enough to cover such diverse classes as unlicensed peddlers, beggars, drunkards, fortune-tellers, prostitutes, notorious criminals, etc., as well as the specific tramp (q.v.).

VAHLEN, vä'len, Johannes (1830—). A German philologist, born in Bonn, where he studied at the university, and became privat-docent in 1854. In 1856 he was made professor in Breslau, in 1858 at Vienna, and in 1874 in Berlin. Among his writings are to be noted especially: *Ennianæ Poesis Reliquiæ* (1854); *Nævii de Bello Punico Reliquiæ* (1854); *Ueber die Annalen Menæchmi* of Plautus (1882); *Ueber die Annalen des Ennius* (1886); *Ulpiani Liber Regularum* (1856); and *Cicero de Legibus* (2d ed. 1883); a critical edition of Aristotle's *Poetics* (3d ed. 1885); *Lorenzo Valla* (2d ed. 1870); *Laurentii Vallæ Opuscula* (1869); and many articles in periodicals. For several years he was co-editor of the periodical *Hermes,* and also of the *Zeitschrift für österreichische Gymnasien.*

VAIGATCH, vī-găch'. An island in the Arctic Ocean belonging to the Russian Government of Archangel, between the mainland and Nova Zembla (Map: Russia, J 1). It is separated from the latter by the Kara Strait, and from the mainland by the Yugor Strait, while its eastern coast is washed by the Kara Sea. It is about 70 miles long and 25 miles wide, with an area of 1400 square miles, and is traversed lengthwise by a range of mountains belonging to the Ural system. The climate is cold and the vegetation very scanty. The island is permanently inhabited by a few Samoyeds, but in summer it is visited by a number of Russians for its fisheries and the fur-bearing animals.

VAIHINGER, vī'hĭng-ẽr, Hans (1852—). A German philosophical critic, born in Nehren, and educated at Tübingen, Leipzig, and Berlin. He became docent at Strassburg in 1877, and professor in 1883, and in 1884 went to Halle as professor of philosophy and pedagogy. He is known as a critic of Kant. He edited *Kantstudien* (1896 et seq.), and wrote a *Kommentar zu Kants Kritik der reinen Vernunft* (1881-82); *Kant—ein Metaphysiker?* (1889); and *Die transcendentale Deduktion der Kategorien* (1902). His other works include: *Goethe als Ideal universeller Bildung* (1875); *Hartmann, Dühring und Lange* (1876); and the valuable critique *Nietzsche als Philosoph* (2d ed. 1902).

VAIL, vāl, ALFRED (1807-59). An American inventor, born near Morristown, N. J. He graduated at the University of the City of New York in 1836. In September, 1837, he entered into partnership with Prof. S. F. B. Morse, agreeing to supply the funds necessary to bring Morse's newly invented telegraph before the public, and to construct a practicable model at his father's iron works at Speedwell, near Morristown, N. J. In January, 1838, the model was completed, and on the 23d was first publicly exhibited at the University of New York. When in 1843 work was begun on an experimental line between Washington and Baltimore, Vail became assistant superintendent. He suggested so many improvements to Morse's original machine, as did also Joseph Henry (q.v.), that the instrument used to-day is the product of the latter two men rather than of its original inventor. Consult Pope, "The American Inventors of the Telegraph," in *The Century*, vol. xxxv. (New York, 1888).

VAILIMA (vī-lē'mȧ) **LETTERS.** A series of letters written from Samoa by Robert Louis Stevenson between November, 1890, and October, 1894. They are addressed to Sidney Colvin and contain a varied record of his Samoan exile. The title is derived from the name given by Stevenson to his island home.

VAILLANT, vȧ'yäN', MARIE EDOUARD (1840—). A French socialist, born at Vierzon (Cher), and educated in Paris, where he studied engineering and then medicine, and in Heidelberg, Tübingen, and Vienna. After his return to Paris in 1870 he took a prominent part in the Government of the Commune and served for a time as Minister of Education. He escaped to London on the downfall of the Commune, became a member of the general committee of the Internationale (q.v.), took part in the Hague conference in 1872, and in the same year was sentenced to death *in contumaciam* by the Conseil de Guerre. After the amnesty of 1880 he returned to Paris, and in 1884 was elected to the municipal council, where he advocated the suppression of standing armies, national control of public services, and various socialistic measures. He opposed Boulangism very strongly, at the same time attacking the opportunism of the radical Republicans. In 1893 he secured a seat in the House of Deputies, and he was reëlected in 1898.

VAIR. One of the tinctures in heraldry (q.v.).

VAIŚĒSHIKA, vī-shä'shē-kä. The name of one of the two great divisions of the *Nyāya* (q.v.) school of Hindu philosophy, and probably a later development of the Nyaya itself, properly so called. It agrees with the latter in its analytical method of treating the subjects of human research, but differs from it in the arrangement of topics and more especially in its doctrine of atomic individualities or *viśēṣas*—whence its name is derived.

The topics or categories (*padārthas*) under which Kanada (q.v.), the founder of this system, arranges his subject-matter, are the following six: (1) substance, (2) quality, (3) action, (4) generality, (5) atomic individuality, and (6) co-inherence; and later writers of his school add to these a seventh category, non-existence. These may be explained more precisely. (1) Substance is the intimate cause of an aggregate effect; it is that in which qualities abide, and in which action takes place. It is ninefold, earth, water, light, air, ether, time, space, soul, and *manas*, or the organ of affection. (2) Quality is united with substance; it comprises, according to the commentator, the following twenty-four elements: color, savor, odor, feeling, number, dimension, individuality, conjunction, disconjunction, priority, posteriority, gravity, fluidity, viscidity, sound, understanding, pleasure, pain, desire, aversion, volition or effort, merit, demerit, and self-restitution. Seven of these are later additions to Kanada's list. That qualities belong to the soul is maintained by the Vaiśeshikas in opposition to the Vedantists and Sankhyas. (3) Action consists in motion, and abides in substance alone. (4) Generality abides in substance, quality, and action. It is of two kinds, higher and lower, or genus and species. (5) Atomic individuality resides in eternal substances, by which are meant *manas*, soul, time, space, ether, earth, water, light, and air; it is the ultimate difference, technically called *viśēsa;* such differences are endless; and two atoms of the same substance, though homogeneous with each other, differ merely in so far as they exclude each other. (6) Co-inherence, or perpetual intimate connection, resides in things which cannot exist independently from one another, such as the parts and the whole, quality and the thing qualified, action and agent, species and individual, atomic individuality and eternal substance. (7) Non-existence, the last category, added to the foregoing by the modern Vaiśeshikas, is defined by them as being either non-existence, which is without beginning, but has an end; or non-existence, which has a beginning, but no end; or absolute non-existence, which, extending through all time, has neither beginning nor end; or mutual non-existence, which is the reciprocal negation of identity. The nature of each of these substances, qualities, and actions, is then the subject of special investigation. It is worthy of especial notice that, according to the Vaiśeshika system, understanding is the quality of soul, and the instruments of right notion are treated under the head of 'understanding' (*buddhi*). Kanada admits of only two such instruments, or *pramāṇas*, perception and inference. Comparison, revelation, and the other instruments of right notion, mentioned in other systems, the commentators endeavor to show are included in these two. Fallacies and other modes of inconclusive reasoning are further dealt with in connection with 'inference,' though with less detail than in the Nyaya, where these topics are favorite topics for discussion.

In point of time the Vaiśeshika system antedates that of the Vedanta (q.v.) and may be referred to some time not long before the Christian Era. The work of its reputed founder, Kanada, has been commented upon by a triple set of commentaries, and popularized in several elementary treatises. The text with the commentary of *Sankara Miśra* was edited at Calcutta in 1861 by Jayanarayana Tarka Panchanana, who added to it a gloss of his own; and some of the sutras were translated by Ballantyne (Mirzapore, 1851). Of later works on the same system may be mentioned the *Bhāshāparicchēda*, edited with the commentary called *Siddhāntamuktāvali*, and translated by Roer in the *Bibliotheca Indica* (Calcutta, 1850), and the popular *Tarkasañgraha* in several editions: also edited and translated by Ballantyne (2d ed., Calcutta, 1848), and edited again by Vidyasagara (ib., 1897); and by Vasadeo Athalya (Bombay, 1897). Consult: Gough, *The Vaiśeshika Aphorisms of Kánâda*, translated (Benares, 1873); Windisch, *Ueber das Nyāya-bhāshya* (Leipzig, 1886); Colebrook, *Miscellaneous Essays*, vol. i. (2d ed., London, 1873); Müller, *Six Systems of Indian Philosophy* (New York, 1899).

VAISHNAVAS, vīsh′nȧ-vȧz (Skt. *vāiṣṇava*, adherent of Vishnu, from *Viṣṇu*, Vishnu, name of a Hindu god). The general name of all worshipers of Vishnu (q.v.), but applied particularly to those who worship Vishnu in his incarnate form, either as Krishna or as Rama. Even those who worship Vishnu under other forms, such as the reverers of 'Vishnu as the tortoise' (see VISHNU), are adherents at the same time of one of these two sects. Of the two, the older division comprises those who worship Vishnu as Krishna. These Krishnaites were known in the earliest sectarian period (c.200 B.C.) as *Pāñcarātras* and *Bhāgavatas*. Whether these names were at first applied to the same sectaries or to two divisions of Krishnaites is not known; but in the seventh century A.D. they appear to be two distinct bodies. The essential tenet of these sects is that which is maintained by all Vaishnavas, namely, that, besides the identity of Krishna with Vishnu, the human soul is a distinct entity, while incorporate in an earthly body, and after the death of the body it becomes one with Vishnu. This qualified idealism distinguished the Vaishnavas philosophically from the Saivas (q.v.) on the one hand, and from the Vedantists (see VĒDĀNTA) on the other. Another tenet held by all Vaishnavas, though not exclusively by them, is the doctrine of *bhakti* or saving faith, and this may be said to be the great popular support of all the Vaishnava sects. It appears first in the *Bhagavadgītā* (q.v.), the oldest scripture of the Vaishnavas. According to this doctrine, all works and other beliefs are without essential value, though good works and right knowledge are useful. The one essential, however, is faith in Krishna (or Rama) as Vishnu, i.e. as supreme deity. He who believes that Krishna is God is saved. Salvation, further, consists in being received back into God's essence. The corresponding activity on the part of the divinity is grace or favor extended to such as have faith. In the grosser conception of Vishnu as a god occupying a heaven of his own, the soul, instead of being reabsorbed, simply shares the joy of this heaven.

At the present time the Krishnaites are largely in the majority in Northern India, while the Ramaites are strongest in the southeast, the southwest being the home of one of the strong Krishnaite sects, which arose in the twelfth century. At this period, in fact, sprang up the chief sects of both parties, and from this time onward the antagonism between the sects and sub-sects of each separate division became powerful.

Before these popular schools or sects arose, a special division of Krishnaite Vaishnavas was formed (c.1200 A.D.) on the Malabar coast under the influence of Anandatertha, the founder of a school known as Madhvas. He taught not only the separate existence of human souls, but the separate existence of matter as an eternal essence. This school remains a restricted southern growth, but the 'duality doctrine,' as it is called, has been acepted by the masses over a wide area. Both the next great Krishnaite sects emphasize an entirely new practice, on which they lay more weight than they do on theology or metaphysics. This is the practice of revering the Child Krishna. No trace of this cult, with its accompaniment of madonna-worship, is to be found in the records of the older sects, and it is quite possible that the practice was an imitation of Christian usage. Unfortunately, with the introduction of this child-worship was still retained the antique conception of Krishna as an amorous shepherd, and under the influence of these two images, together with the continual emphasis upon *bhakti*, the worship of Krishna-Vishnu rapidly deteriorated. This element became supreme in the later development of the Krishnaite sects of the north, where among the lower classes it has superseded all other religious notions and has deeply affected even the cultivated classes.

The first of these sects is that of Caitanya, who was born in Bengal in 1485. His special religious tenet was 'love for Krishna.' This was expressed by songs and dances of an amorous and licentious character. Caitanya himself, like most of the late Vaishnava teachers, was regarded as also divine and as a reincarnation of Krishna himself. The second great sect of Krishnaites arose in the northwest and was founded by Vallabha, called also Vallabhacarya. His sect, if somewhat less licentious than that of Caitanya, was no less self-indulgent. The worship of the Child Krishna was particularly affected by the Vallabhas with all its excesses. But the sect is saved from the uniform low level of the Caitanyas through the fact that it is not without sectarian literature. The founder reverted to the non-dualistic doctrine of the Vedanta, and the philosophy of his school is thus distinguished from that of Caitanya, who taught that each believer was to exist as a separate spirit in a heaven filled with sensual pleasures. Both these sects elevate Radha, the mistress of Krishna, to a divine position. A reform of both these religious bodies took place in the eighteenth century. The Caran Dasis were protestants against the excesses of the Vallabha sect and they instituted a moral reform based on the purer belief and practice of the southern Madhva Krishnaites. A similar protest against the Vallabha sect resulted in the formation of a new division under the leadership of Narayana, who was worshiped as a god by his adherents. Other reforming sects of this sort scarcely deserve to be called Vaishnavas, as they are eclectic deists.

At the same time that Madhva was founding his Krishnaite sect in Southwestern India, Ramanuja in the southeast (about Madras) was founding the first distinctively Ramaite Vaishnava sect. The Ramanuja sect remained in the south, but the sect founded by Ramanuja's follower, Ramanand, was operative in the north in the fourteenth century, and to this sect are due in succession some of the reform movements of more recent times. The Northern School (Vadagalis) hold to the 'monkey doctrine,' while the Southern School (Tengalais) affect the 'cat doctrine.' The former doctrine holds that God saves the sinner as a monkey does its young, by allowing the young to embrace it and be carried to safety. The cat doctrine is Calvinistic, affirming that God saves as does a cat, by picking up the kitten without concurrence or effort on the kitten's part. The Tengalais are the more numerous and have a theological literature written in Tamil.

But the great difference between Krishnaites and Ramaites is moral and intellectual. The Krishnaite Vaishnavas, with few exceptions, such as that of the high-caste Madhva sect, are as epicurean and licentious in practice as they are unphilosophical in intellect. What literature they possess is small, apart from erotic poetry. On the other hand, the Rama schools have elaborated complete theological systems, and, generally speaking, they are morally above reproach. Most Ramaites hold that the deity is not without qualities, and in logical conclusion they maintain that Rama as Vishnu has a heaven of pure delight in which the believer will lead a pure but joyful existence, not being absorbed into the divine essence. In consequence of the moral tone of the Rama Vaishnavas, it is from them rather than from the Krishnaites that the later reformers draw their inspiration. Such reformers were in no sense themselves Vaishnavas, but rather deists and unitarians who are unsectarian. Kabir, one of the disciples of Ramanand, founded the sect of the Kabir Panthis, which still has a large following in Northern India, but unites Rama and the divine monkey, Hanuman (q.v.), in one common worship. A purely deistic sect also claiming Ramanand as the teacher of their founder is that of the Dadu Panthis. The literature of the modern Vaishnava sects is best represented by the *Ramcaritmanas* of Tulasidasa, the greatest of modern Hindu poets, and by the *Premsāgar* or 'ocean of love,' an erotic-religious poem of the Vallabha sect. For the older literature, see the article VISHNU.

It remains only to be said of the Vaishnavas that some of the sub-sects worship almost exclusively the 'female side of Vishnu,' in the form of his wife, Lakshmi, or in that of Sita, the wife of Rama. The Vaishnavas have several famous festivals, the chief being that of the *Rath Yāha* in Bengal, in which an image of the god is carried in a procession, the *Janmaṣṭamī* or birthday festival of the Child Krishna at Benares, and the *Rās Yāha* or dance festival, commemorating the dancing of Krishna with the Gopis, his mistresses. The general sign of all Vaishnavas consists of two perpendicular marks on the forehead. They revere as symbols the Tulasi-plant and the salagrama stone, a white pebble; the veneration for this latter as a symbol, however, is of recent origin. Consult: Wilson, *Sketch of the Religious Sects of Hindus* (edited by Rost, London, 1862); Williams, *Brahmanism and Hinduism, or Religious Thought and Life in India* (3d ed., ib., 1887); Barth, *Religions of India* (ib., 1881); Hopkins, *Religions of India* (Boston, 1895).

VAIŚYA, vī'shyȧ (Skt. *vāiśya*, from *viś*, people). The third or agricultural and business class in the constitution of the early community of India. See CASTE.

VALAAM, vȧ-läm' (Finnish *Valamo*). A small island in the northern part of Lake Ladoga (q.v.) Northwestern Russia. It is very picturesque and surrounded by numerous islets. On its southern end is the famous Valaam Monastery of the Transfiguration, which attracts numerous pilgrims.

VALAIS, vȧ'lā' (Ger. *Wallis*). A southern canton of Switzerland, bounded by the cantons of Bern and Vaud on the north, Uri, Ticino, and Italy on the east, Italy on the south, and France on the west (Map: Switzerland, B 2). Area, 2027 square miles. It consists of the valley of the Rhone and a number of lateral valleys along its tributaries, inclosed by the Bernese Alps on the north and the Valais Alps on the south. Valais abounds in glaciers which occupy about one-fifth of its area. The highest point is the Dufour Peak on Monte Rosa, over 15,000 feet. Valais contains many kinds of minerals, principally lead, gold, iron, anthracite, marble, and limestone. Most of these minerals are worked. The canton is chiefly pastoral, vineyards and orchards being found only in the deep valleys. The wines of Valais are well known. The chief manufactures of the canton are soap, glass, sugar, and dynamite. The Constitution of Valais provides for a legislative assembly (*Grand Conseil*) elected directly at the rate of one member for every 1000 inhabitants. The capital is Sion (q.v.). Population, in 1900, 114,158, almost entirely Roman Catholic. The French-speaking inhabitants, who form about two-thirds of the population, inhabit the western part of the canton and the German-speaking the eastern.

The valley of the Upper Rhone, the *Vallis Pœnina* of the Romans, was conquered by the Romans in B.C. 57, and later incorporated with Rhætia. On the dissolution of the Roman Empire the region was occupied by the Burgundians, whose rule was supplanted by that of the Franks. After the disruption of the Frankish realm, at the close of the ninth century, it formed part of the Kingdom of Transjurane Burgundy and then of the Kingdom of Arles. Later the bishops of Sion and the counts of Savoy held sway in Western or lower Valais, contending with each other for dominion, while Upper Valais was colonized by Germans, who founded a number of independent communities or 'tithings.' Finally, in the fifteenth century, Upper Valais, after joining the Swiss Confederation, secured control of Lower Valais, which was ruled as a subject territory. In 1798 the whole region became part of the Helvetic Republic. In 1802 Valais was made an independent republic by Napoleon, who annexed it in 1810 to France as the Department of Simplon. It was freed in 1814, and in 1815 was constituted a canton of the Swiss Confederation. It took part in the League of Sarnen as well as in the Sonderbund.

VALCKENAER, väl'ke-när, LODEWIJK KASPAR (1715-85). An eminent Dutch classical scholar, born at Leeuwarden, and educated at Franeker and Leyden. In 1741 he became professor of Greek at Franeker, and twenty-five years later was called to Leyden. He is known for his editions of Euripides's *Phœnissæ* (4th ed., 2 vols., 1824) and his *Hippo-*

lytus of Euripides, which contained the famous *Diatribe in Euripidis Perditarum Fabularum Fragmenta* (1768). He also edited Homer's *Iliad* with Scholia (1747), Theocritus, Bion, and Moschus (1781). His greatest work, however, was his *Diatribe de Aristobulo*, first published posthumously by Luzac (1806), in which he exposed the literary forgeries of the Alexandrians. His *Opuscula Critica*, etc., were published in 2 vols. (1801). Consult: Bergmann, *Memoria Valckenarii* (Utrecht, 1874); L. Müller, *Geschichte der klassischen Philologie in den Niederlanden* (Leipzig, 1869).

VALDAI (vȧl-dī′) **HILLS.** A low plateau or group of hills in West Central Russia, occupying the southwestern parts of the governments of Novgorod and Tver, and extending for about 250 miles midway between Saint Petersburg and Moscow (Map: Russia, D 3). They form the culminating portion of the broad elevation running through Central Russia, and rise very gradually from the surrounding plain. The interior, however, is cut into steep hills and valleys, the latter containing a number of lakes. The hills rise to the maximum height of a little over 1000 feet above the sea. They were formerly forested, but are now mostly cleared and cultivated. The plateau is the watershed between the Volga and the Dnieper, and of streams running into the Baltic Sea.

VAL-DE-GRÂCE, vȧl′de-grȧs′. A former Benedictine nunnery in Paris, founded by Anne of Austria, and changed into a military prison in 1790. The dome of the church, dating from 1645, is modeled on that of Saint Peter's at Rome. The church was the place of burial of the French royal family and the Orleans princes, and contains the tomb of Henrietta, wife of Charles I. of England.

VAL DEL BOVE, väl dĕl bō′vȧ. A crater of the volcano of Etna (q.v.).

VALDEPEÑAS, väl′dȧ-pȧn′yȧs. A town of the Province of Ciudad Real, Spain, 115 miles south of Madrid, on the right bank of the Jabalón River (Map: Spain, D 3). It is on the highway to Andalusia. It has manufactures of spirits, flour, and cooperage ware; but its reputation rests mainly upon its celebrated red wine. There are chalybeate springs in the vicinity. Valdepeñas, in 1900, had a municipal population of 20,688. The town made an heroic defense against the French in 1808.

VALDÉS, vȧl-dās′, Armando Palacio. A Spanish novelist. See Palacio Valdés.

VALDÉS, Juan de (c.1500-c.41). A Spanish-Italian theologian and reformer. He was born at Cuenca, in Castile, imbibed some of the ideas of the Reformation in Germany, and in 1528 wrote a treatise, *Diálogo de Mercurio y Carón*, criticising the Church in such manner that the Inquisition made Spain uncomfortable for him. He went to Naples in 1530, spent some time in Rome and Bologna, and in 1533 returned to Naples, where he resided until his death. He devoted himself to study and literature and gathered round him a choice circle, including Peter Martyr and Vittoria Colonna. He was an advocate of the Lutheran doctrines, but remained a Catholic.

Consult: Wiffen, *Life and Writings of Juan de Valdés, with a translation from the Italian of his Hundred and Ten Considerations*, by John T. Betts (London, 1865).

VALDEZ, Pierre. See Waldenses.

VALDIVIA, vȧl-dē′vē-ȧ. A southern province of Chile, bounded by Llanquihue on the south, Cautín on the north, Argentina on the east, and the Pacific on the west (Map: Chile, C 11). Area, 8315 square miles. The larger part of the surface is level and only the portion adjoining the Andes and the coast land are mountainous. The climate is moist and healthful and the soil is fertile. Forests are abundant in the mountainous regions, and timber is one of the most important products of the province. The chief occupations are agriculture and grazing. Population, in 1895, 60,687. A large proportion of the population is German. Capital, Valdivia.

VALDIVIÁ, Pedro de (1497-1554). The Spanish conqueror of Chile. He was born at Serena, in Estremadura, and served in the Spanish armies in the Italian wars, being present at the capture of Milan and the battle of Pavia (1525). He went to the New World and in Mexico joined Cortés, by whom he was sent to Peru when Pizarro asked for help against the Inca insurrection in 1535. His brilliant conduct in the battle of Salinas led to his selection to prosecute the conquest of Chile. In March, 1540, he started south with a hundred and fifty men. On February 7, 1541, he laid the foundations of the city of Santiago, and for six years he successfully combined the establishment of settlements in the country with the operations against the Indian armies. In December, 1547, he returned to Peru, where he rendered important service on the royal side in the contest with Gonzalo Pizarro. As soon as this rebellion was ended on the plain of Sacsahuana, Valdivia hastened back to Chile, in January, 1549, to renew the war against the Araucanian Indians. He met with repeated successes, but was unable to stamp out the guerrilla bands, which united in a fierce attack on the Spanish fort at Tucapel in December, 1553. Valdivia hastened to its relief, and had all but dispersed the Araucanians, when the latter were suddenly rallied by a young native page of Valdivia, named Lautaro, who deserted his master at the critical moment, called upon his countrymen to renew their attack, and annihilated the Spaniards (January 1, 1554). Valdivia was captured and killed, despite the efforts of Lautaro to save his life.

VALDOS′TA. The county-seat of Lowndes County, Ga., 156 miles southwest of Savannah, on the Plant System and the Georgia Southern and Florida railroads, and the terminus of the Valdosta Southern Railroad (Map: Georgia, C 5). It is the shipping centre of a region engaged in cotton and fruit growing and farming, and manufactures cloth and lumber products. The government, under the revised charter of 1900, is vested in a mayor, elected biennially, and a unicameral council. The water-works are owned and operated by the municipality. Valdosta was settled in 1859, and was incorporated in 1860. Population, in 1890, 2854; in 1900, 5613.

VALENCE, vȧ′läɴs′. The capital of the Department of Drôme, France, 66 miles by rail south of Lyons, crowning a hill on the left bank of the Rhone, below the confluence of the Isère (Map: France, L 7). The Cathedral of Saint Appolinaire, in the odd Auvergnat-Romanesque style, consecrated in 1095, contains an apse with colonnade. The Maison des Têtes (sixteenth century), with its beautifully decorated windows and its front sculptured with heads of Homer, Aristotle, Pythagoras, and Hippocrates, and the fine paintings of the Church of Saint Jean Baptiste are worthy of mention. There is a fine suspension bridge over the Rhone. Across the river lie the interesting ruins of the Crussol, a twelfth-century castle. The printing of linen and cotton fabrics, the manufacture of flour and tinned foods, and agriculture are important industries. The vineyards are of great extent. Population, in 1891, 19,970; in 1901, 26,946. Valence is the Valencia of the Romans.

VALEN'CIA, *Span. pron.* vä-län'thē-ä. The name of a former kingdom of Spain, comprising the present provinces of Valencia, Alicante, and Castellón de la Plana. The region is bounded on the north by Aragon and Catalonia, on the east by the Mediterranean, on the south by Murcia, and on the west by Murcia, New Castile, and Aragon. Area, 8830 square miles. The surface is of a broken mountainous character, with some small plains scattered along the coast and in the uplands of the southwest. The plains bordering the Mediterranean abound in lagoons, from many of which salt is derived in large quantities. There are few good harbors. The most important rivers are the Segura, Guadalaviar, Júcar, and Mijares. The rainfall varies greatly, and the cold north winds and the hot southwest winds are very dry. The temperature varies from the extreme summer heat of the lower coast plains and valleys to the extreme winter cold of the inland mountain regions. With this variation in temperature and rainfall there is a wide variety of agricultural products. Wheat and other cereals are grown in fairly large quantities, but their yield is surpassed by that of the vine, rice, sugar, and fruits, among which the exports of oranges and figs have the lead. The stock-raising interests of the section are important. The mining industry is not very large, lignite, iron, lead, and zinc being produced in small quantities. In manufactures Valencia ranks next to Catalonia and has extensive textile establishments, iron and copper foundries, distilleries, sugar mills, and potteries. The fisheries and the curing of salt fish also employ a considerable portion of the population. The inhabitants, who preserve many traits of the Moorish admixture, in 1900 numbered 1,587,533. Upon the dissolution of the Caliphate of Cordova in the early part of the eleventh century, Valencia became an independent kingdom. Toward the close of the century it passed under the rule of the Almoravides, who were supplanted half a century later by the Almohades. In 1238 the city of Valencia was taken by James I. of Aragon, who soon became master of the region.

VALENCIA. A Mediterranean seaport of Spain, capital of the Province of Valencia, 185 miles east-southeast of Madrid, on the right bank of the Guadalaviar, two and a half miles from its mouth (Map: Spain, E 3). As the former capital of the Kingdom of Valencia it retains many traces of Moorish occupancy. The surrounding *huerta* resembles a vast shady orchard and bears magnificent groves of citron, orange, and mulberry. The city itself is picturesque in the crowded, narrow, and winding streets of the older portion and charming in the broader streets and luxuriant *plazas* and *paseos* of the newer part. Its climate is mild and very dry. The public buildings are numerous and interesting architecturally and because of their historical significance. Among the important churches the Cathedral La Seo occupies first place. This structure was begun in 1262 and completed in 1482. The Church of San Andrés contains some beautiful frescoes and paintings of Juanes, Ribalta, and Vergara. The former Convento del Cármen is now utilized for the Provincial Museum of Paintings, with a very complete collection representing the Valencian school and some notable foreign works. La Lonja (the silk exchange), the centre of the commercial life of the city, is a beautiful Gothic structure, built on the site of the Moorish Alcázar. The Aduana, a superb structure erected for a custom house by Charles IV., is now occupied as a tobacco factory, employing 4000 operatives. The provincial hospital, housed in a fifteenth-century structure, accommodates 6000 patients annually. The ornamental Plaza de Toros, or bull ring, reputed the best in Spain, seats 17,000 spectators. The Plaza del Mercado is the largest of the public squares of the city; others of note are the Plaza del Príncipe Alfonso, the Plaza de Tetuán, the site of the old Citadel, and the Plaza de la Reina, a busy shopping and café centre. Modern improvements include the introduction of tramways, of gas and electricity, an adequate water supply, and a sewerage system. The harbor of Valencia is one of the most secure on the Mediterranean coast. The chief exports are rice, melons, oranges, and other fruits, green and dried, wines, silks, raw and spun, and an excellent quality of olive oil. In 1898 more than 1200 vessels entered and cleared. The industries of the city include tobacco manufacturing, silk spinning, and hemp and linen weaving. There are also manufactures of velvet, hat plush, felt, gloves, fans (a special product), iron and bronze ware, leather goods, and pottery ware, especially the mosaic bricks known as azulejos, for which there are more than twenty establishments in the environs of the city. The agricultural industries of the vicinity are also important. Valencia is the seat of one of the foremost universities of Spain. (See VALENCIA, UNIVERSITY OF.) The population, illustrating in character and physical traits the early Moorish admixture, numbered, in 1900, 215,687. Valencia first appears in history in B.C. 138, when it was given the *Jus Latinum.* It was destroyed by Pompey, captured by the Visigoths in 413, and by the Moors in 714. In 1021 it became the capital of an independent Moorish kingdom. In 1095 it was captured by the Cid, but the Moors subsequently assumed control, until its final capture by James I. of Aragon in 1238. The expulsion of the Moriscoes at the beginning of the seventeenth century greatly crippled its prosperity, and by espousing the Austrian side during the War of Spanish Succession, it lost many of its ancient privileges. In 1812 it was captured by Suchet and remained in the possession of the French until the following year.

VALENCIA. The capital of the State of Carabobo, Venezuela, situated 24 miles south of Puerto Cabello, with which it has railway connection, near the western end of Lake Valencia or Tacarigua (Map: Venezuela, D 2). Valencia is the second city of the Republic, and is well constructed with broad streets, well-kept plazas, a beautiful market and alameda. Valencia contains a notable cathedral erected during the first half of the nineteenth century. The city is on the banks of the Aragua River. The chief exports are coffee, sugar, cacao, and hides. Population, in 1894, 38,654. Valencia was founded in 1555. During the struggle for independence it was the scene of battles fought by Bolivar in 1814 and 1821, the latter of which gained the freedom of Venezuela from Spain. On account of the various sieges from 1810 to 1821 and the great earthquake of 1812, there are many ruins in the vicinity.

VALENCIA, University of. A Spanish university, founded by the union of an episcopal foundation for theology and a municipal school of arts, medicine, and civil and canon law, both dating from the middle of the fourteenth century. These were combined about 1500. Several colleges were founded in the sixteenth century, the period of the greatest prosperity of the institution. From that century it sank in numbers and reputation. It was reorganized in the decade 1848-58, and has since grown to be one of the leading universities in the kingdom. It has the three faculties of law, physics-chemistry, and medicine, and in 1901 had 1728 students.

VALENCIENNES, vȧ'läɴ'syĕn'. The capital of an arrondissement in the Department of Nord, France, and a fortress of the second class, at the junction of the Rhondelle and the Scheldt, 30 miles by rail southeast of Lille (Map: France, K 1). Broad boulevards are laid out on the site of the old fortifications, which were demolished in 1892. There are many houses of the seventeenth century, which give the streets a mediæval apearance. The handsome Hôtel de Ville, pure seventeenth century except the façade, contains a large collection of paintings, especially of the Flemish school (including splendid specimens of Rubens), and a collection of sculptures. The Gothic Church of Saint Géry, dating from the thirteenth century, with a modern tower, and the Church of Notre Dame du Saint Cordon, a modern structure in thirteenth-century style, with beautiful stained glass windows by Lévêque, are worthy of notice. In the old Jesuit College is the municipal library of more than 25,000 volumes, containing much valuable Romance literature. There are an academy for sculpture and painting, a museum of natural history, an immense hospital, a lycée, and an arsenal. The famous Valenciennes lace is no longer manufactured. The extensive coal fields amid which Valenciennes lies have made it a metallurgical centre. Glass, sugar (from beets), chemicals, cambrics, and lawns are also manufactured. Chicory coffee is shipped in large quantities. Population, in 1901, 309,460. Valenciennes is the Roman Valentiana. It came to France by the Treaty of Nimeguen in 1678.

VALENCIENNES, Achille (1794-1865). A French zoölogist, born in Paris and educated there. In 1836 he became professor of ichthyology at the Museum of Natural History. He shared in Cuvier's *Histoire naturelle des poissons*, which he continued (22 vols., 1829-49). Valenciennes wrote *Histoire naturelle des mollusques, des annélides et des zoophytes* (1833).

VALENCY (Lat. *valentia*, strength, from *valere*, to be strong, able; connected with OIr. *flaith*, power, Lith. *galeti*, to be able, Goth. *waldan*, OHG. *waltan*, Ger. *walten*, AS. *wealdan*, Eng. *wield*), Valence, or Atomicity. In chemistry, the combining capacity of an atom, with reference to the number of other atoms with which it can be directly combined. The conception of valency is an offspring of the atomic and molecular theories. These theories led to a knowledge of the numbers of different atoms making up the molecules of compounds; but as in many cases very different compounds were found to have the same composition and the same molecular weight, it became clear that differences in the chemical and physical properties of compounds must often be caused by differences in the manner of combination of their atoms. Those differences of combination had to be investigated, and thus arose the question, In what manner does affinity act in holding together the atoms of compounds? In considering various compounds with a view to obtaining some light on this question, chemists were gradually led to a series of assumptions, the incorporation of which in atomic chemistry has proved exceedingly fruitful.

First of all it was observed that, in compounds of hydrogen with some one other element, one atom of hydrogen can hold in combination only one atom of the other element; this was shown by such compounds as hydrochloric acid (HCl), hydrobromic acid (HBr), hydriodic acid (HI), etc., and the fact was expressed by saying that hydrogen is *univalent* or *monad*. The valencies of certain other elements were then found by considering their compounds with hydrogen, on the principle that by every unit of their combining capacities the atoms of those elements can hold one atom of hydrogen; for hydrogen itself is univalent, i.e. has unit combining capacity. From the compounds already mentioned it may be seen that the atoms of chlorine, bromine, and iodine are, like hydrogen, univalent; for each atom of these elements can be combined with only one atom of hydrogen. Similarly, compounds like water (H_2O), sulphureted hydrogen (SH_2), ammonia (NH_3), and marsh-gas (CH_4) show that oxygen and sulphur are di-valent, that nitrogen is tri-valent, and that carbon is quadri-valent. The valencies peculiar to some of the elements being thus established by an inspection of their compounds with hydrogen, the valencies of the other elements can be found by studying their compounds not necessarily with hydrogen, but with any element of known valency. Thus compounds like sodium chloride ($Na\,Cl$), postassium chloride (KCl), etc., show that the atoms of sodium and potassium are univalent; for they can hold in combination only one atom of another univalent element. The same thing is shown by the fact that sodium or potassium takes the place of one atom of hydrogen in acids; for example, in hydrochloric acid:

$$\mathrm{Na} + \mathrm{H\,Cl} = \mathrm{Na\,Cl} + \mathrm{H}$$
$$\mathrm{K} + \mathrm{H\,Cl} = \mathrm{K\,Cl} + \mathrm{H}$$

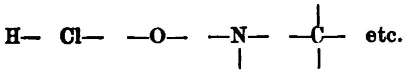
Evidently, an atom of sodium or potassium is *equivalent* to an atom of hydrogen, and as the latter is univalent, the former, too, must be univalent. Similarly, an atom of calcium takes the place of two atoms of hydrogen:

$$\mathrm{Ca} + \begin{matrix}\mathrm{HCl}\\ \mathrm{HCl}\end{matrix} = \mathrm{CaCl_2} + 2\mathrm{H}$$

and therefore the element calcium, or rather an atom of this element, is considered di-valent.

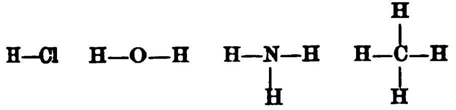
Thus a few simple compounds and a few simple reactions led to a knowledge of the valencies peculiar to all of the elements. The conception of valency has proved especially useful in the domain of organic chemistry, i.e. the chemistry of the compounds of carbon. Our modern 'structural theory' is based entirely on the assumption that an atom of carbon is invariably quadrivalent; and the usefulness of the structural theory can hardly be overestimated. For it exhibits in a clear and simple manner the relations between similar as well as different compounds, and, above all, it permits of determining the exact number of different compounds that may have the same composition and the same molecular weight, and thus permits of foretelling the existence of compounds before they have been actually obtained.

Graphically each unit of combining capacity of an atom is represented by a dash added to its symbol. The valencies of different elements are thus denoted as follows:



$$\begin{array}{ccccc} & & & | & \\ \text{H—} & \text{Cl—} & \text{—O—} \quad \text{—N—} & \text{—C—} & \text{etc.} \\ & & \quad\quad\quad | & | & \end{array}$$

When two atoms combine, at least one valency of each is employed, and in compounds like the following, the atoms are said to be linked together by single 'bonds,' each 'bond' evidently representing two 'valencies' or 'affinities' (i.e. one unit combining capacity of each of the combining atoms):



$$\begin{array}{cccc} & & & \text{H} \\ & & & | \\ \text{H—Cl} & \text{H—O—H} & \text{H—N—H} & \text{H—C—H} \\ & & | & | \\ & & \text{H} & \text{H} \end{array}$$

Hydrochloric acid Water Ammonia Marsh-gas

The graphic representation of valency suggests an important question, viz.: Are the valencies of an atom forces acting only in certain directions, or do they act, like gravity, in all directions? A further question naturally suggests itself in the case of atoms having more than unit valency, viz.: Are the several affinities equal to one another in power? To answer these questions is a matter not of idle speculation, but of necessity in the case—again—of the compounds of carbon. The study of these compounds has led chemists to make the following assumptions: (1) the four valencies of carbon are in all respects equal; (2) they act in four different directions which are perfectly symmetrical with respect to the carbon atom. The carbon atom is, namely, imagined to be placed at the centre of a regular tetrahedron, and four equal forces are assumed to act in the directions of the four vertices of the tetrahedron. A further assumption that thrusts itself upon the organic chemist is that in every compound capable of independent existence all the valencies of the constituent atoms are satisfied by combination, and that no valency is 'free.' Without these assumptions organic chemistry can make no progress. These assumptions made, there is hardly a general fact that remains unaccounted for. The assumptions, though hypothetical in character, are therefore incorporated as principles of science, and thus in connection with the compounds of carbon chemistry answers in a sense the question stated at the beginning of this article, viz.: In what manner does affinity act in holding together the atoms of compounds?

In the case of other elements than carbon, the application of the idea of valency has been much less useful and much less successful. In fact, the obstacles in the way of consistently applying the idea to the several elements are so great that the idea would probably have been abandoned long ago, were it not for its great usefulness in the case of carbon. The chief obstacles are as follows: Firstly, the valencies of most elements are found to be variable and hence unreliable as a basis for predicting the constitution of unknown substances. Thus, while in ammonia (NH_3) the atom of nitrogen is tri-valent (because combined with three univalent atoms of hydrogen), in nitric oxide (NO) it is di-valent (because combined with one di-valent atom of oxygen), and in ammonium chloride (NH_4Cl) it is penta-valent (because combined with five univalent atoms, viz. four hydrogens and one chlorine). In other compounds nitrogen seems to have still other valencies. Turning to iron, we find it di-valent in ferrous chloride ($FeCl_2$) and tri-valent in ferric chloride ($FeCl_3$). Chlorine is univalent when combined with hydrogen, and quinqui-valent when combined with oxygen. Sulphur is di-valent when combined with hydrogen, and hexa-valent when combined with oxygen. Phosphorus is tri-valent when combined with hydrogen, and quinqui-valent when combined with oxygen. Oxygen is di-valent in nearly all of its compounds; yet in di-methyl ether hydrochloride oxygen must be assumed to be quadri-valent. Even in the case of carbon an exception is known: in ordinary carbonic oxide (CO) the carbon atom is apparently di-valent (because combined with one di-valent atom of oxygen)—unless we assume that the oxygen atom in this compound is quadri-valent, and hence that the compound is an exception to the rule according to which oxygen is di-valent. Further, it has been stated above that the atoms of hydrogen, chlorine, iodine, and sodium were primarily assumed to be uni-valent. One might therefore expect that in all combinations of any two or three elements one atom of one would combine with one, and only one atom of the other. Yet the compound called tri-chloride of iodine has the formula ICl_3. Is iodine tri-valent in this compound? Another compound, a hydride of sodium, has the formula HNa_2. Is hydrogen in this compound di-valent? And is, therefore, the valency even of hydrogen variable? Again when we find the molecule of hydrogen gas to be made up of two hydrogen atoms, we conclude that the affinity of each of these atoms is satisfied by that of the other atom. But the molecules of certain uni-valent elements (the vapors of sodium, potassium, iodine, at high temperatures, etc.) are known to be made up each of a single atom. Are the affinities of these single atoms 'free?' Or shall we accept the verdict of organic chemistry, acording to which the molecule of a substance capable of independent existence can contain no 'free' affinities? But then how can a single atom form a molecule? While we thus search in vain for an explanation as to what becomes of affinities in certain compounds, we find that other compounds seem to involve the use of more valencies than those possessed by the constituent atoms. Examples of such compounds are presented by crystallo-hydrates, like NaCl. $2H_2O$, made up of several molecules within each of which all the available valencies should be expected to be satisfied. Other examples of this kind are presented by many of the minerals found in nature. Do atoms, then, possess additional valencies which sometimes do and sometimes do not come into play?

All of these questions remain, as yet, unanswered. And hence while the conception of valency serves as an excellent working principle for the correlation of the compounds of carbon, many important facts remain for the present beyond its reach. See CHEMISTRY; CARBON COMPOUNDS; STEREO-CHEMISTRY.

VA'LENS (c.328-378 A.D.). Roman Emperor of the East (A.D. 364-378). He was the brother of Valentinian I. (q.v.), was born near Cibalis, in Pannonia, about A.D. 328, and was associated with his brother in the Imperial authority, receiving as his share of the Roman world Asia, Egypt, and Thrace, in 364. His sovereignty was, however, disputed by Procopius, a supposed scion of the race of Constantine, who raised his standard in Thrace, was crowned at Constantinople, and for two years maintained his ground with skill and courage, till the defeat of his troops at Thyatira and Nacosia, followed by his capture and death in 366. The first prominent act of Valens's reign was a reduction of 25 per cent, in the taxes. The prolonged imprisonment of 3000 Ostrogoths, who had been sent to aid Procopius, led to a war which lasted from 367 to 369. The contest was carried on in the country of the Goths and was throughout in favor of the Romans. Difficulties arose immediately afterwards (370) with the Persians, who sought to occupy Armenia, although war was not declared till the end of 372, when the Romans were victorious. Valens, who had removed to Antioch at the beginning of the war, now occupied himself with the religious quarrels between the Arians and the orthodox party, which at that time raged with much violence over the whole Eastern Empire. Affairs on the eastern frontier again assumed a threatening aspect; but the Romans were disinclined any longer to interfere with the designs of the Persians on Armenia, and concluded a somewhat discreditable treaty in 376. In the meantime the Goths, who had for some time been peacefully settled in Dacia, were assailed by the advancing hordes of the Huns. The Ostrogoths, who first felt the shock, were partly incorporated, and the remainder forced to retreat; the Visigoths next attempted to stem the torrent, but without success, and crowds of fugitives crowded to the north bank of the Danube. Valens accorded permission to a large body of Goths under Fritigern to cross into Mœsia and Thrace, and take possession of the waste lands in these provinces; the fugitive Ostrogoths soon afterwards crossed the river without permission; and the alarm which the numbers and turbulence of his new subjects speedily aroused led Valens to the adoption of such impolitic measures that the gratitude of the Goths for shelter afforded was turned to bitter resentment. Valens at last resolved on war, and engaged the Goths near Adrianople, August 9, 378. His army was totally routed, and two-thirds of it, including Valens himself and most of his chief officers, left dead on the field.

VALENTIA, vȧ-lĕn'shĭ-ȧ, or **VALENCIA.** A small island off the southwestern coast of Ireland noted as the eastern terminus of the submarine cables between Great Britain and America (Map: Ireland, A 5).

VALENTIA. One of the five provinces into which Britain was divided under Diocletian, covering the portion of Scotland south of the wall of Antoninus.

VAL'ENTINE. A little-known saint and martyr of the third century, whose day is kept on February 14th. He is said to have cured the blind daughter of a certain Asterius who had been charged by the Emperor Claudius to win him back to paganism, but who was thus converted to Christianity. Valentine was accordingly imprisoned, tortured, and finally beheaded. It is impossible to trace any connection between his story and the celebration afterwards connected with his day. It has been suggested that this may be a survival, with a Christian sanction, of the ancient Roman festival of the Lupercalia, celebrated in the month of February, at which it was customary to put the names of young women into a box, from which they were drawn by the men as chance directed. A custom exactly similar to this was common in England and France for centuries, and for a time very popular among the upper classes, and at many European courts. From Pepys's *Diary* we learn that in the reign of Charles II. married as well as unmarried persons could be chosen. At one time it was customary for both sexes to make presents to each other, but afterwards the obligation was restricted to young men, who were supposed to remain faithful for the entire year to the service of their 'Valentines.'

VALENTINE. (1) A character in Shakespeare's *Two Gentlemen of Verona*, one of the two whose humorous adventures give the play its title. (2) The extravagant and ingenious hero of Congreve's *Love for Love*, a rôle which the actor Betterton has made famous. (3) The extravagant hero of Beaumont and Fletcher's *Wit Without Money*. (4) The brother of Gretchen in Goethe's *Faust*. He is killed by the title character while trying to avenge the family honor.

VALENTINE. A sentimental romance by George Sand (1832), deriving its name from that of the leading female character, a misunderstood wife. The story represents some phases of the author's own experience.

VALENTINE, BASIL. A pseudonym under which Johann Thölde published in 1644 a work entitled *Halographia*. *Basil Valentine* was an alchemist who lived in Germany in the fifteenth century. See VALENTINUS BASILIUS.

VALENTINE AND OR'SON. A Carolingian romance, written in the second half of the fifteenth century and printed at Lyons in 1495. It narrates the history of the two title characters, who are twin brothers, sons of the Emperor of Constantinople. They are born in a wood. Orson is carried off by a bear and grows up as a savage denizen of the forest, but Valentine is found by his uncle, King Pepin, and is trained at the palace to be a finished courtier. In 1589 Hathaway and Munday wrote a play founded upon the story, and six years later an interlude bearing the same title was produced.

VALENTINE VOX, THE VENTRILOQUIST. A lengthy and once popular novel by Henry Cockton (1840), abounding in farcical situations produced by the hero's use of his gift. It is said to have influenced a change in the English lunacy laws through its description of a sane man driven to madness by incarceration in a lunatic asylum.

VALENTINIAN. A highly rhetorical romantic drama by Fletcher produced before March, 1618-19, but not printed until 1647. It contains some quite simple and very beautiful songs.

VAL'ENTIN'IAN (Valentinianus). The name of three Roman emperors of the same family. The most famous, Valentinian I. (A.D. 364-375), was the son of humble parents, and was born at Cibalis, in Pannonia, in 321. Valentinian entered the army at an early age, and rose rapidly in rank under the emperors Constantius and Julian, only, however, to fall more rapidly; for he was degraded by Constantius in 357, and banished by Julian in 362. Restored to favor in the following year, he distinguished himself in the East, and on the death of Jovian was unanimously chosen as his successor (February 25, 364). A month after his accession he chose as his colleague his brother, Valens (q.v.), to whom he resigned the government of the East, reserving for himself Illyricum, Italy, the Gauls, Britain, Spain, and Africa. During Valentinian's reign the Alemanni repeatedly (366-368) ravaged the east, and the Saxons (370) the northeast of Gaul; Illyricum was wasted (370) by the Quadi, and Africa by the southern desert tribes, though these invasions were mostly repelled and revenged. The internal administration, on the other hand, was excellent, for the Emperor added to his ability prudence and firmness, vigilance and impartiality. Though himself a zealous Catholic, he permitted his subjects to adopt whatever religion they chose, and strictly forbade all persecution or annoyance on account of religious belief. On account of the abuse of ecclesiastical influence, he excluded priests and monks from the right of succession to property; judicial proceedings were forbidden to be held in private; the extreme license of speech hitherto allowed to advocates was restrained; gratuitous medical attendance was provided for the poor of Rome; and schools were established throughout the Empire. The success of his administration was doubtless much owing to his fortunate choice of officers: Theodosius the Elder in Africa and Britain, Jovinus in Gaul, and Theodosius the Younger (afterwards Emperor) in Illyricum. In private life Valentinian was above reproach, but his violent temper ultimately caused his death, for while giving audience to the deputies of the Quadi, with whom he was then at war, he worked himself into such an excess of passion as to rupture a blood-vessel in his chest, and fell back dead into the arms of his guards (November 17, 375). By his first wife he had one son, Gratianus (q.v.); and by the second, Justina, another son, Valentinian, and three daughters, one of whom, Galla, became the wife of the Emperor Theodosius I.

Valentinian II. (A.D. 375-392) the younger son of the preceding, was born A.D. 372, and received from his elder brother, Gratianus (q.v.), the provinces of Italy, Illyricum, and Africa, as his share of the Western Empire. During his long minority the Empress Justina administered the government; and about three years after her death Valentinian, who had given promise of good administrative qualities, was murdered at the instigation of the Frank Arbogastes, the commander-in-chief of his army (May 15, 392).

Valentinian III. (A.D. 425-455), the grandnephew of the preceding, was born about A.D. 419 and was seated on the throne of the West by Theodosius II., Emperor of the East, in 425. Valentinian was a weak and contemptible prince and may be said never to have ruled during the thirty years that he sat on the Imperial throne; his mother, Placidia, governed till her death in 450, and she was succeeded by the eunuch Heraclius. The regulations enacted for the internal administration were creditable, and especially so when ecclesiastical interests were involved, but the utter corruption of manners, the complete extinction of 'public spirit,' the exactions of the tax collectors and commissioners, the employment of the powers of the executive in the avenging of private quarrels, and the impossibility of obtaining redress for injuries, showed that the Empire had fallen far beyond remedy. The early part of Valentinian's reign was disturbed by the contests between the 'comites' Boniface and Aëtius, the former of whom had supported, and the latter resisted Valentinian's claims to the throne; but notwithstanding this, Aëtius prevailed upon the Empress to declare his rival, the Governor of Africa, a public enemy; and the latter called to his aid the Vandals under Genseric (q.v.). Thus Africa was lost to the Empire. But Aëtius, notwithstanding, proved himself the bulwark of the Roman power in Europe; the Franks, Goths, Burgundians, and other German nations who had encroached on the Empire were successively defeated and repelled, and the advance of the Huns was stayed on the field of Châlons. Yet the labor of defending an extensive empire from attack on all sides was too much for one man; and much of Spain and Gaul was seized by the Suevi and Visigoths, the north of Italy was ravaged by the Huns, Sicily and Sardinia by the Vandals, and even Rome was repeatedly besieged, while Britain was abandoned to the Picts and Scots. Aëtius seems to have committed the same error as his predecessor Stilicho (q.v.) in attempting, by the marriage of his son to Valentinian's daughter, to transfer the Imperial dignity to his own family, and, like him also, he was assassinated, though by the sword of his master (454). In the following year Valentinian was conspired against by the friends of Petronius Maximus and the adherents of Aëtius, and murdered, March 16th.

VALENTINIANS. A Gnostic sect or school, founded by Valentinus, who went from Alexandria to Rome about A.D. 140 and died there, or in Cyprus, about 160. They recognized heathenism as a preparatory stage of Christianity, and divided the higher spiritual world into fifteen pairs of æons, each consisting of a male and a female. The first pair, or syzygy, is made up of Bythos, or God in himself, and Ennoia, or God as existing in his own thoughts; from these emanated next Nous (Intelligence) and Aletheia (Truth), and so on. As the last æon, Sophia, transgressed the bounds that had been laid down by the æon Horos, and a part of her being became lost in Chaos, there was formed a crude being, called Achamoth, which, through the Demiurgos that emanated from it, created the corporeal world. Horos now imparted to the souls of men (for all the bodies composing the corporeal world are possessed of souls) a pneumatic or spiritual element, but this only attained to full activity when Christ, a collective emanation from all the æons, appeared as Saviour, and united himself with the man Jesus. In the end, all that is pneumatic, and even the originally psychic or soul element in as far as it has assimilated itself to the psychic, will return into the Pleroma. The Valentinians existed as late as the second half of the fourth century. See GNOSTICISM.

VAL′ENTI′NUS (?-c.160). The founder of one of the Gnostic sects which came into existence in the first half of the second century. According to Epiphanius (*Hœr.* xxxi. 2) he was born in Egypt, as some assert, of Jewish parents, and was educated in the Hellenic schools of Alexandria. During the reign of Antoninus Pius (about 140) he came to Rome, where he first appeared as an orthodox religious teacher. On his settling in Cyprus he became an open enemy to the Church and began to propagate his peculiar doctrines, for which see GNOSTICISM; VALENTINIANS.

VALENTINUS, BASILIUS. A mediæval alchemist, born probably on the upper Rhine. In his youth he is said to have made extensive travels through Spain, the Low Countries, and England, and in 1413 he is found living in the monastery of Saint Peter at Erfurt. His numerous writings offer a curious mixture of mystical obscurity and real scientific love of investigation, especially in chemistry and metallurgy, in which he made some notable discoveries. It is not known whether his works were originally composed in German or in Latin; the most complete edition of them is that published by Petræus (Hamburg, 1717).

VALERA Y ALCALÁ GALIANO, vȧ-lā′rȧ ē äl′kȧ-lä′ gä′lê-ä′nô, JUAN (1824—). A Spanish novelist, poet and scholar, born at Cabra, in the Province of Cordova. He was educated at Malaga and at the University of Granada, where he took his degree in law, and then entered upon a diplomatic career (1847). When the Duke de Rivas was sent as Spanish Ambassador to Naples, Valera accompanied him. He was then as a member of the Spanish legations at Lisbon (1850), Rio Janeiro (1851-53), Dresden and Saint Petersburg (1857-58). After his return to Madrid (1858), he became one of the editors of the liberal journal *El Contemporáneo* (1859). He was a leading member of the Union Liberal, and was made Minister to Frankfort (1865) by General O'Donnell. After the Revolution of 1868 he was appointed Director of Public Instruction. During the reign of Alfonso XII. he was Ambassador to Lisbon (1881-83), Washington (1885), and Brussels (1886), and in 1893-95 to Vienna. Throughout all his diplomatic and political activity he produced works which rank among the highest that his country's literature contains.

Valera really began the movement in fiction that was the glory of the last three decades of the nineteenth century in Spain with his *Pepita Jiménez*, first published as a serial in 1874 and since translated into many modern languages. *Pepita* was written after Valera had steeped his mind in the Spanish mysticism of the sixteenth and seventeenth centuries. His next novel, *Las ilusiones del doctor Faustino* (1875), the story of a modern Faust, did not catch the popular favor so quickly as *Pepita*. His third novel, *El commendador Mendoza* (1877), is free from philosophizing. After a shorter story, *Pasarse de listro*, appeared the *Doña Luz* (1879). Having abandoned politics, Valera wrote *El hechicero*, *Juanita la larga*, *La buena fama*, *Genio y figura*, *De varios colores*, and *Morsamor*, all attractive novels. The short tales of Valera are hardly less known and appreciated than his more extended works. Among them are the *Cuentos, dialogos y fantasias*, the delightful little *El pájaro verde*, the *Parsondes*, the *Asclepigenia*, the *Gopa*, and the *Bermejino prehistórico*. In the poetry of Valera his erudition is more visible than any other trait. By translating or paraphrasing in verse the poems of foreign authors, Valera has made his countrymen acquainted with portions of the poetic literature of Germany and the English-speaking regions; thus he has rendered into Spanish verse parts of Goethe's *Faust*, of Uhland's ballads, and of Moore's *Paradise and the Peri;* poems of James Russell Lowell, Whittier, and W. W. Story. He also translated Schack's *Poesie und Kunst der Araber* (1881). As a critic he displays great powers of observation, and gives evidence of wide reading.

Among his critical and other works are *Tentativas aramáticas* (1879); *Disertaciones y judicios literarios* (1882); *Arte de escribir novelas* (1887); *Estudios criticos* (2d ed. 1884); *Neuvos estudios críticos* (1888); *Cartas americanas* (1889); *De Rios argentinos* (1901); *Ecos argentinos* (1901); and *Florilegio de poesías castellanas del siglo XIX*. (1901-02). Consult Brunetière, *La casuistique dans le roman de Juan Valera*, in his series *Histoire et littérature*, vol. i. (Paris, 1884).

VALERE, vȧ′lâr′. A stock name for a lover in French classical comedy. In Molière's *L'avare* he is the son of Anseline and lover of Elise, Harpagon's daughter. The character occurs also in *Le dépit amoureux*, *L'école des maris*, and *Le médecin volant*, and in Mrs. Centlivre's *Gamester*.

VALERIAN (OF. *valeriane*, Fr. *valériane*, from ML. *valeriana*, valerian; probably from Lat. *Valerianus*, prop. name, from *valere*, to be strong, able), *Valeriana*. A genus consisting of about 180 species of annual and perennial herbs of the natural order of Valerianaceæ. The common valerian (*Valeriana officinalis*) is abundant in ditches, moist woods, etc., throughout Europe and Northern Asia. Its fleshy root (*valerianæ rhizoma*) has been used in medicine as an antispasmodic and stimulant—actions attributed to valerianic acid.

The chief ingredients of valerian are woody fibre, resinous and gum-like matters, and a little more than one per cent. of a volatile oil, which is crystallizable, and in which *valerianic* or *valeric acid* is developed on exposure to the air. There are three official preparations, viz. the *fluid extract*, the *tincture*, and the *ammoniated tincture*.

The greater valerian (*Valeriana Phu*), which grows in alpine districts of the Continent of Europe, is now almost entirely disused, although it is said to be one of the strongest of the European valerians, a preëminence which *Valeriana Dioscoridis* disputes with it. *Valeriana celtica* and *Valeriana saliunca*, alpine species found in Styria and Carinthia, are exported to India to be used as substitutes for spikenard (q.v.) and for perfuming baths. *Valeriana sitchensis*, a native of the United States, is said to possess the medicinal properties. The root of *Valeriana edulis*, a species found in Northwestern America, is used as food by the Indians.

VALERIAN (PUBLIUS LICINIUS VALERIANUS). Roman Emperor A.D. 253-260. He was descended from an ancient and noble family, and was chosen for his integrity and accomplishments to the office of censor. Faithful in his allegiance to Gallus, he went to summon the legions of Gaul and Germany to aid the feeble Emperor against the usurper Æmilianus, but arrived too late to save his master. The usurper's troops murdered their own chief, and united with their late antagonists in proclaiming Valerian Emperor, August, A.D. 253. He was then about 60 years old, and took as colleague his eldest son, Gallienus (q.v.). Valerian showed abundant proof during his short reign of most ardent zeal for the prosperity of the Empire, but the times required a ruler of more energy and ability, as the irruption of the Franks into Gaul, despite the efforts of Aurelian, the devastation of Thrace, Macedonia, Greece, and the archipelago by the Goths, the advance of the Alemanni to Milan, and the conquest of Syria and Armenia by the Persian King Sapor (Shapur), testified. The troubles in the East appearing most threatening, Valerian went thither in person, and was for a time successful, but was surprised by superior numbers at Edessa, was defeated, and with the remnant of his army forced to surrender (A.D. 260). Valerian remained in captivity till his death. The statements regarding the indignities heaped upon the unfortunate captive by his haughty conqueror are probably false, or at least much exaggerated. After his death his skin was flayed off, stuffed, and preserved as a proud trophy of victory, which was invariably exhibited to the ambassadors from Rome to the Sassanid Court.

VALERIANOS, vȧ'lā-rē-ä'nŏs, APOSTOLOS. The real name of the Greek navigator more commonly known as Juan de Fuca (q.v.)

VALERIC or **VALERIANIC ACID.** A volatile fatty acid represented by the formula $C_4H_9CO_2H$. It is a limpid, colorless, oily fluid of a penetrating odor, similar to that of valerian root, and of an acrid taste. It makes a transparent spot on paper, but the spot disappears on exposure to the air. It is only slightly soluble in water, but dissolves in alcohol and ether in all proportions. It exists in and is obtained by distilling valerian root with water acidulated with sulphuric acid. It may be similarly obtained from angelica root, and some other vegetable sources. It is also formed during the oxidation of fats and fatty acids (especially oleic acid), either by nitric acid or mere exposure to the air, by the oxidation and putrefaction of albuminoids, etc., but the best method of preparing it is by distilling a mixture of amyl alcohol (or fusel oil) with bichromate of potash and sulphuric acid.

The following salts are used in medicine: (1) *Valerianate of ammonia*, which forms colorless, or white, flat quadrangular crystals that are deliquescent in the air. (2) *Valerianate of iron*, a dark-red amorphous powder which is readily soluble in alcohol, but is insoluble in cold water. (3) *Valerianate of zinc*, which forms brilliant white pearly tabular crystals, with a feeble odor of valerianic acid and a metallic taste, is scarcely soluble in water, in alcohol, or in ether. Valerianic acid and its salts are supposed to be useful remedies for reflex neuralgia and for various neurotic troubles; but what their action consists in is entirely unknown. *Amyl valerianate*, $C_5H_{11}.C_5H_9O_2$, is a volatile fluid with a penetrating odor of apples, slightly soluble in water, but dissolving freely in spirit and in ether. In the form of a dilute spirituous solution, it so strongly resembles apples in its smell that it is used in perfumery under the name of *oil of apples*, or *essence of apples*.

The acid described above (boiling point 174°C.) is the modification of valeric acid usually met with. The existence of three other modifications of the same substance is possible according to the structural theory of organic compounds; and, as a matter of fact, all the possible modifications have been prepared by chemical methods. They have, however, no practical value and need not be described here.

VALE'RIUS, ANTIAS. A Roman historian of the first century B.C., who wrote the history of Rome from the earliest times down to those of Sulla. This work, which consists of at least 75 books, was full of exaggerations, but was mentioned among the well-known annals, and was one of the chief sources of Livy, who mentions Valerius by name repeatedly, and followed him unhesitatingly in the first decades of his work. For the fragments of the *Annales* consult Peter, *Historicorum Romanorum Fragmenta* (Leipzig, 1883); also Teuffel, *History of Roman Literature* (Eng. trans. by Warr, 1891).

VALERIUS FLAC'CUS. A Roman scholar and teacher. See FLACCUS, GAIUS VALERIUS.

VALERIUS MAX'IMUS. A Roman historical compiler of the reign of Tiberius, to whom he dedicated a work bearing the title of *Factorum et Dictorum Memorabilium Libri IX.*, and consisting of short stories and anecdotes from various authors. His style is ornate and often obscure, and his want of acquaintance with the history and constitution of his country renders him an unsafe guide; yet he was a favorite author of his own time, and much studied in the Middle Ages. The best edition, including the two epitomes by Julius Paris and Januarius Nepotianus, is that of Kempf (Leipzig, 1888). There is an old English translation by Speed (London, 1678).

VALE′SIUS, Henricus (Henri de Valois) (1603-76). A famous classical scholar, born in Paris. He was chosen by the clergy of France to publish an edition of all the Greek authors whose writings deal with the early history of the Church, and in 1654 he was given a pension and the title of Royal Historiographer. The works which he published include the ecclesiastical histories of Eusebius, Socrates, Sozomen, Theodoret, and Evagoras, all of which were accompanied by Latin translations and scholarly introductions and notes (1659-73). Other works of Valesius are the publication of a collection of excerpts from the Greek historians, especially Constantine Porphyrogennetus, known as the *Excerpta Peiresciana* (1634), and an edition of Ammianus Marcellinus (1636). His minor works were published under the titles *H. Valesii Emendationum Libri V.* and *De Critica Libri II.* (1740).

VALETTA, vȧ-lĕt′tȧ. The fortified capital of Malta, located on the eastern side of the island (Map: Italy, J 12). The city is on a tongue of land, which forms two harbors and terminates in a narrow promontory bearing the lighthouse and fort of Saint Elmo. In addition to Saint Elmo there are three other important fortifications, Government and private dry docks, a coaling station, a marine hospital, and quarters for troops. The town has a university, Government palace, custom house, library, botanical garden, and museum. In parts of the city the streets are broad and run at right angles to each other; in others the land is so steep that the streets are practically stairways. Valetta has a large transit trade, and is an important British naval station. In 1901 the number of vessels entering was 3910, with a tonnage of 3,533,703, about 40 per cent. of the vessels and 60 per cent. of the tonnage being British. Population, in 1900, 61,268. In 1565 Valetta withstood a memorable siege by the Turks, against whom it was successfully defended by Jean Parisot de la Valette (q.v.). See Malta.

VALETTE, vȧ′lĕt′, Jean Parisot de la (1494-1568). Grand Master of the Knights of Saint John of Jerusalem (q.v.). He was born in Toulouse, and at an early age entered the Order of Saint John. His chief distinctions were won in naval service against the Turks in the Mediterranean. In 1557 he was elected grand master, the forty-eighth to hold that office. During the first five years of his grand-mastership he captured fifty great galleys from the Turks, and a large number of smaller vessels of war. In May, 1565, a Turkish fleet of 150 ships, conveying 30,000 troops, appeared off the harbor of Malta, and after failing in several assaults, formally invested the island. Alone and unsupported by any of the Christian Powers, La Valette, with about seven hundred knights and eight thousand men at arms and islanders, defended the fortress under circumstances of extreme difficulty and distress. At the end of four months, and after a loss, it is said, of 20,000 men, the Turkish fleet was forced to raise the blockade and withdraw from the island. La Valette died three years later, August 21, 1568.

VAL′GIUS RU′FUS. A Roman poet of the Augustan age. Horace (Sat. i., 10, 82) mentions him among those friends whose commendation outweighs the criticisms of detractors. He is said to have written elegies, epigrams, and works on botany and grammar. Consult Peter, *Historicorum Romanorum Fragmenta* (Leipzig, 1883).

VALGUARNERA CAROPEPE, väl′gwȧr-nä′rȧ kä′rō-pȧ′pȧ. A town in the Province of Caltanissetta, Sicily, 48 miles northeast of Girgenti (Map: Italy, J 10). It produces sulphur and oil. Population (commune), in 1901, 13,985.

VALGUS (Lat., bow-legged). In surgery, the condition of bow-legs. The term is also given to a variety of club-foot (q.v.). The technical term for bow-legs is *genu valgum*. *Hallux valgus* is a deformity consisting of a deflection of the great toe toward the other toes, which occurs often in bunion (q.v.).

VALHAL′LA. See Walhalla.

VALIANT-FOR-TRUTH. A character in the second part of Bunyan's *Pilgrim's Progress*, who joins the company of Christiana on her journey to the Celestial City. He combines the noble qualities of a mediæval crusader with the homely virtues of the English middle classes of the seventeenth century.

VALJEAN, vȧl′zhäN′, Jean. The hero of Hugo's romance *Les misérables*, an ex-convict, converted through the kindness of an ecclesiastic. On regaining his liberty, he devotes his life to rearing a beautiful girl, whom, as a child, he has saved from cruelty and sorrow. See Cosette.

VALK, välk. A town of Livonia, Russia, 102 miles northeast of Riga. Population, in 1897, 10,139.

VALKY′RIE. An English cutter, 126 feet in length, with which Lord Dunraven competed for the *America's* cup in the races in 1893, when she was defeated by the *Vigilant*. She was sunk in a collision in the Frith of Clyde in the following year.

VALKYRIES, vȧl-kĭr′ēz (Icel. *valkyrja*, chooser of the slain). In Scandinavian mythology, the maidens, usually nine in number, who attend on Odin (q.v.). Adorned with golden ornaments they ride through the air in brilliant armor, order battles, and distribute the death-lots according to Odin's commands. Fertilizing dew drops on the ground from the manes of their horses, light streams from the points of their lances, and a flickering brightness announces their arrival in the battle. They conduct the souls of the heroes who fall in battle to Walhalla (q.v.), where they act as his cup-bearers. Two valkyries, Hrist and Mist, are cup-bearers to Odin himself.

The valkyries are of diverse origin. Some of them spring from elves and other superhuman beings, and some are the daughters of princes, who in their lifetime are numbered among the valkyries, showing all their qualities, and becoming valkyries when they die. They ride generally in companies of three, or of three times three, or four times three. The valkyries represent the clouds, especially those of the storm. As the white clouds, however, they are regarded as swan-maidens, one of the most widespread beliefs in folk-lore. Whosoever gains possession of their feather robes has them in his power. Their evolution into the maidens of Odin seems to be of later origin. Still later, in the Icelandic versions of the Nibelung Saga, Brunhilda (q.v.), the daughter of Odin, is represented as a Valkyr. The myth of the valkyries has been treated in *Die Walküre,* the second of the four divisions of Wagner's music drama, *Der Ring des Nibelungen.*

VALLA, väl′lȧ (LORENZO LAURENTIUS) (c.1407-1457). An Italian humanist of the early Renaissance. He taught at Pavia, Milan, and Naples, and wrote theological and critical works whose departure from established points of view stirred up heated polemics, and about 1448 was saved from the Inquisition only by his patron, King Alfonso V., who assisted him to flee to Rome. There he was befriended by the Popes Nicholas V. and Calixtus VI., by whom he was appointed to various posts in the Vatican, to a canonicate in Saint John Lateran, and in 1450 to a professorship of rhetoric in the University of Rome. Of especial importance was his *De Elegantia Latinæ Linguæ* (6 books 1471). He wrote his first comparison of the Vulgate New Testament with the Greek originals and his *Annotationes* were reëdited by Erasmus. He made Latin translations of Herodotus and Thucydides which were printed in Paris (1510) and Lyons (1543). His collected *Operas* were published in Basel, 1543. For his biography consult: Vahlen (Berlin, 1870); Mancini (Florence, 1892); Wolf (Leipzig, 1893); and Schwan (Berlin, 1896).

VALLADOLID, väl′yȧ-ᴅō-lēᴅ′. The capital of the Province of Valladolid, Spain, 102 miles northwest of Madrid, on the left bank of the Pisuerga River (Map: Spain, C 2). The plain bordering this river is well irrigated and very fertile. The climate is genial, because of the moderate elevation, pure air, and generally cloudless sky. The city was long the capital of Castile and Leon, and later of all Spain, and contains many marks of its former greatness. The Campo Grande is larger than the Plaza Mayor at Madrid. Upon the Plaza del Campanillo, now a modern market, fronts the house once occupied by Cervantes. Near the Church of the Magdalen, on a street named after the great discoverer, stands the house in which Columbus died. From the side of the Plaza de Portugalete rises the cathedral, a Renaissance structure begun by Juan de Herrera, during the reign of Philip II., and yet incomplete. Santa Maria la Antigua, the most interesting church of the city, a Gothic creation of the eleventh century, enlarged in the fourteenth, contains a retablo, which is the masterpiece of Juan de Junî. The thirteenth-century Church of San Pablo, remodeled by Cardinal Torquemada in the fifteenth century and modernized by the Duke of Lerma two hundred years later, was often the meeting place of the ancient Cortes. This and the Colegio de San Gregorio, now occupied by municipal offices, are two of the finest examples of Gothic architecture in the world. The Colegio de Santa Cruz now contains the provincial library and museum, which preserves some fine paintings. The university (see VALLADOLID, UNIVERSITY OF) has an elaborately sculptured façade. The ancient royal palace now serves the sessions of the provincial *audiencia.* The city has manufactures of chocolate, flour, woolen and silk goods, iron and metal ware, gloves, and pottery. The population of Valladolid in 1900 was 70,951. The Roman origin of the city is in dispute. Two important Church councils were held here during the twelfth century. Under Charles V. the population approached 100,000. The permanent removal of the capital to Madrid, in 1606, was a severe blow to the prosperity of Valladolid, from which it has only recently begun to recover. In 1808 it took a prominent part in the uprising against the French, and, as a result, suffered severely at the hands of the invaders.

VALLADOLID. The capital of Michoacan, Mexico. See MORELIA.

VALLADOLID. A town of Yucatan, Mexico, situated 100 miles southeast of Merida (Map: Mexico, P 7). The town is well laid out, and possesses a Jesuit college and the remains of a fine Franciscan convent. It manufactures cotton goods. Population, 14,000, mostly Indians and mestizos. Valladolid was founded in 1544.

VALLADOLID. A town of Negros, Philippines, in the Province of Western Negros, situated on the coast, 16 miles south-southwest from Bacólod (Map: Philippine Islands, G 9). It is an important military post. Population, 14,000.

VALLADOLID, UNIVERSITY OF. A Spanish university, one of the oldest in Europe, having been in existence since the early part of the thirteenth century. It received many gifts and privileges from kings and popes alike, and flourished greatly until the eighteenth century. It has faculties of law and medicine, and a section of philosophy and letters. There are about 900 students.

VALLANDIGHAM, văl-lăn′dĭ-*gam*, CLEMENT LAIRD (1820-71). An American politician, born at New Lisbon, Ohio. After a year in Jefferson College, Pennsylvania, in 1837-38, he taught for two years in Maryland; was admitted to the Ohio bar in 1842; was elected to the Ohio Legislature in 1845; edited the Dayton *Western Empire* in 1847-49; and from 1857 until 1863 was a member of the National House of Representatives. In politics he was an extreme States-rights Democrat. He violently attacked the Lincoln Administration both in and out of Congress, and his conduct led to a resolution for an inquiry into his loyalty, while numerous petitions for his expulsion were presented. After his term in Congress expired, he continued to make incendiary speeches against the Government. As a result he was arrested in May, 1863, by order of General Ambrose E. Burnside (q.v.); was tried by court martial; and was sentenced to be imprisoned in Fort Warren. President Lincoln, however, changed the sentence to deportation into the Confederate lines. Thence Vallandigham made his way to the Bermudas, and thence to Canada. In the same year he was nominated by his party for the Governorship of Ohio, but was defeated by the overwhelming majority of 100,000 votes. He was allowed to return in the following June; became supreme commander of the 'Sons of Liberty' (see KNIGHTS OF THE GOLDEN CIRCLE); and took an active part in the Democratic convention of 1864. In June, 1871, while acting as counsel in a murder trial, he attempted to illustrate his theory of how the shooting had been done, and was killed by the accidental discharge of the pistol. Consult J. L. Vallandigham, *Life of Clement L. Vallandigham* (Baltimore, 1872).

VALLE, vål′lå, Pietro della (1586-1652). An Italian traveler, born in Rome. He received a good education in the arts and sciences and became a member of the Roman Academy of the Umoristi. In 1611 he took service against the Moors of Barbary. He traveled extensively in the Orient during the years 1614-26, going to Turkey, Egypt, Palestine, Persia, and India, studying the languages and the customs of these countries. In 1621 he started from Ispahan and visited the ruins of Persepolis. He saw the cuneiform inscriptions there and copied several of the characters. He went to India in 1623, where he remained, chiefly at Surat and Goa, for more than a year. He first drew attention to the existence of the ancient Sanskrit language. He died in Rome. Of his works, which are all marked by clearness and exact knowledge, but also betray the desire to relate miraculous things, the most famous is the *Viaggi in Turchia, Persia ed India descritti in 54 lettere famigliari* (1650-58), translated into French (1661-64), German (1674), and English (1664), while a new translation in the latter language was made by Grey, *Travels of Pietro della Valle in India* (1892).

VALLE DE SANTIAGO, väl′yå då sän′tē-ä′gō. A town in the State of Guanajuato, Mexico, situated in a fertile valley, 45 miles south of the city of Guanajuato (Map: Mexico, H 7). It has a celebrated parish church, built during the early years of the eighteenth century. Municipal population, in 1895, 12,671,

VALLEJO, vål-yä′hō. A city in Solano County, Cal., 30 miles north by east of San Francisco; on San Pablo Bay, and on the Southern Pacific Railroad (Map: California, B 2). It has Saint Vincent's Convent School and a public (Carnegie) library. Other features include the city hall, the buildings of the various fraternal organizations, the Home for Orphans, and the Sailors' Club House, projected in 1903. Vallejo is surrounded by a rich farming section and is of considerable industrial importance. The leading establishment is the Mare Island Navy Yard, which gives employment to nearly 2000 men. There are also a cement plant, a fish cannery, flour and planing mills, and a tannery. A quicksilver mine is operated near the city. The government is vested in a mayor, elected every two years, a board of public works, and a board of city trustees. The water-works are owned and operated by the municipality. Vallejo was founded in 1851 to be the capital of the State, and the Legislature met here in 1851, in 1852, and for a time in 1853. It was chartered in 1866, and in 1871 ranked as the third city in size in the State. Population, in 1890, 6343; in 1900, 7965.

VAL′LENTINE, Benjamin Bennaton (1843 —). An English journalist and author, born in London. He was educated at King Edward VI.'s school at Birmingham. Abandoning study for the English bar, he came to the United States and wrote for various New York papers, becoming dramatic critic for the *New York Herald*. He was one of the founders of *Puck* in 1877, and was its editor down to 1884. To this periodical he contributed a series of humorous observations on current events under the titles "Fitznoodle in New York," "Fitznoodle in America," and "Fitznoodle at Home" (1877-84). Besides these papers, by which he is best known, are stories such as "The Lost Train" and "The Last Circle" —and successful plays, *Fitznoodle; A Southern Romance; In Paradise; Fritz in New York;* and *Madame Saccard* (adapted from Zola's drama *Renée*). He advocated a national American endowed theatre.

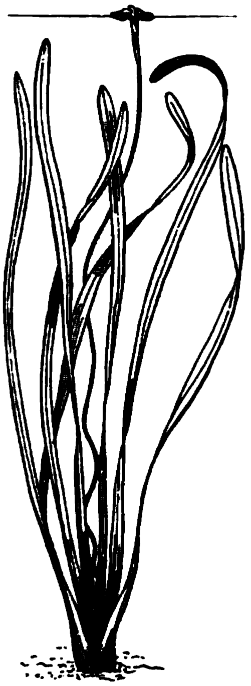
VALLEY. A depression in the land surface usually occupied by a river. The chief agency in the formation of a valley is erosion carried on by the running streams and assisted by the natural decay or weathering of the rocks in which the channels lie. The relative rapidity with which the two agencies of erosion and weathering perform their work determines to some extent the form of the valley. In dry regions where erosion along the river bed proceeds at a rapid rate compared to the weathering of the rocks on the sides the valley may be narrow and bordered by steep walls. With the lapse of time, however, erosion alone will widen the valley as the stream tends more and more to cut away the walls in proportion as the channel is lowered to base-level, and when this stage is reached the course of the stream wanders from one side to the other, forming a flood-plain by deposition of the silt that has been brought down from above. See River.

VAL′LEYFIELD. A port of entry in Beauharnois County, Quebec, Canada; on the Saint Lawrence River, the Beauharnois Canal, Lake Saint Francis, and the Grand Trunk, the Canada Atlantic, and the Adirondack and Saint Lawrence railroads; 30 miles southwest of Montreal (Map: Quebec, B 5). It has a cathedral, a college, and a hospital; cotton, paper, and flour mills, electric lights, water-works, and excellent water power. Population, in 1891, 5515; in 1901, 11,055.

VALLEY FORGE. A small village on the Schuylkill River, in Chester County, Pa.; on the Philadelphia and Reading Railroad, 24 miles west-northwest of Philadelphia. Here on December 17, 1777, after the battles of Brandywine and Germantown and the occupation of Philadelphia by the British, the American army, of about 11,000, encamped for the winter. Washington chose this place partly for its defensibility and partly to protect Congress, then in session at York, Pa., from a sudden British attack. Owing largely to the incapacity of the quartermaster-general and of the Commissary Department, the men were left without adequate shelter, food, or clothing, and in consequence suffered terrible hardships, many dying of starvation and cold. At no time were more than half of their number fit for active service. It was here, however, that Baron Steuben (q.v.) trained, disciplined, and reorganized the army, and thus enabled it to fight with greater efficiency in subsequent campaigns, and it was here (May 1, 1778) that news reached Washington and his troops of the consummation of the French alliance. On June 18, 1778, Washington abandoned his camp and reoccupied Philadelphia, preparatory to pursuing the British across New Jersey. In 1893 Pennsylvania appropriated $25,000 toward making Valley Forge and its vicinity a State park, but the sum proved insufficient and the project was virtually abandoned.

VALLEY QUAIL. See QUAIL; PARTRIDGE.

VALLGREN, vål'grĕn, VILLÉ (1855—). A Finnish sculptor, born in Borgå, and long resident in Paris, whither he went in 1878, after studying architecture in the Helsingfors Polytechnic. He entered the Ecole des Beaux-Arts, studied under Cavalier, and gained much popularity by his fresh and distinguished style. His mirrors, figurines, lamp stands, urns, and candelabra rank him as one of the foremost modern decorative artists. Of his statues and portraits, several are in New York City in the Vanderbilt collection, notably "Death and Resurrection" and "A Breton Girl." His works in Finland include a "Mariatta," in the Imperial Castle, and a "Head of Christ" in the National Museum at Helsingfors. The marble group "Maternity," in the Museum of Arras, and a bronze statuette, "Youth," in the Berlin National Gallery, should also be mentioned.



EEL GRASS (*Vallisneria spiralis*).

VAL'LISNE'RIA (Neo-Lat., named in honor of Antonio *Vallisneri*, an Italian botanist of the eighteenth century). A genus of small, stemless, aquatic plants, with grass-like leaves, belonging to the natural order Hydrocharidaceæ, and found in the warm parts of both hemispheres. They generally grow in running waters. *Vallisneria spiralis* is particularly celebrated on account of its peculiar process of fecundation. The flowers of the female plants rise to the surface of the water by uncoiling their long spirally twisted stalks; the flowers of the male plants become detached, having previously grown on short spikes at the bottom of the water, and expand, floating about upon the surface. After fecundation, the female flowers return under the water by the recoiling of their stalks and the fruit is ripened under water. The plant is found in ditches and bogs in Italy, Southern France, and the United States, where it is called wild celery, and is famous as the food of the canvas-back duck.

VALLOMBROSA, väl'ôm-brō'zȧ, CONGREGATION OF. A branch of the Benedictine Order, founded in the eleventh century and taking its name from its mother-house, a celebrated abbey of Tuscany, situated among the Apennines in a valley surrounded with forests, whence the name. Its founder was Saint John Gualbert, born at Florence either in 985 or 995. The congregation was a contemplative one, and observed strict silence. It spread into France and through Italy, but never had more than sixty houses. Its decline was hastened by the vicissitudes of the mother-house, which was pillaged in 1527 by the troops of Charles V. It was plundered in 1808 by the French Napoleon. In 1866 it was appropriated by the Italian Government, and since 1870 has been used as a school for the Royal Academy of Forestry. A few monks still remain, partly occupied in the duties of the meteorological station founded in 1654. Vallombrosa was visited by Dante, celebrated by Ariosto in the *Orlando Furioso*, and mentioned by Milton in a famous passage of *Paradise Lost*.

VALLON, vȧ'lôN', CHARLES (1853—). A French alienist, born in Limoges. He studied medicine there and in Paris, where he took his degree in 1882. He then entered the Asile des Aliénés of the Department of the Seine, passed to the clinic of mental diseases in the Medical Faculty of Paris, and became in 1885 chief of the Asile Départmental d'Aliénés at Villejuif and expert on mental diseases for the courts. Vallon was commissioned in 1897 to investigate the treatment of the insane in Russia, the results of which investigation were embodied in the volume *Les aliénés en Russie*.

VALLS. A town in the Province of Tarragona, Spain, 50 miles west of Barcelona, on the left bank of the Francolí (Map: Spain, F 2). It has textile factories, potteries, flour mills, and distilleries. Its ancient walls give it a picturesque aspect. Population, in 1897, 12,738.

VALMORE, vål'môr', MARCELINE. A French poet. See DESBORDES-VALMORE.

VALMY, vål'mē'. A village of France, in the Department of Marne, 36 miles southeast of Rheims. It is noted as the scene of a battle (September 20, 1792) in which the French under Kellermann (q.v.) and Dumouriez repulsed the Prussians under the Duke of Brunswick, after displaying fine bravery under a furious cannonade from the enemy. The battle or skirmish, frequently spoken of as the cannonade of Valmy, did not cost either army more than 800 men, but, though from a military point of view an insignificant affair, it produced moral effects of the greatest importance. It was the first triumph of the republican arms, and freed the French nation from the temporary panic inspired by the foreign invasion. Napoleon made Kellermann Duke of Valmy in 1809.

VALOIS, vȧ'lwä', HOUSE OF. A branch of the Capetian dynasty (q.v.) which occupied the throne of France from 1328 till 1589. It originated in the person of Charles, second son of King Philip III., who obtained in 1285 the County of Valois as an appanage from his father. Philip IV., the elder brother of Charles, left three sons, who reigned one after the other and died without male issue, and the succession fell, by the Salic law, to the eldest son of Charles, who accordingly ascended the throne as Philip VI. (q.v.). The elevation of the House of Valois to the throne of France gave rise to long and bloody wars with Edward III. of England, who claimed the crown through his mother, Isabella, the daughter of Philip IV. (See HUNDRED YEARS' WAR.) The French crown fell by regular succession of son to father to John the Good (1350-64), Charles V. (1364-80), Charles VI. (1380-1422), Charles VII. (1422-61), Louis XI. (1461-83) and Charles VIII. (1483-98). Charles VIII. having died without male issue, the crown fell to the representative of the nearest collateral male line, Louis, son of Charles, Duke of Orleans, and grandson of Louis, Duke of Orleans, the younger brother of Charles VI., who ascended the throne as Louis XII. (1498-1515), the first of the Valois-Orleans house; but he also dying without male issue, the succession devolved upon the descendants of his uncle, Count Jean d'Angoulême, whose grandson, Francis I. (1515-47), succeeded. Francis I. was followed by his son Henry II. (1547-59). Henry's three sons, Francis II. (1559-60), Charles IX. (1560-74), and Henry III. (1574-89), occupied the throne in succession, but, none of them leaving male heirs, the crown devolved upon Henry IV. of Navarre of the House of Bourbon (q.v.), which was descended from Robert, a younger brother of Philip III.

VALO'NIA (It. *vallonia*, from Gk. *βάλανος*, *balanos*, acorn; connected with Lat. *glans*, Lith. *gîle*, OChurch Slav. *zelandĭ*, acorn). The acorn-cup of Quercus Ægilops, a species of oak indigenous to Asiatic Turkey. It is rich in tannic acid, in consequence of which it is extensively used by tanners. The tree is cultivated along the Mediterranean shores. In Algeria it is used for reforesting the mountains, as it grows rapidly and seems well adapted to its surroundings.

VALPARAISO, văl'pȧ-rī'sô. A western province of Chile, bounded by Santiago on the south and east, Aconcagua on the north and east, and the Pacific Ocean on the west (Map: Chile, C 10). The small islands of Juan Fernandez are included in the province. Area, 1659 square miles. The surface is largely mountainous and sterile in the southern part, but fertile in the north. The chief occupation, outside the capital, is agriculture. Population, in 1895, 220,756. Capital, Valparaiso.

VALPARAISO. The capital of the Province of Valparaiso, Chile, and the chief seaport of the republic, situated on a bay of the Pacific 68 miles (116 miles by rail) west-northwest of Santiago, with which it is connected by rail (Map: Chile, C 10). The older and business portion of the city extends along the shore of the bay, while on the slope of the surrounding hills are the finer residence suburbs. Viña del Mar, a few miles to the east, is a noted suburb and seaside resort. Valparaiso enjoys a mild and equable climate, the average temperature being 58° F., the average for January 63°, and for July 53°. The average annual rainfall is about 13.5 inches. The town has some well-constructed streets and a square with many monuments. The more important monuments include statues of Columbus, William Wheelwright, who built the first railway in South America, Thomas Cochrane (tenth Earl of Dundonald), who organized the Chilean navy, and a fine monument to the navy, surmounted by a statue of Admiral Prat. The port is strongly fortified and the Government maintains here a large naval arsenal. The chief manufactures are cotton goods, machinery, and ironwork; other interests are the manufacture of tobacco, the bottling of mineral water, sugar refining, brewing, and distilling. The harbor is very accessible and has a complete system of docks, warehouses, and shipyards. Valparaiso exports grain, wool, leather, guano, saltpetre, and copper. In 1898 it had more than 63 per cent. of the Chilean import trade, but less than 17 per cent. of the export. The imports at Valparaiso in 1900 amounted to 79,110,000 pesos (paper) and the exports 12,793,000 pesos (paper). In 1900, 1027 ships, of 1,386,884 tons, entered the port. Population, in 1820, 6000; in 1895, 122,447; in 1900, 135,674, of whom some 12,000 were foreigners. Valparaiso has been the port for Santiago since 1544. It was visited by a terrible earthquake in 1855 and bombarded by a Spanish fleet in 1866. During the civil war of 1891 it was taken and partly sacked by the Congressional troops.

VALPARAISO, văl'pȧ-rī'zô. The county-seat of Porter County, Ind., 44 miles southeast of Chicago, Ill.; on the Pittsburg, Fort Wayne and Chicago, the Chicago and Grand Trunk, and the New York, Chicago and Saint Louis railroads (Map: Indiana, B 1). It is largely a residential city, and has the Valparaiso College and Normal Training School, Saint Paul's Academy, and a fine court house. The city is in a rich farming section, and manufactures mica, paint, and educational specialties. The government is vested in a mayor, elected every four years, and a unicameral council. Valparaiso was settled in 1836 and was incorporated in 1856. Population, in 1890, 5090; in 1900, 6280.

VAL'PY, ABRAHAM JOHN (1787-1854). An English printer and editor, second son of Richard Valpy, the head master of Reading School. From his father's instruction he passed to Pembroke College, Oxford, graduating in 1809. While a schoolboy at Reading he published a selection from Cicero's *Letters*, which went through several editions. With the intention of rivaling the great classical printers, he began business in London, first in Chancery Lane and subsequently (1822) in Red Lion Court, Fleet Street. Among the classics published by him are Brotier's *Tactus* (5 vols., 1812); a reissue of Stephens's *Thesaurus Græcæ Linguæ* (12 vols., 1816-28); the *Delphin Classics*, with George Dyer as editor (141 vols., 1819-30); and *The Family Classical Library*, translations into English (52 vols., 1830-34). He also founded *The Classical Journal* (1810) and a periodical called *The Museum* (1822); and brought out an illustrated edition of Shakespeare (15 vols., 1832-34). In or about 1837 he sold his business and became interested in an insurance company and other financial undertakings.

VALPY, RICHARD (1754-1836). An English educator. He was born on the island of Jersey, studied at Valognes, Normandy, at Southampton, and at Guildford grammar schools, and proceeded to Pembroke College, Oxford, where he graduated in 1776. Having taken orders the following year, he became a master at Bury Saint Edmunds School and in 1781 was appointed head master at Reading. He was a successful teacher at this school for fifty years, and upon retiring was succeeded by his youngest son, Francis Edward Jackson. He was the author of Greek and Latin grammars very widely used in their day.

VALTELLINA, văl′tĕl-lē′nȧ. The upper valley of the Adda River, in the Province of Sondrio, Italy, extending from the Stilfser Joch (Alpine pass) to Lake Como. More particularly, however, it designates only the lower portion (some 55 miles long). This is a luxuriant, charming little district, opening toward the west between the Bergamese and the Bernina Alps. The valley is famed for its wines. Grain and fruit are also produced. Sondrio and Tirano are in this valley. In mediæval times the Valtellina was a part of Lombardy. It was wrested from the Duke of Milan by the people of Grisons in 1512. In 1620 the Catholics sought through the murder of the adherents of the Reformed faith to free the district from the rule of the Swiss Confederation. The Confederates, however, were able ultimately to maintain possession of the valley with the help of Spain and Austria. In 1797 Napoleon united it to the Cisalpine Republic. In 1814 it passed to Austria and in 1859 to Italy.

VALUE (OF. *value*, value, fem. sg. of p.p. of *valoir*, from Lat. *valere*, to be strong, able). In political economy, a word that is most commonly used to designate the power of a commodity to command other commodities in exchange. The term is applied, however, to several other conceptions. The potential capacity of an object to meet human needs is sometimes called value—'value in use,' in the terminology of the classical economists. In modern scientific economics, the term 'utility' has for the most part supplanted this use of the word value. Another meaning which the term value conveys is the significance of an object to an individual as the indispensable condition of a certain satisfaction. Value in this sense of the term is frequently called 'subjective value,' to distinguish it from 'objective' or 'exchange' value (the first conception noted above). Subjective value is of two kinds, 'subjective use value,' where the importance of an object is gauged by the direct satisfaction to be obtained through its consumption, and 'subjective exchange value,' where the importance of an object is gauged by the satisfaction it will yield indirectly, through exchange.

A distinction is usually made between 'market value' and 'normal' or 'natural value.' Market value is the purchasing power of a commodity in the open market on a given day; normal or natural value is the value which would prevail if competitive forces worked without friction. Market values fluctuate widely from day to day; normal values change, if at all, only with changes in the fundamental conditions of production and consumption.

The word 'price' is often used as synonymous with 'exchange value.' Economists define price as the power of a commodity to command money in exchange; value ('exchange' or 'objective') is the power of a commodity to command in exchange commodities in general.

In order to have value, an object must satisfy some human want, and it must exist in a quantity which is insufficient wholly to satisfy all desire for it. It must possess 'utility' and 'scarcity.' In the case of most commodities, limitation in supply is due to the necessity for effort or sacrifice in winning such commodities from nature. In explaining value, economists have been inclined to emphasize one or the other of these two essential conditions. On the one hand, we have the *cost* theories of value; on the other, the *utility* theories. As representative of the cost theories we may take that known as the classical theory, derived from Adam Smith, logically developed by Ricardo, and substantially completed by Senior, Carey, John Stuart Mill, and Cairnes. According to this theory, market value is determined by demand and supply, being fixed at the point where the former just equals the latter. Value increases directly with increase in demand, inversely with increase in supply (other conditions remaining the same). In the case of commodities that may be freely reproduced without increase in cost, cost of production determines normal value. If market value is not high enough to cover cost of production some producers will turn to other industries, with the result that value will rise through decrease in supply. If, on the other hand, market value exceeds cost of production, producers will secure a profit which will lure other producers into the field, whose competition will reduce prices to the cost level. In the case of commodities produced at varying costs (e.g. the products of agriculture) values will tend to equal cost to the producer in the least favorable situation whose product is nevertheless necessary to meet the demand. The classical economists recognized a third class of commodities, consisting of those which could not be reproduced (e.g. paintings by the old masters), and of those whose production is controlled by a monopoly. The value of such commodities, in their theory, is derived from their utility and scarcity. Such commodities were regarded as relatively unimportant; accordingly, the law that value is controlled in the long run by cost of production was held to be nearly universal.

During the second and third quarters of the nineteenth century the classical theory of value was almost universally held by economists; it serves as the basis of much of the economic thought of the present day.

A second theory of much historical importance is the labor theory of value. Adam Smith argues that in a primitive society the respective amounts of labor spent on commodities must have served as a basis for their exchange value; Ricardo in many passages speaks as though he regarded labor as the basis of exchange value, although a general examination of his work leaves no doubt that he admits the determining influence of other elements in value besides labor. The theory was adopted by Karl Marx and his followers as a theoretical basis for socialism. Whatever part of the value of a commodity falls to the landlord or the capitalist Karl Marx regarded as a deduction from the fruits of labor, since labor alone created value. The difficulty in accounting for the value of goods produced at a varying expense in labor, of goods which are not reproducible, and of those which are freely given by nature, but in quantities not adequate to the demand, deprives this theory of scientific value.

Utility theories of value were unsuccessful in explaining the facts of value, until the second half of the nineteenth century, when the concept 'marginal utility' was discovered. By a well-known psychological principle, the pleasure derived from the satisfaction of any given want declines with each successive unit of satisfaction experienced. If an individual possesses a stock of goods for consumption, some units of this stock may be so used as to yield a high degree of satisfaction; other units will yield less, and the 'final' or 'marginal' unit may yield but little satisfaction, however great the satisfaction from the first unit may have been. The absolute importance to the individual of any unit in his possession will be measured by the utility of the marginal unit, since the loss of any other unit would at once be made good by the substitution of the marginal unit. In his private economy, an individual values his goods according to their marginal utilities. In exchange, both buyer and seller compare the marginal utility of the commodity to be bought and sold with the marginal utility of money. If the seller finds that the marginal utility of the money offered him exceeds the marginal utility of the commodity for sale, he is naturally willing to sell; if the buyer finds that the marginal utility of the commodity exceeds that of the money demanded, he purchases. Naturally, many sellers would be willing to take a price less than that which they are offered; many buyers would pay more than they do rather than go without the commodity they desire. A certain number of buyers, however, possess limited means, and would not purchase if the price rose above a certain figure. A number of sellers would hold their property rather than take a lower price. It is these buyers who are least eager to buy and sellers least eager to sell who hold the power of determining ratios of exchange, all other purchases and sales, in an open market, conforming to the values set by these.

The marginal utility theory does not deny that in the long run the values of commodities tend to correspond with their respective costs of production; but it gives a new interpretation to the fact. 'Costs' consist themselves in values—value of labor, capital, use of land, etc., used up in the manufacture of a commodity. These things are not valued for their own sake, but for the sake of the products for final consumption into which they enter. Naturally, these commodities are valued marginally. If pig iron in one use creates a value equal to 40, in another use a value represented by 10, the latter use will determine the value of pig iron. But under free competition there would be a tendency to increase the production of commodities in which pig iron created a value of 40, withdrawing iron, if necessary, from the less productive use. The result would be that the value of iron in the more profitable use would decline, and with it the value of the commodity into which it entered. In this way it appears as if value were determined by costs. On the other hand, the increase in value of iron in the least profitable use, resulting from the withdrawal of iron from that use, shows quite clearly that in a broad view it is the commodity for final consumption that determines the value of the elements in cost, not cost that determines values.

This theory was originated by Gossen in the fifties, but gained no attention at the time. Two decades later it was rediscovered by Jevons, Menger, Walras, and J. B. Clark, working independently. Through the consistency with which it explains the diverse phenomena of value, it has received wide acceptance, although it has been unable to displace the classical theory completely. Marshall has endeavored to reconcile the two theories, holding that cost of production and marginal utility, taken together, explain value, but that neither theory alone explains it satisfactorily. In this view he is followed by probably the majority of American and English economists. See POLITICAL ECONOMY.

BIBLIOGRAPHY. All standard works on economics present a general theory of value. For the classical theory, the best expositions are Mill, *Principles of Political Economy* (London, numerous editions), and Cairnes, *Political Economy* (New York, 1874). For the labor theory, see Marx, *Capital* (London, 1887). For the marginal utility theory, consult Gossen, *Gesetze des menschlichen Verkehrs* (Brunswick, 1854); Jevons, *Theory of Political Economy* (London, 1871); Clark, *Philosophy of Wealth* (Boston, 1894); Wieser, *Natural Value* (London, 1893); Smart, *Introduction to the Theory of Value* (ib., 1891); Marshall, *Principles of Economics* (3d ed., ib., 1895).

VALUE. In music, the time-value of a note or rest, in a general sense, is the length of its duration as compared with the whole note, which is the unit of time-measure. In a special sense, the value of a note or rest is the length of its duration as compared with the particular note adopted as the unit of measure for a particular composition. Thus, in $\frac{3}{4}$ time the unit of measure is the quarter note, in $\frac{6}{8}$ time the eighth note, etc.

VALVA'TA. A small pulmonate mollusk of American fresh waters, remarkable for the squareness of its whorls. See Colored Plate of SNAILS.

VALVE. A device or appliance for controlling the flow of liquids, gas, or loose material through a pipe, chute, or other form of passageway. With the general use of steam, water, gas, and other fluids, a great variety of valves have been invented and are in daily use. These valves bear various trade names based on their purpose, the shape or motion of the valve, and the method of operation. Thus we have safety valves, globe valves, slide valves, screw valves, etc. Valves generally, whatever their specific names may be, can be included in a general classification with reference to the manner in which their motion is obtained, or in a general classification with regard to the motion relative to the valve seat. In the first classification are: (1) Valves opened and closed by hand; (2) valves operated by independent mechanism; (3) valves operated by mechanism connected with the machine whose operation they control; and (4) valves opened and closed by the motion of the fluid whose flow they control. Classified with regard to their motion relative to the valve seat there are: (1) valves which rotate in the opening, (2) valves which rise and fall perpendicularly from and to their seats, and (3) valves which open and close by sliding on and parallel to their seats. It is obvious that the characteristics of the first and second classifications may be combined in one valve; thus a slide valve may be operated by hand like the ordinary hand screw gate valve, by separate mechanism like the hydraulic gate valves for water-works, or by mechanism connected with the medium operated like the slide valve of a locomotive. The construction of some common forms of valves is as follows: A *flap valve* consists of a disk hinged at one side so as to open and close like the lid of a coffee pot. A butterfly valve consists of a disk hinged at diametrically opposite edges and slit through the centre at right angles to the hinges so that the two flaps swing upward and away from each other when the valve opens. Another construction consists in placing the hinges together on the diametrical slit so that the two flap upward and toward each other. A *disk valve* consists of a circular disk seated on a grid and free to slide up and down for a limited distance on a rod or bolt passing through a hole in its centre. *Lift* or *poppet valves* consist of a disk with a flat or beveled edge seated on a circular disk; they operate by their own weight, like a disk valve, or by means of springs or rods. *Slide Valves* are of various forms. The *D valve* and the *piston valve,* illustrated in the article on Locomotives, are examples. The *gate valve* used on water mains consists of a metal disk sliding between two seats inclined toward each other so as to form a wedge-shaped slot. This disk is also wedge-shaped to correspond with the slot, and is raised and lowered by a stem attached to its upper edge and screwed up and down by a hand wheel. *Cocks* consist of a conical plug seated in a conical casing; both plug and casing have a hole through them in the line of the pipe, and by turning the plug so that the holes coincide the valve is opened. Valves are usually made of metal, cast iron, bronze, brass, and steel, combined with rubber, leather, or other flexible material to secure tightness. See Air Compressors; Gas; Locomotive; Pumps and Pumping Machinery; Steam Engine; Water-Works.

Valves in Musical Instruments are mechanical devices in some brass instruments for lengthening or shortening the column of air. By means of this mechanism the older natural horns and trumpets, which had only a diatonic scale, were changed to chromatic instruments capable of producing every chromatic interval within their range. The number of valves is generally three, though some instruments have four. Two systems of valves are now in general use—piston valves and rotary valves. The latter afford the player a lighter manipulation of his instrument, but are more likely to get out of order than the piston valves. For valves in the organ, see Organ.

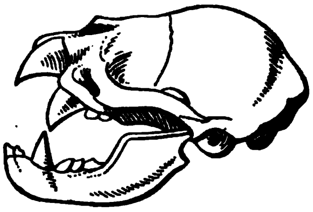
VÁMBÉRY, văm′bâr-y′, Arminius (1832—). An Hungarian traveler and Orientalist, born at Szerdahely, near Pressburg. He was largely self-educated. In 1854 he went to Constantinople as a private tutor, where he acquired a knowledge of Eastern languages, later becoming private secretary to Fuad Pasha. With the assistance of the Hungarian Academy he traveled through Armenia and Persia from 1861 till 1864, visiting Khiva, Bokhara, and Samarkand. On his return to Europe he was appointed professor of Oriental languages at the University of Budapest. The literary activity of Vámbéry was confined, in the main, to the Ural-Altaic linguistic stocks, especially the Turkish. Among his numerous works the most important are: *Travels and Adventures in Central Asia* (2d ed. 1873); *Meine Wanderungen und Erlebnisse in Persien* (1867); *Cagataische Sprachstudien* (1867); *Etymologisches Wörterbuch der turko-tatarischen Sprachen* (1878); *Altosmanische Sprachstudien* (1901); editions of the *Kudatken-Bilik* (1870) and the *Scheībaniade* (1885); and the geographical, political, and historical books: *Skizzen aus Mittelasien* (1868); *Russlands Machtstellung in Asien* (1871); *Geschichte Bocharas oder Transoxaniens* (1872); *Zentralasien und die englisch-russische Grenzfrage* (1873); *Der Islam im neunzehnten Jahrhundert* (1875); *Sittenbilder aus dem Morgenlande* (1876); *Primitive Kultur des turko-tatarischen Volkes* (1878); *Ursprung der Magyaren* (1882); *Das Türkenvolk* (1885); *The Coming Struggle for India* (1885); *The Story of Hungary* (1886); and *A magyarság keletkezése és gyarapodása* (1895). Consult his autobiographical *Arminius Vámbéry; His Life and Adventures* (7th ed., London, 1889).

VAMPIRE (Serv., Bulg. *vampir*, Russ. *vampirŭ*, Little Russ. *vampyr, uper,* White Russ. *upir*, vampire, probably from North Turk. *uber*, witch). In Slavic folklore, a corpse that rises at night from his grave, and drinks the blood of the living, which he obtains by sucking, without arousing the sleeper. He may not only appear in human form, but can assume the shape of a dog, cat, toad, or any blood-sucking animal, The victim loses appetite, wastes away, and after a few days expires without any visible disease. The corpse of the destroyer, being thus supplied, remains pliable and life-like. The veins are full, the cheeks ruddy and plump, and the mouth is gory—properties which enable an inquirer to ascertain the vampire quality. The most effective remedies against the vampire are cremation of the corpse, or nailing it by a thorn or aspen stake driven at one blow through the breast to the bottom of the grave to prevent the body from wandering. Yet another mode of killing the vampire is to chop off the head of the corpse with a grave-digger's shovel.

Communities as well as individuals may be attacked by the vampire. In general, children are first destroyed. The demon may, however, be traced by sprinkling salt on the floor of the house which it haunts. Vampirism is seldom a matter of choice, but a necessity depending on criminal character, or some other reason which is likely to render a spirit uneasy in the grave. Thus witches, wizards, suicides, children of the devil, or illegitimate offspring of parents themselves illegitimate, are vampires, while the leap of a cat or the flight of a bird across a corpse may force even the innocent dead to become a vampire. Vampirism is, moreover, regarded as infectious, since, it is believed, a man who has been the object of attack is himself thereby turned into a vampire. The practice of burying murderers and other criminals with a stake through the body was evidently brought about by dread of their turning into vampires; as regards suicides, this custom was only abolished in England by a statute of George IV. A survival of the superstition has been cited in New England as late as the first half of the nineteenth century, while in 1870-71 there were several trials for vampirism in West Prussia, Pomerania, and Mecklenburg.

The belief in vampires is part of the widespread fear of malignant ghosts (see Ghosts), especially the Lamia (q.v.), fostered by the mediæval belief of the Greek Catholic Church that all who died under ecclesiastical ban were kept alive by the devil for the ruin of their surviving friends. The belief is an ancient one, treated by Philostratus and Phlegon of Tralles, by Goethe in his *Braut von Koirnth*, and in operas by Palma (1812), Hart (1820), Marschner (1828), and Von Lindpainter (1828). Consult: Hertz, *Der Werwolf* (Stuttgart, 1862); Ralston, *Russian Folk-tales* (London, 1873).

VAMPIRE. A Neotropical blood-sucking bat of the section Desmodontes of the family Phyllostomidæ, and especially of the genera Desmodus and Diphylla; specifically, *Desmodus rufus*. These bats are of small size, are tailless, and have nose-leafs, an organization modified in accordance with their habit of subsisting by sucking blood from the bodies of the larger mammals, including man, usually while the victim is asleep. The single pair of upper incisors are prolonged and sharpened into caniniform teeth, which will pierce the skin like lancets and are rooted in bones of unusual size and solidity. The canines are large, the premolars small, and the molars absent. The gullet is so small that nothing but liquid food can pass, and the stomach is intestiform, while the intestinal canal is modified to suit a diet of blood. The blood of the victim is likely to continue to flow after the vampire departs. Repeated visits of the vampire may so weaken a horse, a cow, or a human being, that death may follow. In some places and times it becomes dangerous to sleep exposed to the bat's attack, but the total of injury done is far less than is popularly believed. Desmodus inhabits forested regions from Central America to Chile. Another still smaller bloodsucker is the closely related Brazilian *Diphylla ecaudata*, whose habit is to pare away the skin until the blood oozes through the shaved space.



SKULL OF A TRUE VAMPIRE.

Showing extraordinary form of piercing incisors in the upper jaw of *Desmodus rufus*.

The family (Phyllostomidæ) is very large, and distinguished from other bats by the presence of three bony joints in the middle finger of the hand (wing). They are greatly diverse in habits and fare. Some are exclusively insectivorous; the majority feed mainly or entirely on fruits; two species are exclusively blood-drinkers and one section, the javelin-bats (Phyllostoma), while probably subsisting mainly on fruit, sometimes also attack animals and men. In the uncertainty of information as to this group, the word 'vampire' has been widely and often mistakenly applied. It is commonly given, for example, to the great South American 'false vampire' (*Vampirus spectrum*), which feeds wholly on fruit, and is quite harmless. It measures 28 inches across the expanded wings, and is common about villages. For illustrations and bibliography, see Bat.

VAN, văn. The capital of the Vilayet of Van, in Turkish Armenia, in a very fertile plain, two miles east of Lake Van (Map: Turkey in Asia, K 3). The town, surrounded by double walls and a moat, is poorly built, with narrow streets and flat-roofed mud houses. The most interesting archæological feature of Van is the ancient castle, standing on a rock about 300 feet high. There are fragments of cuneiform inscriptions on the walls and a trilingual inscription of Xerxes on the southern side of the castle rock. There are a number of Christian schools in the town maintained by the American Mission. The population is estimated at 30,000, of whom the Armenians constitute about one-half.

Armenian historians give to Van the name of Shemiramagerd, or the 'City of Semiramis.' It is believed that Van occupies the site of Thospia, and capital of the Armenian Kingdom of Biainas, and its citadel and fortifications date probably from the eighth century B.C. The city was captured by Sapor II. in the middle of the fourth century A.D. At the beginning of the tenth century it became the capital of the Armenian Province of Vasburagan. It was captured at the end of the fourteenth century by Timur, after whose death it passed to Persia, and in the sixteenth century to the Osmanlis.

VAN, Lake. The largest lake in Asiatic Turkey. It lies near the Persian and Russian boundaries, between Armenia and Kurdistan, and close to the sources of the Euphrates and Tigris, at an altitude of over 5000 feet (Map: Turkey in Asia, K 3). It is about 80 miles long and 10 to 50 miles wide, with an area of 1400 square miles. Its shores are very irregular, and the lake is surrounded by densely wooded mountains. It receives a few short streams, but has no outlet, its water being very salt. Near its eastern shore lies the town of Van (q.v.).

VANADINITE. A mineral lead chloride and vanadate crystallized in the hexagonal system. It has a resinous lustre, and in color varies from yellow to red and brown. It usually occurs as prismatic crystals with smooth faces and sharp edges, also sometimes in rounded forms and globular incrustations, and is found in the Urals, Sweden, Argentina, South Africa, Mexico and in the United States with wulfenite and pyromorphite at various localities in New York, Arizona, and New Mexico. This mineral finds some use as a source of vanadium salts, which are used as a pigment for porcelain, and in the manufacture of ink.

VANADIUM (Neo-Lat., from *Vanadis*, a Scandinavian goddess). A metallic element discovered by Sefstrom in 1830. It is never found native, but occurs in combination as vanadic acid in a number of minerals, including descoloizite, endlichite, motthamite, psittacinite, roscoelite, and vanadinite. It has also been found in the lava at Vesuvius and spectroscopically in the sun. It is a difficult metal to obtain pure, but was isolated by Roscoe by heating the anhydrous dichloride in pure dry hydrogen.

Vanadium (symbol, Va; atomic weight, 51.38) is a light-gray powder that has a specific gravity of 5.5 and melts at a very high temperature. The metal combines with platinum to form an alloy, and with oxygen forms a monoxide, a dioxide, a trioxide, a tetroxide, and a pentoxide, of which the last two act as acid-forming oxides, forming hypovanadic and vanadic compounds. Of the various vanadium salts, ammonium metavanadate, formed by dissolving the pentoxide in ammonium hydrate, is used as a black pigment, frequently with aniline as a dye, and also as the basis of a permanent black ink.

VAN BENEDEN, vän bā′ne-dĕn, PIERRE JOSEPH. A Belgian zoölogist. See BENEDEN.

VANBRUGH, văn′bŭr-ŭ, Sir JOHN (1664-1726). An eminent English architect and dramatist. He was born in London, the grandson of a Protestant refugee from Flanders, said to have settled in England in the time of Queen Elizabeth. John Vanbrugh at about nineteen went to France, presumably to study architecture, but he returned to England some two years later and got a commission in the army, in which he presently became a captain. In 1690 he was again in France, and was arrested on suspicion of being a spy, at length being made a prisoner in the Bastile. He was released late in 1692 and returned to England. His first play was *The Relapse, or Virtue in Danger,* a sequel to Colley Cibber's *Love's Last Shift,* from which Sir Novelty Fashion reappears in Vanbrugh's piece as the inimitable Lord Foppington. It was produced at Drury Lane about the end of 1690, and it at once established its author as one of the leading wits and dramatists of the day. In the following spring his comedy of *The Provok'd Wife,* brought out at the Lincoln's Inn Fields Theatre, met with an even better reception. The year 1698 is notable in dramatic history for the publication of Jeremy Collier's famous *Short View of the Immorality and Profaneness of the English Stage.* Vanbrugh was among those specially attacked, and he published in the same year a pamphlet in reply called *A Short Vindication of The Relapse and The Provok'd Wife from Immorality and Profaneness.* Of his other works, several of them more or less free adaptations from the French, the best is *The Confederacy,* a brilliant comedy, which was produced in 1705 at the new theatre that he built in the Haymarket for himself and Congreve.

Meanwhile, he had been making his way as an architect. In 1701 he began erecting for the Earl of Carlisle the palace of Castle Howard in Yorkshire. In 1702 he was appointed Comptroller of the Board of Works. His reputation was such that in 1705 he was engaged to erect Blenheim Palace, which Parliament had voted to the Duke of Marlborough; but the Duchess, after her husband's death, refused to pay Vanbrugh his salary and dismissed him from his office. After much trouble, he managed to get nearly all the money due. He was knighted in 1714, and died at Whitehall. At his death Vanbrugh left an unfinished comedy called *The Journey to London,* which Cibber completed and produced at Drury Lane in 1728 as *The Provok'd Husband.* Consult: W. C. Ward, Introduction to ed., *Sir John Vanbrugh* (London, 1898); Swain, Introduction to the *Best Plays of Sir John Vanbrugh* (ib., 1896); Leigh Hunt, *The Dramatic Works of Wycherly, Congreve, Vanbrugh, and Farquhar, with Biographical and Critical Notes* (new ed., ib., 1855); Hazlitt, *Lectures on the English Comic Writers* (ib., 1819); Dametz, *John Vanbrughs Leben und Werke* (Vienna, 1898).

VAN BRUNT, HENRY (1832—). An American architect, born in Boston, Mass. He graduated at Harvard in 1854, and during the Civil War served for two years as military secretary on the staff of the admiral commanding the North Atlantic Squadron. Among the more important buildings of which he was the architect are Memorial Hall at Harvard, the library building of the University of Michigan, the First Church in Boston, and the Electricity Building at the World's Columbian Exposition. Among his writings are *Greek Lines and Other Architectural Essays* (1893), and a translation of Viollet le Duc's *Discourses on Architecture.*

VAN BU′REN, MARTIN (1782-1862). Eighth President of the United States. He was born at Kinderhook, N. Y., December 5, 1782, studied law with William P. Van Ness in New York City, and was admitted to the bar in 1803. He early developed a fondness for politics and held successively the offices of Surrogate and State Senator, in the latter capacity being recognized as the leader of the Tompkins faction of the Republican Party. In 1815 he became Attorney-General of the State, a position from which he was removed in 1819 on account of his rupture with the administration of Governor DeWitt Clinton. In February, 1821, he was elected to the United States Senate, and in the same year served as a delegate in the State Constitutional Convention. In the Senate, to which he was reëlected in 1827, he served for a number of years as chairman of the Judiciary Committee, supported the tariff bills of 1824 and 1828, opposed internal improvements by the Federal Government, and became a strong advocate of States' rights (q.v.). He resigned from the Senate to accept the office of Governor of New York, to which he was elected in 1828. Van Buren was an enthusiastic supporter of General Jackson for the Presidency in 1828, and became Jackson's Secretary of State the following year, but resigned in 1831 to accept the post of Minister to England. The refusal of the Senate, for a trivial reason, to confirm his nomination after he had sailed only brought increased popularity to Van Buren, and with the support of Jackson easily secured his nomination and election to the Vice-Presidency in 1832. During all the vicissitudes of Jackson's administration Van Buren succeeded in retaining his confidence unimpaired, winning especial favor from the President because of his attitude in the Peggy O'Neill episode (see EATON, MARGARET O'NEILL), and soon came to be regarded as his logical successor. In 1835 he was nominated by the Democratic Party, and in the following year was elected President, receiving 170 electoral votes, as against 73 given to his principal opponent, the Whig candidate, General W. H. Harrison. Van Buren's term was made notable by a widespread financial panic resulting partly from certain measures of President Jackson's Administration, and partly from the spirit of reckless speculation which prevailed at the time. The chief measure of his Administration was the establishment of the independent treasury system for the safekeeping and disbursement of the public moneys. This system, after a short interruption during the Whig supremacy, became a part of the permanent policy of the country. President Van Buren was renominated in 1840 for the Presidency, but, chiefly on account of the financial distress of the time, for which he was to a considerable extent held responsible in the popular mind, he was overwhelmingly defeated by the Whig candidate, General Harrison. In 1844 he was again a candidate for the Democratic nomination, but on account of his opposition to the annexation of Texas he was opposed by the Southern Democrats, and was defeated. In 1848 he was nominated for the Presidency by the newly formed Free-Soil Party (q.v.). His ticket diverted sufficient votes in New York from General Cass, the Democratic candidate for President, to insure the latter's defeat and the triumph of the Whigs. He supported Pierce in 1852 and Buchanan in 1856, and remained to the day of his death a Democrat except on the question of slavery extension. He died at Kinderhook, his birthplace, on July 24, 1862.

Van Buren attained eminence at the bar, but never practiced after his election to the United States Senate in 1821. As a politician he was surpassed by few, if any, men of the time, and for many years was the controlling spirit of the Albany Regency (q.v.). He was the author of a fragmentary work entitled *An Inquiry into the Origin and Cause of Political Parties in the United States*, published in 1867. A number of biographies have been published, the latest and most valuable one to students being that of Edward M. Shepard (Boston, 1888), in the "American Statesmen Series." See UNITED STATES. One of his sons, John (1810-66), popularly known as "Prince John," graduated at Yale in 1828, became an able and prominent lawyer, and was Attorney-General of New York in 1845-46.

VAN BUREN, WILLIAM HOLME (1819-83). An American surgeon, born in Philadelphia. He studied two years in Yale; graduated at the medical department of the University of Pennsylvania in 1840; entered the army and served in Florida and on the Canadian frontier; was on the staff of Bellevue Hospital from 1849 till 1852; was professor of anatomy in the Medical College of New York University from 1852 till 1866; and from 1866 till shortly before his death occupied the chair of surgery in Bellevue Hospital Medical College. He translated Bernard and Huette's *Operative Surgery and Medical Anatomy* (1855), and Morel's *Compendium of Human Histology* (1861). He also published: *Contributions to Practical Surgery* (1865); *Lectures on Diseases of the Rectum* (1874); and, with Dr. E. L. Keyes, *Text-book on Diseases of the Urinogenital Organs with Syphilis* (1874).

VANCE, ZEBULON BAIRD (1830-94). An American soldier and politician, born in Buncombe County, N. C. He attended Washington College, Tenn., and in 1851-52 studied law at the University of North Carolina. In 1852 he was admitted to the bar. He was a member of the State Legislature in 1854, and in 1858 was elected to Congress as a Whig to fill the unexpired term of Thomas L. Clingman (q.v.). He opposed secession as long as possible, but raised a company which became a part of the Fourteenth North Carolina Regiment. Later he was elected colonel of the subsequently famous Twenty-sixth North Carolina Regiment, and served in eastern North Carolina and in the Seven Days' Battles. In 1862, while in the field, he was elected Governor, and at once bent all his energies to the successful prosecution of the war. Upon the collapse of the Confederacy, he was imprisoned in Washington from May 20, to July 5, 1865, but was then released on parole. In 1870 he was elected to the United States Senate, but, as his disabilities had not been removed, was refused admission. He resigned in 1872, and resumed the practice of law in Charlotte. In 1876, after an exciting campaign, he was for the third time elected Governor. He was again elected to the United States Senate in 1879, and was reëlected in 1885 and 1891. Consult Dowd, *Life of Zebulon B. Vance* (Charlotte, N. C., 1897).

VAN CLEVE, JOHN SMITH (1851—). An American musician, born in Maysville, Ky. He received his musical education under native teachers, and from 1872 to 1875 was employed as musical teacher at the Institute for the Blind, Columbus; after which he occupied a similar position at Janesville, Wis. In 1879 he removed to Cincinnati, where until 1897 he was engaged in teaching, musical journalism, and as lecturer at the Conservatory and College of Music. In 1897 he removed to Chicago, and became prominently identified with the musical life of that city. He published several pianoforte pieces, and contributed largely to the more important musical periodicals.

VAN COR'LEAR, or **VAN CURLER**, ARENDT (c.1600-67). A Dutch colonist in America, born in Holland. Emigrating to New Amsterdam (New York) about 1630, he became superintendent of Rensselaerswyck in 1642, and as such was called upon to conduct frequent negotiations with the Indians, whom he treated with uniform consideration and justice and over whom, in consequence, he exercised a powerful influence, by which he preserved peace for many years between them and the whites. Throughout the Mohawk country, and to a certain extent among the eastern Indians generally, the name 'Corlear' soon came into use to designate the English governors (especially of New York), and was so used for more than a century. On several occasions Van Corlear rescued French prisoners from the Iroquois, or saved them from torture. In 1661 he bought the 'Great Flat' of the Mohawk River from the Indians, and in 1662 founded Schenectady, the first agricultural settlement in the province in which farmers could hold land in fee simple, free from feudal annoyances. In 1667, while on his way to Quebec to visit the French Governor, he was drowned off Split Rock, in Lake Champlain.

VAN CORT'LANDT, PHILIP (1749-1831). An American soldier and legislator, born in Westchester County, N. Y. He became a land-surveyor at nineteen, and in June, 1775, after the outbreak of the Revolutionary War, entered the Continental Army as lieutenant-colonel, serving in the campaign against Burgoyne (1777), in Sullivan's expedition against the Iroquois Indians (1779), and in the Virginia campaign, which closed with the capture of Yorktown (1781). He became a colonel in November, 1776, and a brevet brigadier-general in September, 1783. Subsequently he was a member of the State Convention which ratified the Federal Constitution (1788), of the New York Assembly (1789-90), of the New York Senate (1791-94), and of Congress (1793-1809).

VAN CORTLANDT, Stephanus (1643-1700). An American colonial administrator, born in New Amsterdam (New York City). He was privately educated in New Amsterdam, and became a prosperous merchant. He was a member of the Court of Assizes, a legislative-judicial body, under the first English Governor, Nicolls. He had various ranks from captain to colonel in the regiment of colonial militia, and from 1677 almost continuously until his death was Mayor of New York City, being the first native American to hold that position. His other positions under the British colonial government included those of Governor's Councillor, Judge of the Common Pleas, Justice and Chief Justice of the Provincial Supreme Court, Commissioner of Revenue, Deputy Auditor-General, and Deputy Secretary of the Province. In 1697 William III., by patent, erected Van Cortlandt's large estates into the manor of Cortlandt.

VANCOUVER, văn-ko͞o′vẽr. The largest city of British Columbia, Canada, situated on Burrard Inlet (q.v.), a deep indentation in the mountainous coast, forming a fine harbor for the largest vessels (Map: British Columbia, E 5). It was incorporated as a city in 1886, and has fine water-works, gas and electric lights, and electric street railroads. Stanley, East End, and False Creek are fine parks; and there are handsome churches. Vancouver College, affiliated with McGill University, Montreal, is located here. Its industrial establishments include workshops of the Canadian Pacific Railway, iron works, jute, cooperage, and furniture works, sugar refineries, candy factories, and fruit-preserving establishments. The lumber industry is also represented. A solitary sawmill in an unbroken wilderness marked the site of the present town when, in 1885, the Canadian Pacific Railroad decided to make it their western terminal on account of the fine harbor. The city was platted and many buildings had been erected when in 1886, the place was entirely destroyed by fire. Population, in 1886, 600; in 1891, 13,709; in 1901, 26,196.

VANCOUVER. The county-seat of Clarke County, Wash., 6 miles north of Portland, Ore.; on the Columbia River, the Northern Pacific and the Vancouver, Klickitat and Yakima railroads, and on several steamship lines (Map: Washington, C 4). It has Saint James College (Roman Catholic), opened in 1856, and the State School for Defective Youths. The headquarters of the Military Department of the Columbia are there, the Vancouver Barracks (q.v.) being among the finest army posts in the United States. Other features include the House of Providence, Saint Joseph's Hospital, the Public Library, Court House, and a United States Land Office. There is also a picturesque park, in the heart of the city. The surrounding section is noted for its extensive lumbering interests. Farming, fruit-growing, and dairying are other important industries. The principal manufactures include brick, beer, flour, and lumber products. According to the charter of 1890, the government is vested in a mayor, chosen annually, and a unicameral council. Vancouver was founded by the Hudson's Bay Company in 1828, and was first incorporated in 1858. Population, in 1890, 3545; in 1900, 3126.

VANCOUVER, George (1758-98). An English naval officer and explorer, who served with Cook in his second and third voyages. In 1789 he was sent to Nootka Sound (q.v.) to receive the transfer of the disputed territory from the Spaniards. He went by way of the Cape of Good Hope, touched at Australia and New Zealand, where he surveyed and mapped a portion of the coast hitherto unknown, and then proceeded by way of Tahiti to Nootka. In the following year he passed through the Strait of San Juan de Fuca, discovered the Gulf of Georgia, and circumnavigated Vancouver Island. He then carefully examined for the first time the coast north of San Francisco, and returned to England in October, 1795. His account of his expedition was practically completed at the time of his death in 1798, and was published that year, in London, under the title, *A Voyage of Discovery to the North Pacific Ocean and Round the World in the Years 1790-95.*

VANCOUVER BARRACKS. A United States military post in the State of Washington, established in 1849. The reservation, which embraces 640 acres, is situated on the right bank of Columbia River, 120 miles from its mouth, and 8 miles from Portland, Oregon, which is the nearest railroad station. The post office is Vancouver, Wash., and there is a telegraph station at the post. There are quarters for a regiment of infantry.

VANCOUVER ISLAND. An island on the Pacific coast of North America, belonging to British Columbia, from the mainland of which it is separated on the north by Queen Charlotte Sound and on the east by Johnston and Georgia straits. It is separated from the State of Washington by Georgia and Fuca straits (Map: British Columbia, D 5). Its greatest length is from northwest to southeast. Area, 12,760 square miles. The island is mountainous, belonging to the adjacent chain on the continent. Victoria Peak is the highest point, reaching an elevation of about 7500 feet. The coast presents a fjord-like aspect, being roughly irregular. Nootka Sound is on the west. Lakes and rivers abound, but none of the streams is navigable. The climate is damp and raw, yet is considered healthful. The summers are pleasantly warm, owing to the influence of the Japan current. The island has fine forests of both coniferous and deciduous trees. There is plenty of big game, and the fisheries are rich in salmon, herring, and sturgeon. The flora and fauna are akin to those of British Columbia (q.v.). Gold is found in the rivers; iron and copper ores are abundant; and particularly noteworthy are the coal mines, which supply the whole Pacific Coast. The island has two railways. There are about 10,000 Indians—the Wakash. Victoria, the capital of British Columbia, with a population of 20,816 in 1901, is situated at the southeastern end of the island.

Vancouver was discovered in 1774 by Juan Francisco de la Bodegay Quadra, and in 1792 was circumnavigated by George Vancouver, whence its name. The United States laid claim to it, but relinquished it under the Oregon Boundary Treaty in 1846. At the instance of Great Britain the Hudson's Bay Company agreed to vacate the island for ten years, in order that settlers might enter. As a result it was made a colony at the end of that time, and in 1866 it was united with British Columbia.

VANDA (Neo-Lat., from Skt. *vandana*, parasitic plant). A genus of plants of the natural order Orchidaceæ. The species, which are generally epiphytic, are well supplied with foliage and grow vigorously. In most species the flowers are large and richly colored. *Vanda suavis*, one of the most remarkable species, has large fragrant white or yellow flowers with a violet lip. *Vanda cœrulea* is highly prized for its panicles of azure flowers. Several other species are cultivated in greenhouses. They are propagated by removing the upper portion of the plants with a few roots and planting it separately. A dense shade, a moist atmosphere, and careful watering are required to establish the new plants.

VANDA'LIA. The county-seat of Fayette County, Ill., 69 miles northeast of Saint Louis, Mo.; on the Kaskaskia River, and at the junction of the Vandalia and the Illinois Central railroads (Map: Illinois, C 5). The old State House is the most prominent feature of the city. Vandalia is of considerable importance as the shipping centre of a farming and stock-raising section, and has a foundry, a tarring plant, a paper mill, a manufactory of butchers' blocks, stave and wagon factories, and a brick yard. The water-works are owned and operated by the municipality. Vandalia was settled about 1816, and from 1818 to 1836 was the capital of the State. Population, in 1890, 2144; in 1900, 2665.

VAN'DALS (Lat. *Vandali*, *Vinduli*, *Vindili*, probably connected with Goth. *wandjan*, OHG. *wentan*, Ger. *wenden*, AS. *wendan*, Eng. *wend*, to turn, go). An ancient Germanic people. Procopius states that they originally occupied the country about the *Palus Mœotis* (Sea of Azov), but it would appear that afterwards they migrated to the northwest, and settled south of the Baltic, between the rivers Vistula and Viadua (Oder). They make their first appearance in history in the second century A.D., at which time they inhabited the region to the northeast of the Riesengebirge, and figure as the associates of the Marcomanni and Quadi in the plundering expeditions into Pannonia, and the wars with Marcus Aurelius. In the latter half of the third century they are found in the Roman province of Dacia, along with Goths and Gepidæ. According to Jordanes, the Gothic King Geberic annihilated a large part of the nation on the banks of the Maros. The remainder were transplanted by Constantine to Pannonia (about A.D. 334), where they lived in peace for sixty years. But at the beginning of the fifth century, urged, it is said, by Stilicho, they abandoned their new homes, and in company with the Suevi, Alani, and Burgundians, led by their King, Godegisil, burst into Gaul, which they wasted for the space of three years. Thence they swept through the passes of the Pyrenees into Spain, which experienced a similar fate; and finally, after much quarreling and fighting with their German associates, they settled in a part of Bætica, which received from them the name of *Vandalitia* (modern *Andalusia*). In 429, at the call of Bonifacius, Roman governor of Africa, they crossed the strait of Gibraltar, under their leader, Genseric (q.v.), in one resistless horde (numbering 50,000 to 80,000 in all), carrying devastation and ruin from the shores of the Atlantic to the frontiers of Cyrene. They were joined by the Donatists (q.v.), a sect of African heretics, and being themselves Arians, they inflicted great cruelties upon the orthodox Christians. Meantime Bonifacius endeavored to undo his treachery. He marched against the Vandals, but was defeated with considerable loss, and driven into Hippo (now *Bona*), which he defended for more than fourteen months. Reënforced by a Byzantine army under Aspar, he sallied out against the Vandals, and a second defeat decided the fate of Africa. In 439 Genseric broke the peace which he had concluded with Valentinian III. in 435, and conquered Carthage. A new peace was established which recognized the authority of the Vandals over North Africa from the Atlantic to Cyrene, over the Balearic Isles, Sardinia, Corsica, and part of Sicily. In 455 the Vandals invaded Italy, and plundered Rome for fourteen days. After the death of Genseric (477), his son, Hunneric, cruelly persecuted the Catholics. He warred against the Moorish races in North Africa, who were trying to recover their independence, and kept the Mediterranean in a state of alarm by his piracies. His successors, Guntamund (484-496) and Thrasamund (496-523), were comparatively mild and tolerant rulers. But the warm climate and the love of luxurious pleasure now began to enervate the spirit of the Vandals. Thrasamund was compelled to solicit aid from his brother-in-law, Theodoric (q.v.), who sent a Gothic contingent to him to help him against the Moors of Tripoli. After his death, Hilderic (523-530), a son of Hunneric, became ruler, but his subjects grew discontented, and he was overthrown by his uncle, Gelimer, in 530. This led the Greek Emperor Justinian to send an expedition, under Belisarus, against Gelimer. When the latter heard of the arrival of the Byzantine general, he caused Hilderic and his sons to be put to death, but was himself soon after forced to seek refuge in Numidia. In 533 he surrendered, was carried to Constantinople in triumph, and ended his life in Asia Minor. Most of the Vandals were drafted into the Imperial army, and were lost in the wars with Persia. The few who remained in Africa rapidly disappeared among the natives. Consult: Papencordt, *Geschichte der vandalischen Herrschaft in Afrika* (Berlin, 1837); Wrede, *Die Sprache der Vandalen* (Strassburg, 1866).

VANDAMME, väɴ'dȧm', Dominique René (1771-1830). A French general, born at Cassel (Nord). He enlisted at Martinique in 1788, and, returning to France at the beginning of the Revolution, gained distinction as the commander of a free corps which he organized in 1792, and became at the age of twenty-two a brigadier-general in the Army of the North. He fought in Belgium under Jourdan and on the Rhine, became general of division in 1799, and distinguished himself at Austerlitz (1805). In the following year he was placed in command of the Württemberg troops, and in this capacity occupied Silesia in 1806-07, and took part in the Austrian campaign of 1809. In 1812 he commanded the forces in Westphalia, but, owing to dissensions with King Jerome, was removed. After the battle of Dresden (1813) he was intrusted by Napoleon with the pursuit of the Allies, but at Kulm (August 29-30) was surrounded and compelled to capitulate with 10,000 men. During the Hundred Days he was created a peer by Napoleon (he had been made count in 1808), and fought at Ligny and Wavre. He was banished after the second restoration and lived for some time in America. He died in his native town.

VANDERBILT, Cornelius (1794-1877). An American capitalist and financier, born near Stapleton, Staten Island, N. Y. He had practically no schooling. At the age of sixteen he established a ferry between Staten Island and New York for passengers and farm products. At eighteen he owned or controlled three boats, and from that time on his interests in shipping rapidly increased. In 1813 he married and settled in New York City. He rapidly acquired a considerable fleet of river and harbor boats, and in 1817 built and became captain of the first steamboat running between New York and New Brunswick, N. J. A company was organized of which he obtained in 1824 a controlling interest. In 1827 he leased the New York and Elizabeth Ferry and made it a paying investment. In 1829 he began the construction of a fleet of steamboats to compete with the existing Hudson River and Long Island Sound lines. Gradually he obtained control of the important competing lines, established new lines out of New York to Boston and other coast points, and started a new line on the Delaware River. Subsequently his fleet became the largest of the sort in the world, and led to their owner being popularly known as 'the Commodore.' In 1851 he established a steamship and transfer line to California by way of Lake Nicaragua, which successfully competed with the existing Panama route. During the Crimean War he established a transatlantic line between New York and Havre. About the time of the outbreak of the Civil War, having accumulated a fortune of upward of $10,000,000 in the steamboat business, he gradually began to withdraw from that and transfer his capital to railroads, the great possibilities of whose development appealed to him. He had become president of the New York and Harlem Railroad as early as 1857, and in 1864 he obtained control also of the Hudson River Railroad, the stock of which had fallen to a low figure, worked it in conjunction with the Harlem line, and soon placed it on a paying basis. In 1867 he obtained control of the New York Central Railroad, was elected its president, and in 1869 consolidated with it the Hudson River road. Eventually he completed his plan of a through trunk line from New York to Chicago by securing the Lake Shore, Canada Southern, and Michigan Central roads. Every line that came into his hands was placed on a sound financial basis, and continually improved in service and equipment. At his death his fortune, estimated at about $100,000,000, was left largely to his son, William H. Vanderbilt. A bequest of $1,000,000 was made for founding Vanderbilt University at Nashville, Tenn.

VANDERBILT, Cornelius (1843-99). An American financier and capitalist, son of William H. Vanderbilt and grandson of 'Commodore' Cornelius Vanderbilt. He was born at New Dorp, Staten Island, and was privately educated. After serving as a banking clerk in New York, he entered the brokerage house of Kissam Brothers. In 1865 he entered the service of the New York and Harlem Railroad, of which he was treasurer from 1867 to 1877. In the latter year, upon his father succeeding 'Commodore' Vanderbilt as president of the New York Central Railroad, he became its first vice-president, in which position he had almost complete control of the finances of the road. In 1878 he became treasurer of the Michigan Central Railroad and vice-president and treasurer of the Canadian Southern. Subsequently he was for several years president of both of the last mentioned roads, besides being president of the New York and Harlem, and after 1886 chairman of the board of directors of the New York Central Railroad. At the same time he was a director in more than thirty-four different railway corporations. He gave largely to educational and religious institutions, among which were Vanderbilt University, Yale University, and the Cathedral of Saint John the Divine in New York City.

VANDERBILT, William Henry (1821-85). An American capitalist and financier, the son of 'Commodore' Cornelius Vanderbilt (q.v.), born in New Brunswick, N. J. He was educated at the Columbia College Grammar School, and at the age of eighteen became a banking clerk in New York City. A few years later failing health compelled him to retire to a farm on Staten Island. He was appointed receiver of the Staten Island Railroad, which had fallen into difficulties, and in two years cleared it from debt, connected it with New York by a new ferry line, and as a result was chosen its president. Thenceforth his father made him a partner in all his large railroad and financial transactions, and manager of the various railroad interests he acquired. The son became vice-president of the New York and Harlem Railroad in 1864, and in the next year vice-president of the New York Central and Hudson River lines. At his father's death in 1877 he succeeded him as president of the latter road, and under his able and skillful management the control was completed of the Michigan Central, Lake Shore and Michigan Southern, Canada Southern, and Chicago and Northwestern systems. Subsequently the 'Nickel Plate' and West Shore roads were acquired. He gave largely during his lifetime to Vanderbilt University, the College of Physicians and Surgeons (Columbia University), and other educational and philanthropic institutions.

VANDERBILT UNIVERSITY. A coeducational institution of learning at Nashville, Tenn., founded in 1872 as the Central University of the Methodist Episcopal Church, which was changed to its present name in 1873 in honor of Cornelius Vanderbilt, who made its establishment possible by a gift of $1,000,000. The university began work in 1875 with four departments, academic, biblical, legal, and medical. Subsequently the departments of pharmacy, dentistry, and engineering were added. The university has subsequently received numerous gifts from the members of the Vanderbilt family amounting to about $600,000 in all, besides a contribution of $28,000 by the citizens of Nashville for the purchase of the grounds. A summer school is maintained, though not as a regular part of the university organization. Correspondence work was instituted in 1902 in the biblical department, the first year's enrollment reaching nearly 200. The university confers the Bachelor's degree in arts, engineering, science, divinity, and law; the Master's in arts, science, and pharmacy; the Doctor's in philosophy, science, and medical and dental surgery, and the degrees of Civil, Mechanical, and Mining Engineer. The whole endowment in 1903 was $1,300,000, when the value of the college property was $2,200,000; the value of grounds and buildings, $800,000; and the income, $125,000. During the year the university had an attendance of 695 students, a faculty of 100 members, and a library of 30,000 volumes.

VAN′DERKEMP, Francis Adrian (1752-1829). An immigrant from Holland to the State of New York toward the close of the eighteenth century; a man of remarkable learning and of the highest character, who was prevented by untoward circumstances from attaining the celebrity which he richly deserved. Born in a family of distinction at Kempen, Holland, and educated in the University of Groningen, and among the Baptists of Amsterdam, he became a minister in Leyden (1777), and there remained for several years. In politics and in religion he was liberal, and incurred the displeasure of the Government. He enjoyed the friendship of Baron van der Capellen of Pol—a firm friend of the American colonies—and joined the armed forces of the Patriot Party, which sought political reform in opposition to the Orange Party. Taken prisoner, he was in confinement for several months. Disheartened upon his release in December, 1787, he informed his friend John Adams, then United States Minister in London, of his intention to emigrate to America, and received from him several introductory letters. Lafayette gave him others. Early in 1788 he arrived in New York. For six years his home was Esopus, after which he removed to the neighborhood of Lake Oneida, where he was engaged in agriculture during the remainder of his life. An appointment as a justice of the peace gave him the title of judge. With many of the foremost men of the country he maintained the friendliest relations, and he was chosen a member of learned societies and admitted to the honorary degree of LL.D. by Harvard University (1820). In addition to many printed papers he left an autobiography, which has furnished the material for a memoir written in 1903 by Mrs. Helen Lincklaen Fairchild. Many of his manuscripts are preserved by the Pennsylvania and Buffalo Historical Societies and by Columbia University.

VAN′DERLYN, John (1775-1852). An American portrait and historical painter, born near Kingston, N. Y. He was a protégé of Aaron Burr, who supported him as a pupil of Gilbert Stuart, in Philadelphia, and sent him to Paris, where he studied for five years under Vincent and other masters. On his return to America in 1801 he lived in the house of Burr, who was then Vice-President, at Washington, where he painted the well-known profile likenesses of Burr and his daughter. In 1803 he returned to Europe, studying for two years in Rome. For his "Marius Among the Ruins of Carthage," now in possession of the heirs of Bishop Kip, of California, a gold medal was awarded him at Paris in 1808. In 1812 he finished his second chief work, "Ariadne of Naxos" (Philadelphia). He painted a number of portraits of public men in Paris, and in America after his return to the United States in 1815. For twelve years his panoramas of Paris, Athens, Mexico, and Versailles and other paintings were exhibited in the New York Rotunda, now the rear of the present city hall; but the financial returns were small and the remainder of his life was a struggle for existence. He died in destitution at Kingston. Only the design of his "Landing of Columbus," one of the large paintings in the rotunda of the Capitol in Washington, well known from its use upon the United States five-dollar note, is by Vanderlyn, the execution having been intrusted to a French painter.

Vanderlyn's paintings show superior draughtsmanship and skill in composition, but are deficient in color. His portraits are good in characterization. The best known are those of Washington in the Capitol at Washington; President Taylor, in the Corcoran Gallery, ib.; Aaron Burr and R. R. Livingston, in the library of the New York Historical Society; and one of himself in the Metropolitan Art Museum.

VAN DER MEER van Delft. See Vermeer.

VAN DER MEER (VERMEER) van Haarlem, vän dĕr mär (vâr′mär), Jan (1628-91). A Dutch landscape painter, born in Haarlem. He was a pupil of De Wet (1638) and became a member of the guild in 1654. His pictures include: "View of Haarlem" (Berlin); "View of the Dunes" (Dresden); "A Wood Road" (Munich), and other examples in Paris, Rotterdam, and Vienna. They are rare, as are those of his son and pupil, Jan, the Younger (1656-1705), born in Haarlem. He also studied under Berghem and became especially well known as a marine painter. He also left six masterly etchings.

VAN DER STUCKEN, stōō′ken, Frank (1858—). An American composer and musical conductor, born in Fredericksburg, Texas. When but six years old he was taken by his parents to Antwerp, and was thus enabled to study with Benoit. Before he was twenty he had produced several successful compositions, among them being a ballet, which was produced at the Royal Theatre, and a *Gloria* and *Te Deum*. In 1876 he went to Leipzig, where he spent two years in study with Reinecke, Grieg, and Langer, after which he traveled through Europe for two years. In 1881 and 1882 he served at the Breslau City Theatre as kapellmeister, wrote incidental music to Shakespeare's *Tempest*, and formed a valuable friendship with Grieg and Liszt. His first important appointment in America was as musical director of the Arion Club of New York, succeeding L. Damrosch. In 1895 he became director of the Cincinnati Conservatory of Music, and was the first conductor of the Cincinnati Symphony Orchestra. He composed the opera *Vlasda* first produced in 1883; a symphonic prologue, *William Ratcliffe; Festival March* for orchestra; *Festival Hymn; Inauguration March,* and orchestra episode, *Pagina d'armore,* and several series of songs. His four-part mixed and male choruses *a Cappella* rank among his most successful compositions.

VAN DER WEYDEN, dẽr wī′den. See WEYDEN, VAN DER.

VAN DE VELDE, vän dȧ vĕl′de. A family of Dutch artists. See VELDE, VAN DE.

VAN′DEWATER, GEORGE ROE (1854—). An American Protestant Episcopal clergyman, born at Flushing, L. I., and educated at Cornell and at the General Theological Seminary, New York City, where he graduated in 1879. He became rector of Saint Luke's Church, in Brooklyn, organized the congregation of Saint Bartholomew, and was appointed general secretary of the parochial mission society. In 1888 he assumed charge of Saint Andrew's, New York City. Dr. Vandewater was chaplain of the Seventy-First New York Regiment, and served with that body during the Spanish-American War, and in 1892 was appointed chaplain of Columbia University. He published: *Manual of Church Music* (1886); *Hymnbooks for Missions* (1887); and *Manual of Church Prayer* (1888).

VAN DIEMEN'S LAND. See TASMANIA.

VAN DORN, EARL (1820-63). An American soldier prominent on the Confederate side in the Civil War. He was born near Port Gibson, Miss.; graduated at West Point in 1842, was appointed second lieutenant in the Seventh Infantry, and served in garrison duty for several years. He took part in the military occupation of Texas by United States troops, and in the Mexican War, winning the brevet of a captain for valor at Cerro Gordo and of major for his conduct at Contreras and Churubusco. After the war he was engaged in suppressing the outbreak of the Seminole Indians in 1849-50, and subsequently in the operations against the Comanches in the Indian Territory. He became a captain in 1855 and a major in 1860. But after the secession of his native State he resigned his commission, and was appointed brigadier-general of the Mississippi troops. Later he succeeded Jefferson Davis as major-general of the Mississippi forces, and in March, 1861, received an appointment as colonel in the Confederate Army. He was promoted to the rank of brigadier-general in June, 1861, and in September to the rank of major-general, and in January, 1862, was appointed commander-in-chief of the Trans-Mississippi Department. He was defeated at Pea Ridge in March, 1862, and was superseded in command by General Holmes and given command of a division in the Army of the Mississippi. Again promoted, he was in command of his own and Sterling Price's troops in the unsuccessful attack on Rosecrans at Corinth, October 3 and 4, 1862. After the defeat of his army at this point charges were brought against him for neglect of duty, but he was completely exonerated by a court of inquiry. Superseded by Pemberton, he commanded a division under the latter, and while in command of the Confederate cavalry during the first advance movements of the Federals on Vicksburg, won an engagement at Holly Springs, Miss., and conducted other operations with great success and brilliancy. He continued in the field until May, 1863, when he was shot and killed as a result of a private quarrel.

VAN DYCK, dīk (**VANDYKE**), Sir ANTHONY (ANTHONIS) (1599-1641). The most important portrait painter, next to Rubens, of the Flemish school; also a figure-painter and an etcher. He was born at Antwerp, March 22, 1599, the son of Francis van Dyck, a wealthy silk-mercer, and of Marie Cuypers, who was known for her skill in embroidery. He was placed, at ten, with the painter Hendrik van Balen; at fifteen he was independently established at Antwerp with Jan Brueghel the younger. His heads of "Christ" and of the "Twelve Apostles" attracted the attention of Rubens, who made the young artist his assistant and friend. He lived in the great master's house, and fell completely under his influence, often painting the same subjects in a manner which makes it extremely difficult to distinguish them, as, for example, in several works at Berlin and a "Saint Jerome" at Dresden. The pretty stories of his youth, like that of his love affair with the maiden in charge of the Archduchess's dogs, are mostly mythical. In November, 1620, on invitation of the Earl of Arundel, he went to England, and was granted a pension by James I., but in February, 1621, he returned to Antwerp. From there he set out for Italy, arriving at Genoa in November. By this time he had formed an independent style, based upon Rubens's, less robust in character and bright in color, but more refined.

At Genoa he was warmly welcomed by the resident Flemish painters, like the brothers De Wael, whom he commemorated in the portrait of the Capitoline Museum (Rome) and in that of Jacobus de Wael and his wife at Munich. Here the best part of his life work begins. He was especially influenced by the great Venetian masters, producing works which in their splendor of color rivaled Titian. Wonderfully characteristic is the series of portraits of the Genoese nobility, in their rich, costly robes and glittering jewels, which are still mostly to be seen in local palaces.

Though Genoa remained his headquarters, he made short visits to other cities, Florence, Bologna, and Venice. His Italian sketchbook, now in possession of the Duke of Devonshire, gives interesting record of his studies, many of which are after Titian. At Rome (1623) he was especially patronized by Cardinal Bentivoglio, whose fine portrait hangs in the Pitti Palace. On a visit to Palermo, at the invitation of the Governor, Emmanuele Filiberto of Savoy, he portrayed his host (Turin), besides painting the celebrated Madonna del Rosario. (See MADONNA.) Afterwards he painted portraits of other members of the House of Savoy at Turin, now in the Pinacoteca. The date of his return to Antwerp is uncertain. He was not present at his father's deathbed, December 1, 1622, as is often stated, but may have returned in January, 1626, though there is no proof of his presence at Antwerp before March, 1828. In the meantime he probably visited Aix-la-Chapelle and Paris.

The second Antwerp period is that of Van Dyck's best work. In friendly rivalry with Rubens, he established an influential school whose work he superintended. Sometimes he painted after Rubens's sketches, achieving works difficult to distinguish from his master's, as in "Saint Martin Dividing His Cloak" (National Gallery, London, and Saventhem, Belgium), and the "Raising of the Brazen Serpent" (Madrid and Richmond). This is the period of his chief religious works. At his father's dying wish, he presented to the Dominican Sisters at Antwerp a picture of "Christ on the Cross" (Antwerp Museum). This was one of his favorite subjects; others were the "Pietà" and "Bewailing the Dead Body of Christ," of which there are splendid examples at Antwerp, Vienna, and Munich. Of his Madonnas well-known examples are at Munich, Paris, Berlin, and Palermo. (See MADONNA.) His mythological subjects are less frequent; among the best known are "Danaë" (Munich) and "Diana and Endymion" (Prado).

His portraits were no less excellent in color than those done at Genoa; they show increased dignity and nobility of character. His celebrity is attested by the appointment as Court painter to the Spanish regents of the Netherlands, Albert and Isabella; his portrait of the latter is in Madrid. Other sitters were Maria de' Medici, the exiled Queen mother of France, and her son Gaston, Duke of Orleans (Earl of Radnor). Most of the best portraits in European galleries belong to this period; among them are those of Frans Snyders and his wife (Saint Petersburg and Cassel), the Count Palatine of Neuburg, the full-length Duke and Duchess of Croy, the so-called Burgomaster of Antwerp and wife, and the Organist Liberti—all at Munich; the beautiful Princess Luisa de Tassis (Liechtenstein Collection, Vienna); Anna Wake (The Hague); President Ricardo and his son (Louvre); and Cornelis van der Geest (National Gallery, London), besides many others in English private collections.

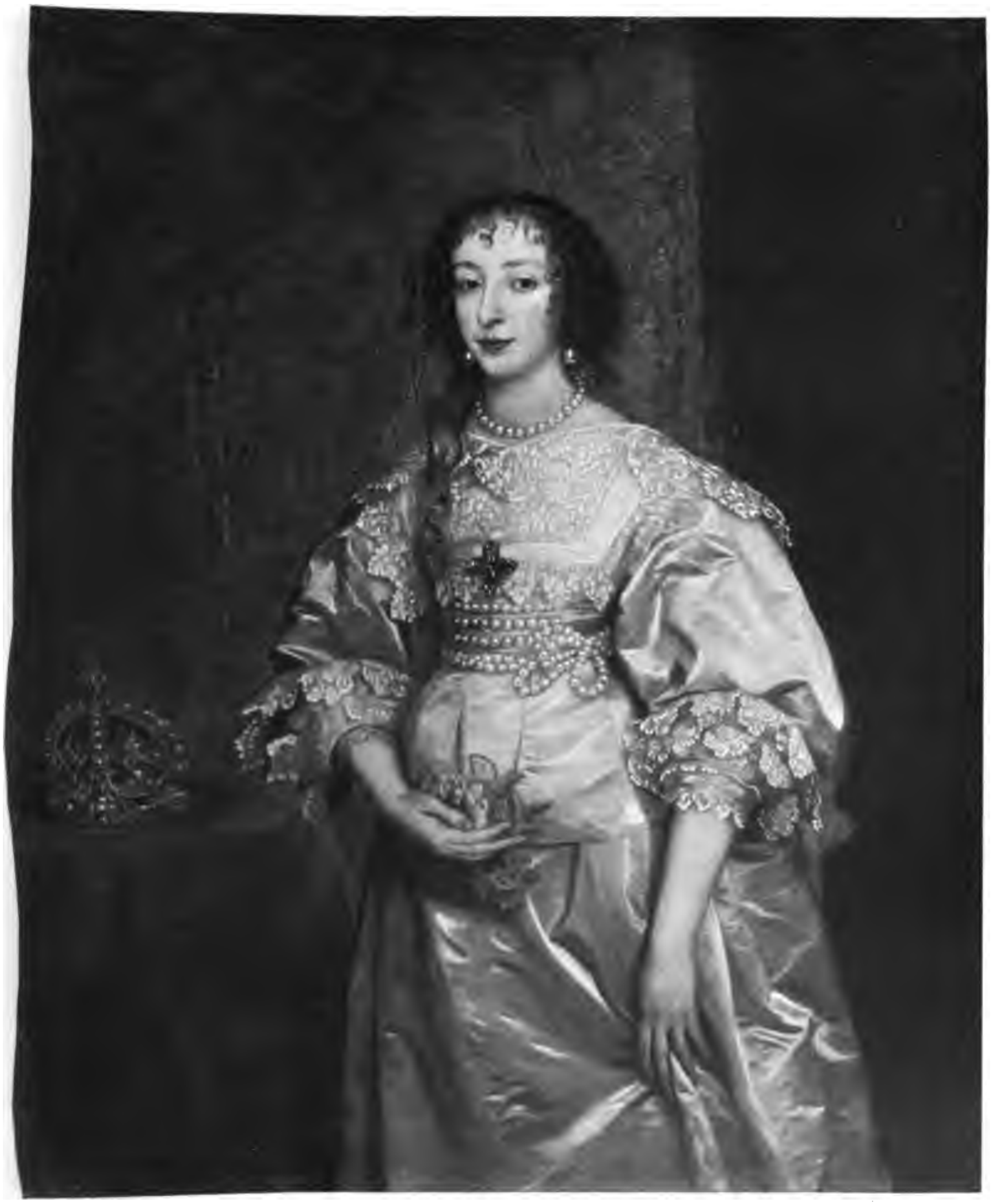
Van Dyck also designed for the school of engravers which Rubens had founded, his plates being executed by Paulus Pontius, Lucas Vorster, and others. He himself etched about 22 plates with fine technique; but he generally preferred to etch only the heads, leaving the detail to engravers. During his stay in Italy he began to collect materials for an iconographic work portraying the chief celebrities of the day. The studies in *grisaille* are dispersed over Europe, but the complete work was published at Antwerp in 1641. It is usually known as Van Dyck's *Centum Icones* or *Iconographiæ.*

For some time Van Dyck had been receiving overtures from the English King, instigated by the Earl of Arundel and his friend Kenelm Digby. He had been persuaded in 1621, but, differences arising, he went instead to Holland. There he portrayed Prince Henry of Orange and the Princes Charles Louis and Rupert, sons of the exiled King of Bohemia (Vienna Gallery). At this time, probably, occurred his visit to Frans Hals at Haarlem, which romancers have elaborated upon. Upon his arrival in England (1632) the King assigned him a house in Blackfriars (London) and apartments in the royal palace of Eltham for the summer; he was knighted and named painter in ordinary to their Majesties, and the year following was granted a yearly pension of £200. The portraits of the royal family which he now began are perhaps his best known works. Among these are Charles I., the Queen, and their children, and Charles I. on horseback, at Windsor; an equestrian portrait of the King in the National Gallery; the portraits of the King and Queen at Saint Petersburg, and at Dresden, and "Charles I. Hunting," in the Louvre. In 1634 Van Dyck returned to Antwerp, where he portrayed the new Regent, Don Ferdinand of Austria (Madrid), and the family of Count John of Nassau (Panshanger), and painted his remarkable picture of the "Magistracy of Brussels in Session." From 1635 to 1640 he resided in England, and there he painted the host of ancestral portraits scattered throughout the seats of the English nobility. Only the sketch and the finishing touches of the paintings of this period are by the master himself, the rest being left to assistants. Among the most charming are the two celebrated groups of the King's children, the three with the spaniel (1635, Dresden), and five with the great Dane (1637, Windsor). Most of his works exist in replicas, and all important museums of Europe and the United States possess examples.

On the death of Rubens in 1640 Van Dyck was invited to Antwerp to complete his pictures for the King of Spain, but declined. In 1641 he went to Paris, but was disappointed in his hopes of a commission to decorate the Louvre. In failing health he returned to London, where he died December 9th. He was a man of refined character and aristocratic bearing, remaining all his life the *pittore cavalieresco* of his colleagues in Italy. These traits are very perceptible in the many portraits of himself which he painted, in the beautiful youthful example at Munich as in the maturer work in the Uffizi. From his youth he was a favorite of the fairer sex, and many were his adventures; but in 1640, at the King's wish, he married Mary Ruthven, a Court lady of noble descent.

Van Dyck's character made him *par excellence* the portraitist of the aristocracy; his portraits are aristocratic and refined, usually with a touch of melancholy, sometimes, indeed, seeming almost posed and sentimental. Much modern sympathy for the cause of the roistering Cavaliers of England is based upon his noble portraits of Charles I. and his followers. In him Flemish realism was tempered by the refining influence of Italy, manifesting itself in more subdued coloring and increased nobility of form. What Rubens sought to express by dramatic action he showed by intensity of expression. Van Dyck trained a large number of assistants, but did not form a school. He had a great influence upon the later English portraitists, like Reynolds, Gainsborough, and Lawrence. Consult the biographies by Carpenter (London, 1844), Head (London, 1877), Michiels (Paris, 1881), Guiffrey (ib., 1882), Knackfuss (Bielefeld, 1896), and Cust (London, 1900).

VAN DYCK, CORNELIUS VAN ALEN (1818-95). An American missionary. He was born at Kinderhook, N. Y., and graduated M.D. at Jefferson Medical College, Philadelphia, 1839. The next year he went as medical missionary to Syria. He was stationed at Beirut, Arbeih, and Mount Tabor; was principal in a seminary (1848-52); in the Siedan field (1852-57), and later at Beirut. In 1846 he was ordained to the Congregational ministry. He made himself master of the spoken and written Arabic, and undertook the work left unfinished by the death of Eli Smith



SIR ANTHONY VAN DYCK

"QUEEN HENRIETTA" OF ENGLAND, FROM THE PAINTING IN THE DRESDEN GALLERY

of translating the Bible into Arabic. Ultimately he entirely rewrote the translation in the style of the Koran. He was the manager of the Mission Press at Beirut from 1857 to 1880; physician to Saint John's Hospital and professor of pathology in the Syrian Protestant College there from 1857 to 1882, when he became physician at Saint George's Hospital. When he had completed his translation of the Bible he came to New York to superintend its printing by the American Bible Society, and taught Hebrew in Union Theological Seminary in that city, 1866-67. He made many translations of religious, scientific, and medical works into Arabic.

VAN DYCK, Ernest (1861—). A Dutch tenor singer, born at Antwerp. He studied in Paris under Bax Saint-Yves. In 1886 he was engaged to sing the rôle of Parsifal, in which his success was instantaneous, and through which he obtained a world-wide reputation. In 1888 he was engaged for the Vienna Court opera, and subsequently made many tours of Europe and America. He became an especial favorite in Chicago and New York.

VAN DYKE, Henry (1852—). An American clergyman, writer, and educator, born in Germantown, Pa. He graduated at the College of New Jersey, Princeton (1873), at the Princeton Theological Seminary (1877), and at Berlin University (1878). From 1878 to 1882 he was pastor of the United Congregational Church of Newport, R. I., and then of the Brick Presbyterian Church, New York City, till 1900, when he accepted a professorship of English literature at Princeton. His works include: *The Reality of Religion* (1884); *The Story of the Psalms* 1887); *The Poetry of Tennyson* (1889, 1895); *The Christ-Child in Art* (1894); *Little Rivers* (1895); *The Gospel for an Age of Doubt* (1896); *The Other Wise Man* (1896); *The Builders, and Other Poems* (1897); *The Gospel for a World of Sin* (1899); *The Toiling of Felix, and Other Poems* (1900); *The Ruling Passion* (1901); and *The Blue Flower* (1902). Some of his books attained great popularity.

VAN DYKE, John Charles (1856—). An American art critic, born at New Brunswick, N. J., and educated at Columbia College. He was admitted to the New York bar in 1877, and afterwards was appointed professor of art history in Rutgers College. His publications include: *Principles of Art* (1887); *How to Judge a Picture* (1888); *Serious Art in America* (1889); *Art for Art's Sake* (1893); *A History of Painting* (1894); *Old Dutch and Flemish Masters* (1895); *Modern French Masters* (1896); and *Nature for Its Own Sake* (1898).

VANE, Sir Henry (Harry) (1613-62). An English statesman. He was the son of Sir Henry Vane, a statesman of the reign of Charles I. He studied at Magdalen Hall, Oxford, but never matriculated, because he refused to take the oath of allegiance and supremacy. At an early age he became a Puritan, and embraced independent principles in religion and republican principles in politics. In 1635 he sailed for New England. He was soon after elected Governor of Massachusetts, but, having quarreled with the leaders of the colony, returned to England in 1637. Through his father's interest he was appointed treasurer of the navy, and entered Parliament in 1640. He immediately joined Pym and the other Parliamentary leaders in their opposition to Charles I., and was one of the originators of the 'Root and Branch' Bill for the total abolition of episcopacy. After the death of Pym in 1643, Vane became the leader of the House of Commons, which power he retained until 1646. He was a member of the Westminster Assembly; was the chief instrument in carrying the Self-Denying Ordinance (1644); carried to the House of Lords the articles of impeachment against Archbishop Laud; and was one of the commissioners at the Treaties of Uxbridge (1644-45) and the Isle of Wight (1648). But he was too strict a Parliamentarian to view with satisfaction the increasing power of Cromwell and the army. He labored for an accommodation with the King, and after Pride's Purge refused to sit in Parliament, taking no part in the execution of the King. On the establishment of a Commonwealth, however, in February, 1649, he was appointed one of the Council of State and was one of its most active and efficient members. After the expulsion of the Rump in 1653, he broke definitely with Cromwell and withdrew from public affairs. In 1656 Vane wrote a book, entitled *A Healing Question Propounded and Resolved,* which was so hostile to Cromwell's Protectorate, that the author was imprisoned in Carisbrooke Castle, Isle of Wight. He was released after a detention of four months, and attempts were made by Cromwell to win him over, but Vane was inflexible, and during the rule of the great Protector and his son Richard he maintained an attitude of sullen discontent. When the Restoration took place, Vane was one of the twenty persons excluded from the general pardon; and in July, 1660, he was committed to the Tower. On June 2, 1662, he was arraigned and indicted for high treason before the Middlesex grand jury, found guilty, and on the 14th was beheaded on Tower Hill. There are *Lives* of Vane by Upham (New York, 1860) and Hosmer (Boston, 1888).

VANES'SA. The disguised name given by Swift to Esther Vanhomrigh, formed from the first syllables of her whole name. She was the daughter of a Dutch merchant, who had followed William III. to Ireland and had received high positions as tokens of that monarch's regard. See Swift, Jonathan.

VAN EYCK, ik. The name of two celebrated Flemish painters. See Eyck, Van.

VAN HISE, Charles Richard (1857—). An American geologist and educator, born at Fulton, Wis. He graduated at the University of Wisconsin in 1879, served successively on its faculty as instructor in chemistry and metallurgy, assistant professor of metallurgy, professor of metallurgy, professor of metallurgy and petrology, and professor of geology until 1903, when he was elected president of the university. He became associated with the United States Geological Survey in 1883, thereafter served as assistant geologist of the Lake Superior Division (1883 to 1888), and geologist in charge of the Lake Superior Division (1888 to 1900), and in 1900 was appointed geologist in charge of the Division of the Pre-Cambrian and Metamorphic Geology. In 1897 he was appointed consulting geologist for the Wisconsin Geological and Natural

History Survey. He became a member of the National Academy of Sciences, the Scientific Society of Christiania, and various other scientific associations, and in 1892, upon the foundation of the *Journal of Geology,* was made one of its editors. His principal works relate to the geology of the Archæan and Algonkian formations. He is a recognized authority of the highest order on American Algonkian and Archæan geology, and particularly on the iron-bearing series of the Lake Superior region, on the deposition of ores, and on the principles of structural and dynamic geology, as applied to Pre-Cambrian formations. His separate publications include such titles as *Correlation Papers—Archæan and Algonkian* (1892); *The Penokee Iron-Bearing Series of Michigan and Wisconsin* (with R. D. Irving, (1892); *Principles of North American Pre-Cambrian Geology* (with Appendix by L. M. Hoskins, 1896); *The Marquette Iron-Bearing District of Michigan* (with W. S. Bayley and H. L. Smyth, 1897); *The Crystal Falls Iron-Bearing District of Michigan* (with J. Morgan Clements, H. L. Smyth, and W. S. Bayley, 1899); *The Menominee Iron-Bearing District of Michigan* (with W. S. Bayley, 1900); *Some Principles Controlling the Deposition of Ores* (1901); *The Iron Ores of the Lake Superior Region* (1901); *The Lead and Zinc Deposits of the Mississippi Valley, U. S. A.* (with H. F. Bain, 1902); *A Treatise on Metamorphism; An Attempt to Reduce the Phenomena of Rock Alterations to Order Under the Laws of Energy* (1903).

VAN HORNE, Sir William Cornelius (1843—). A Canadian railroad official, born near Joliet, Ill. After filling various positions with several railways, he became general manager of the Canadian Pacific Railway in 1882, and in 1888-99 served as president of that road. He was also instrumental in the development of the Canadian Pacific Steamship Company, and of steamship communication with Australia.

VANILLA (Neo-Lat., from Sp. *vainilla, vaynilla,* vanilla, vanilla-bean, little pod, diminutive of *vaina,* pod, from Lat. *vagina,* sheath). A genus of epiphytic orchids, natives of tropical America and of Asia. The seedlings germinate in the ground, and climb with twining stems to a height of 20 to 30 feet on trees, upon which they feed and to which they cling by fibrous roots produced from the nodes. The stem is four-cornered and juicy; the leaves long and fleshy; the very large fleshy, generally fragrant flowers in spikes; the fruit, a pod-like fleshy capsule, opening along the side. The vanilla of commerce is chiefly, if not wholly, the fruit of *Vanilla planifolia,* a species indigenous from Mexico to Peru, and cultivated in the West Indies, Mauritius, and Ceylon. The plant is propagated by cuttings and is allowed to climb trees that will afford it a partial shade. It furnishes a crop in three years and continues in bearing for thirty or forty years. Since it is not self-fertile, artificial fertilization of the flowers is resorted to in the more successful plantations. The fruit is cylindrical, 7 to 8 inches long, and less than half an inch thick. It is gathered before it is fully ripe, dried in the shade, and 'sweated,' to develop and fix the aroma. This manipulation, which is a kind of fermentation, requires great care, and upon it the value of the product largely depends. The fruit contains within its tough pericarp a soft black pulp, in which many minute black seeds are imbedded. It has a strong, peculiar, agreeable odor, and a sweetish taste, which is most pronounced in the interior pulp. It is much used by perfumers and also for flavoring chocolate, pastry, sweetmeats, ices, and liquors. The aromatic principle of vanilla is vanillin ($C_8H_8O_3$), now produced artificially by several methods. Owing to the high price of the best vanilla beans, $10 to $15 per pound, the artificial product is used to a great extent, especially in adulterating the cheaper grades. It has not the delicate odor of the natural product and has a tendency to break up, forming undesirable compounds.

VANILLA PLANIFOLIA.

VANILLA GRASS. See Holy Grass.

VANINI, vȧ-nē′nė, Lucilio (c.1585-1619). An Italian free-thinker, born at Taurisano. He taught successively at Geneva, Paris, and Lyons. at the last of which cities he published in 1615 the *Amphitheatrum Æternæ Providentiæ.* On account of his pantheistic teachings he was forced to flee to England. When his dialogues *De Admirandis Naturæ Reginæ Deæque Mortalium Arcanis* came out in Paris the following year they were burned by the Sorbonne. Vanini then went to Toulouse, where he began to teach. Here he was again accused of atheism and witchcraft, and was burned at the stake on the day of his condemnation. His dramatic death has given him a reputation not justified by the achievements of his life.

VANITY FAIR. In Bunyan's *Pilgrim's Progress,* a fair held in the town of Vanity, at which all comers are supposed to give themselves up to thoughtless frivolity and careless vice. It is a scene graphically described. The term has become synonymous with the world of fashionable pleasure.

VANITY FAIR. A celebrated novel by Thackeray, published first in monthly parts, from January, 1847, to July, 1848, and in book form with illustrations by the author, in 1848. The name was suggested by the Vanity Fair of *Pilgrim's Progress.* It contains the famous character of Becky Sharp (q.v.).

VAN LEN'NEP, HENRY JOHN (1815-89). An American missionary. He was born in Smyrna, Asia Minor, and was sent to the United States for education at the age of fifteen. He graduated at Amherst College, 1837, studied theology for one year at Andover, and sailed as a missionary of the American Board to Turkey, 1849. He was stationed in Constantinople, Smyrna, and Tocat in connection with educational institutions, and traveled in Greece, Palestine, and Egypt. He returned to the United States, 1869, and became professor of natural sciences, Greek, and modern languages in Ingham University, Le Roy, N. Y., 1876, and principal of Sedgwick Institute, Great Barrington, Mass., 1879. He was a fine scholar and author of the valuable books, *Travels in Asia Minor* (1870), *Ten Days Among the Greek Brigands* (1874), and *Bible Lands* (1879).

VAN LENNEP, vän lĕn'nĕp, JACOB. A Dutch author. See LENNEP.

VAN LOO, lō. A family of Flemish and French painters. See LOO, VAN.

VAN MARCKE, märk, EMILE (1827-90). A French cattle painter, born at Sèvres. He studied under Troyon at Barbison, and became a painter of exceptional ability. He differs from his master in that he lacks the dramatic element, representing his animals in a state of repose. He received the cross of the Legion of Honor in 1872 and a gold medal at the Paris exhibition. His works are very popular in the United States, and are to be found in the principal public and private collections.

VANNES, vȧn. The capital of the Department of Morbihan, France, at the mouth of the Vannes, 84 miles northwest of Nantes (Map: France, D 4). It is a quaint, decadent town. The town has the venerable Cathedral of Saint Pierre, a Hôtel de Ville (1884), Saint Simon College (1886), with its seventeenth-century chapel, a museum of natural history, and one of Celtic and Gallo-Roman antiquities. Part of the old walls remain, notably the Tour du Connétable. Vannes has linen and cotton mills, tanneries, breweries, and iron works. Shipbuilding is extensively carried on. There is a large trade in grain, salt, etc., through the Port du Conteau, three miles away. Vannes was the capital of the Veneti. It became the Roman Dariorigum Venetorum. Population, in 1901, 23,375.

VAN RENSSELAER, văn rĕn'se-lär, KILLIAN (1595-1644). A Dutch merchant, active in the founding of the Dutch colony of New Netherland. He came of a wealthy family of Amsterdam, where he received a good education and became a leading diamond and pearl merchant. He was one of the promoters and organizers of the Dutch West India Company, to which he advanced large sums of money, and loaned several vessels. After the successful settlement of the New Amsterdam colony, he purchased, through an agent, a large tract of land on the Hudson River, south of Albany, upon which he established a settlement of mechanics and farmers, which he called Rensselaerswick. The estate covered almost the entire area now included in the three counties of Albany, Rensselaer, and Columbia, and was the first and the largest of the patroonships in New York. (See PATROONS.) Van Rensselaer himself did not come to America, but managed his estate through an agent.

VAN RENSSELAER, văn rĕn'se-lĕr, STEPHEN (1764-1839). An American political leader known as the 'Patroon.' He was born in New York, the fifth in descent from Killian Van Rensselaer (q.v.), the original patroon of the Dutch colony of Rensselaerwyck. He graduated at Harvard in 1782. Engaging early in politics, he was elected to the Assembly in 1789; was a member of the State Senate from 1790 to 1795; was Lieutenant-Governor of New York from 1795 to 1801; presided over the State Constitutional Convention of 1801; and was again in the Assembly in 1808-10. He took a great interest in military affairs, becoming major-general of the State militia, and in 1812 directed the unsuccessful assault upon Queenstown. He took an active interest in the construction of the Erie Canal and was one of its strongest promoters. In 1810-11 he was one of a commission appointed to explore the proposed route, and from 1816 until his death was a member of the Canal Commission, being its president from 1824 to 1839. In 1819 he became a regent of the University of the State of New York, and was subsequently its chancellor. At his own cost he employed Professors Eaton and Hitchcock to make agricultural surveys, in 1821-23, of a large part of New York. In 1824 he established at Troy a scientific school which, two years later, was incorporated as the Rensselaer Polytechnic Institute. From 1823 to 1829 he was a member of Congress. He published *A Geological and Agricultural Survey of the District Adjoining the Erie Canal* (1824). Consult Barnard, *A Discourse on the Life, Services, and Character of Stephen Van Rensselaer* (1839).

VAN REY'PEN, WILLIAM KNICKERBOCKER (1840—). An American surgeon, chief of the Bureau of Medicine and Surgery in the United States Navy. He was born in Bergen, N. J.; was educated in the University of New York; entered the naval service of the United States as assistant surgeon, in December, 1861, and during the Civil War was stationed for a time at the Naval Hospital in New York City, and then served on the *Saint Lawrence* in the East Gulf Blockading Squadron. After the war he served successively in various naval hospitals and on various vessels; was promoted to be a surgeon in 1868, a medical inspector in 1887, and a medical director in 1895; and in 1897 became surgeon-general and chief of the Bureau of Medicine and Surgery, United States Navy, with the relative rank of commodore. During the Spanish-American War he fitted out the ambulance ship *Solace.*

VAN ROOY, văn rō'ĕ, ANTON (1869—). A Dutch dramatic bass singer, born in Rotterdam. Most of his vocal training was received under Stockhausen of Frankfort. For a time he devoted himself entirely to the concert platform, and won fame as a lieder singer and in oratorio. The strong dramatic quality of his voice led Frau Wagner to offer him a Wagnerian role at Bayreuth, after which he was engaged in similar parts in England and America. His first appearance in London was in 1898, and he came to New York in 1899. Subsequently he became a great favorite in German opera in both cities.

VANS. A people who, according to their inscriptions, occupied what is now Armenia before the Armenians. Their language, preserved on the old Vannic monuments, is believed to be non-Aryan, with possibly Caucasic affinities.

VAN SANT'VOORD, George (1819-63). An American lawyer and author, born at Belleville, N. J., and educated at Union College, where he graduated in 1841. He studied law at Kinderhook, N. Y., and, admitted to the bar in 1844, practiced there in 1846-51 and then removed to Troy, N. Y. He was a member of the State Assembly in 1852 and 1856, and district attorney for Rensselaer County from 1860 to 1863. His publications include: *Principles of Pleading in Civil Actions Under the New York Code of Procedure* (1852); *A Treatise on Practice in the Supreme Court of the State of New York in Equity Actions* (1860); *Life of Algernon Sydney* (2d ed., 1853); and *Lives of the Chief Justices of the Supreme Court of the United States.*

VAN SCHAACK, shäk, Peter (1747-1832). An American lawyer and author, born at Kinderhook, N. Y., and educated at Columbia College. In 1773 he was appointed to revise the colonial statutes, and in 1777 was summoned before the committee on conspiracies for opposing the Revolution, and, refusing to swear allegiance to the State of New York, was sent to Boston, where he remained until the following year. He was then banished and went to England, returning to New York in 1785 after a statute had been passed restoring his rights as a citizen. He was readmitted to the bar and gained a wide reputation as a practitioner and instructor. During his later life he became totally blind. He published *Laws of the Colony of New York* (1773) and *Conductor Generalis, or the Duty and Authority of Justices, Sheriffs, Coroners, etc.* (1888). Consult Henry Van Schaack, *Life, Journal, Diary, and Letters* (New York, 1842).

VAN TAS'SEL, Caterina. A beautiful girl, the pride of the village, in Irving's *Legend of Sleepy Hollow.* Ichabod Crane (q.v.) is among her suitors.

VAN TIEGHEM, väɴ tē'gäɴ', Philippe Edouard Léon (1839—). A French botanist, born at Bailleul (Nord), and educated at the Ecole Normale, where he became maître de conférences in 1864. He was elected to the Academy of Sciences in 1877 and in 1879 became professor of botany in the Museum of Natural History. He held a like position in the Institut National Agronomique and was appointed director of the laboratory of vegetable physiology and organography of the Ecole des Hautes Etudes. He translated Sachs's great manual under the title *Traité de botanique* (1873-74), and wrote *Recherches sur la structure du pistil et sur l'anatomie comparée de la fleur* (1871); *Traité de botanique* (2d ed. 1891); *Eléments de botanique* (3d ed. 1898), and *Recherches sur les phanérogames sans graines* (1897).

VAN TWIL'LER, Wouter or Walter (c.1580-c.1650). A governor of New Netherland, born at Nieuwkerke, Holland. Until his appointment as Governor, which he owed to the influence of his wife's uncle, Killian van Rensselaer (q.v.), he was a clerk in the employ of the Dutch West India Company at Amsterdam. He arrived at New Amsterdam, as Governor, in 1633. Owing to his inexperience and lack of character, he was soon involved in troubles, not only with the neighboring English and Indians, but with his own people. In spite of his protests and a military demonstration, colonists from New England took possession of the Connecticut Valley, but he was more fortunate on the Delaware, where his soldiers captured a shipload of intending settlers from Virginia. Though his management of public affairs showed little ability, his shrewdness and the growing prosperity of the colony enabled him to accumulate a considerable private fortune. He returned to Holland in 1637.

VANUCCI, vȧ-nōō'chē, Pietro. See Perugino, Pietro.

VANUX'EM, Lardner (1792-1848). An American geologist, born in Philadelphia, Pa. He graduated in 1819 at the Ecole des Mines, Paris, and was professor of chemistry and mineralogy at South Carolina College from 1819 to 1826. In 1827-28 he studied the geology of Ohio, New York, Tennessee, Kentucky, and Virginia, for the State of New York, to whose Legislature he submitted a report. From 1836 to 1842 he was a geologist of the New York Geological Survey, in charge of the Third District. The Association of American Geologists was originated in 1840 through his suggestion, and he was also one of the founders of the American Association for the Advancement of Science. He assisted in arranging the New York State geological collection, the basis of the subsequent State museum. He published numerous papers, *An Essay on the Ultimate Principles of Chemistry, Natural Philosophy, and Physiology* (1827), and *Geology of New York 3d District* (1842).

VANVES, väɴv. A town of the Department of Seine, France, one mile southwest of the fortifications of Paris (Map: Paris and vicinity). Population, 10,915.

VANVITELLI, vän'vē-tĕl'lē, Luigi (1700-73). An Italian architect. At the age of twenty-six he became architect of Saint Peter's. His masterpiece was the vast palace erected at Caserta in 1752 for Charles III. of Naples, with its remarkable garden and cascade. The palace, nearly 800 by 600 feet, is distinguished by many impressive features, especially its stairs, halls, and vistas, chapel and theatre, and is one of the finest works of late Italian architecture.

VAN WERT. The county-seat of Van Wert County, O., 78 miles southwest of Toledo, on the Pennsylvania and the Cincinnati Northern railroads (Map: Ohio, A 4). It has the Brumback Library, with 4000 volumes, and public parks. Van Wert derives considerable commercial importance from its situation in a rich farming section, and among its industrial establishments are railway machine shops, and manufactories of pianos, lumber products, etc. The waterworks are owned by the municipality. Population, in 1890, 5512; in 1900, 6422.

VAPEREAU, vȧp′rŏ′, Louis Gustave (1819 —). A French encyclopædist, born in Orléans, and educated at the Ecole Normale in Paris. He taught philosophy in Tours (1843-1852) and, returning to Paris, studied law and was admitted to the bar in 1854, but forthwith gave himself entirely to literary pursuits. In 1858 he published the first edition of his *Dictionnaire des contemporains*, a standard work of reference in constant process of revision (6th ed. 1891-93). Vapereau edited also a *Dictionnaire universel des littératures* (1876); *L'Année littéraire et dramatique* (1859-69), and other similar works. He was from 1877 to 1888 Inspector-General of Primary Schools. During the Prussian invasion (1870-71) he was prefect of Cantal, and later of Tarn-et-Garonne.

VAPOR. A term employed to designate the gaseous state of substances that are ordinarily liquid or solid, such as water, benzene, iodine, etc. It has been proposed that the term *vapor* should be applied to gaseous substances below their critical points (see Critical Point), i.e. at all temperatures at which they may be liquefied by sufficient pressure, while the term *gas* should be restricted to the state of substances above their critical points, i.e. when their existence in the liquid or solid state is impossible. Such a usage of the terms might, however, be somewhat misleading, as it might convey the idea of a difference in the general behavior of gaseous substances below and above their critical points. No such difference is really known to exist, the laws of the gaseous state being equally well obeyed below and above the critical point. The most important property of vapors is their density, which leads immediately to a knowledge of the relative weights of molecules. The density of a vapor is usually expressed in terms of that or hydrogen taken as unit, and then the molecular weight of the given substance is twice its vapor density. The best methods of determining the vapor density of substances are described under Molecules—Molecular Weights (q.v.). See also Evaporation; Gases, General Properties of; Critical Point; Boiling Point.

VAPORER MOTH. A tussock moth (q.v.).

VAR, vär. A department of Southeastern France, situated in the former Province of Provence, between the departments of Bouches-du-Rhône and Alpes-Maritimes, and bounded on the south by the Mediterranean Sea (Map: France, N 8). Area, 2333 square miles. The department is covered by the lower spurs and foothills of the Maritime Alps. The chief river is the Argens. Viticulture is the principal industry, producing nearly 30,000,000 gallons of wine annually. Silk culture is also carried on to some extent, and there are manufactures of paper, silk, and soap. Mining is unimportant, though some iron ore and lignite are obtained. Population, in 1896, 309,191; in 1901, 326,384. The capital is Draguignan, and the largest city is Toulon.

VARĀHAMIHIRA, vȧ-rä′hȧ-mĭ′hĭ-rȧ (?-A.D. 587). A celebrated Hindu astronomer who flourished in the sixth century of the Christian Era. Tradition makes him one of the 'Nine Gems' at the Court of King Vikrama (q.v.). He was the author of a number of astronomical works, including the *Pañcasiddhāntikā*, an edition of which has been published by Thibaut and Dvivedi (Benares, 1889), and the *Bṛhat-saṁhita*, an encyclopædic work in one hundred and six chapters. Consult Thibaut, "Astronomie, Astrologie und Mathematik," in Bühler and Kielhorn, *Grundriss der indo-arischen Philologie* (Strassburg, 1899).

VARAN′GIANS. The name by which the Scandinavian invaders of Russia (q.v.) were known to the Slavs. The celebrated Varangian Guard of the Byzantine emperors, which existed from the tenth century, was composed mainly of Northmen from Russia, though later other Teutonic warriors, notably English, were among their numbers.

VARANIDÆ (Neo-Lat. nom. pl., from *Varanus*, from Ar. *waran*, *waral*, lizard). A family of aquatic lizards, called 'warans,' 'varans,' 'safeguards,' etc. See Monitor.

VAREC (Fr., from Icel. *vāgrek*, wave rack, stuff thrown ashore by the waves). A crude sodium carbonate obtained in Brittany and Normandy, France.

VARESE, vȧ-râ′zȧ. A town in the Province of Como, Italy, 37 miles northwest of Milan and 4 miles east of Lago Maggiore (Map: Italy, C 2). The picturesque scenery gives the town considerable prominence as a place of resort. The most interesting edifice is the Church of San Vittore, dating from the sixteenth century. Varese has a museum with a valuable collection of historic relics. There are manufactures of wine, silk goods, paper, furniture, etc. Population (commune), in 1901, 17,715.

VARGAS, vär′gȧs, José Maria (1786-1854). A Venezuelan politician and surgeon, born in La Guaira. He studied medicine at Caracas and Edinburgh, and became professor in the University of Caracas. In the new Venezuelan republic he became Vice-President in 1834, and in 1835 President, but he resigned in 1836. Thereafter he was Senator (1838-42) and Councilor of State (1847-49). In 1853 he settled in New York City, where he died.

VARGAS, Luis de (1502-68). A Spanish painter, born at Seville. He is reputed to have been a pupil of Perino del Vaga at Rome; but his pictures show a robust realism, essentially Spanish. Of his frescoes, which were considered his best works, none survive. His principal oil paintings are in the Cathedral of Seville: a "Nativity" (1541), and his masterpiece, the "Temporal Generation of Christ" (1561), popularly known as the "Gamba."

VARIANCE (from Lat. *variantia*, difference, diversity, from *variare*, to change, vary, from *varius*, different, various). In the law of pleading, an inconsistency or difference between the original process by which an action is begun and the pleadings; or a difference between the facts alleged in the pleadings and those proved by the evidence introduced at the trial. A variance between the process and pleadings must be objected to before a trial is had on the merits, as it is generally held to be *cured* by verdict. Under modern procedure acts, if the facts alleged in the proceedings are proved by valid evidence, any variance in part of the proof will generally be disregarded. Where, however, the proof adduced shows an entirely different cause of action from that set forth in the pleadings, the variance is fatal. Consult the works of Stephen and Chitty on *Pleading*.

VARIATION (Lat. *variatio*, from *variare*, to change, vary). Structural or functional deviations from the parent form or type. Variations, which are apparent to all, are attracting the careful attention of working naturalists, whose tendencies are to cease theorizing and to bend all their energies toward the discovery and classification of facts and of the causes producing variation. Species are unequally variable; there are plastic as well as rigid ones. Nature prevents over-variation by competition; otherwise crowding of species would result. The greatest range of variation occurs in cultivated plants and domestic animals; yet the turkey does not vary, whether living in America or Europe, nor does the guinea fowl in America depart from the African type; and the cat varies much less than the dog. Wide-ranging much diffused, and common species vary most, and those of large genera more frequently vary than those of genera containing but one or only a few species. Persistent or ancient and cosmopolitan forms have not varied all through the immense periods of their history.

There has been much discussion as to whether variation is fortuitous or definite. It was claimed by Darwin that variation is by chance, though he adds that this is 'a wholly incorrect expression,' for in nature there is no such thing as chance, the expression serving "to acknowledge plainly our ignorance of the cause of each particular variation;" and he states that "the direct action of changed conditions leads to definite or indefinite results." But it is more probable that, though variations may in some cases seem to be fortuitous, in general throughout geological time variation has been regulated by changes in the physical and biological conditions of the environment along certain determinate lines, the variations becoming permanent when they prove useful. That the direction of variation is in accordance with and dependent on the surroundings is shown by the atrophy of eyes in animals living in darkness, the reduction in the visual organs varying in degrees dependent on the length of time and on the number of generations the animals have lived in darkness. The reduction in the number of limbs and toes is conditioned by the mode of life. The variation in the colors of animals is in direct relation with the varying amount of light and shade to which they are exposed. See PROTECTIVE COLORATION.

The causes of variation are in the main obscure, but primarily variation is due to the changes of the environment, i.e. to the differences in atmospheric pressure, electricity, gravity, light, to changes of temperature (heat and cold), and of the mechanical and chemical state of the water or air, as well as the kind and amount of food. The causes are mainly external, but some are apparently internal, such as reproduction. These physical agents have been called the primary factors of organic evolution (q.v.) operating on the most primitive and plastic one-celled forms of life, which in the beginning led to the origin of the different types of life or lines of development.

NOMENCLATURE. A variant is one of the dissimilar conditions of form in which an organ appears; thus the variants of the number of rays of a scallop-shell are 13, 14, 15, etc. A variant must be sharply distinguished from a variety, which is a group term for individuals that breed true to one another, and resemble one another in color, size, and other characteristics less broad and general than specific ones. A variate is one of the varying units of study; each scallop-shell is, in respect to the number of its rays, a variate, and in 1000 scallops there may be, for example, 200 variates (ray-numbers) falling in the variant class of 16 rays. Each different variant thus usually includes a number of variates. Variates are of two sorts: counted and measured ('integral' and 'graduated'). For example, the number of rays on a scallop-shell (15, 16, 17, etc.) is an integral variate; the diameter of the shell is a graduated variate. The data of variation may be classified in various ways, but two main types are (1) slight variations and (2) sport variations. Slight variations are such apparently trivial differences as distinguish one adult male of a homogeneous community from another male of this community, one grain of wheat from another grain of wheat, the number of grains on one head of rice from the number on a second head of rice. It is the noticed and yet unnoted form of variation. Sport variations are the relatively rare occurrence of great differences cropping out in a community. These are sometimes incompatible with life, and are then known as 'monsters;' but when sports persist, and are bred from, they may impress themselves with peculiar strength; e.g. Ancon sheep, and the hairless peaches called nectarines. Variable characters may also be classified as 'integral' and 'graduated.' They play a nearly equal part in evolution, for some species have differentiated chiefly along the line of multiplication or reduction of the number of parts, while other species have varied in size, color, and other qualities of parts. Again variates may be either individual or organal. Individual variates belong to different individual animals or plants, whereas organal variates are found in the multiple organs of one and the same individual, e.g. the length of a fish is an individual variate; the diameter of one of its scales as compared with that of the others is an organal variate. According to Huxley's definition, "a race is a propagated variety." These terms, variant, variety, race, species, are by no means fixed, since in many instances gradations may be found which more or less completely link them.

Variation with age is a matter of daily observation. First of all the absolute size of the body and its organs tends to increase with age up to a limit. Secondly, the proportions change. Some organs are developed precociously, for instance, the child's head; others are retarded, e.g. the length of the child's legs. Careful measurements of the shell of a crab have shown that the shell grows larger in proportion to its breadth as it grows older. Especially at the time of sexual maturity in most animals special features develop greatly that are earlier latent. Not only the size, but also the variability of organs, changes with age. Thus the standard deviation of the stature of the 5-year-old child is 3 inches; of the 7-year-old child 2.85 inches. Variation with sex is likewise a widespread phenomenon. Not all organs vary in the two sexes, however, but only the so-called secondary sexual ones, such as the mane of mammals; the comb, wattles, and tail feathers of fowl; the plumage of most birds; and the antennæ of moths. The old idea that the male was uniformly more variable is not markedly true. In the wings of some insects the female is the more variable.

The fact of selection is best measured by variability, any species after selection being presumably less variable than before; the mean also may be changed by selection if this acts especially on the large or on the small. By selection we may, moreover, divide a binomial species into two pure groups each centring about one of the modes. Darwin and others have thought that by selection of minute variations a species might be changed to any extent, but this view is combated by some, especially De Vries, who maintains that selection of slight variations can improve qualities already present, but cannot originate new ones, for which we must wait upon haphazard appearances (sports).

Correlated variation is the term applied to the common case of two organs so interdependent that when the one varies the other varies likewise. Multiple parts, such as the segments of an earthworm, vary just as different individuals do and follow the same laws, and where one of these repeated parts varies, they all vary in the same direction. Thus, if a peculiar spot appears in one segment of a leech, it is apt to appear in the whole series of segments; also, a variety of a species characterized by one peculiarity is apt to be characterized by a whole series of peculiarities. The variability of the various elements of a series or multiple repeated organ differs in the different cases. For example, the spots on the thoracic shield of a potato beetle are sometimes constant in size and occurrence; in others, the reverse. In the case of linear series, like the series of teeth on the jaw, it is often true that the terminal members of the series are the most variable. In general, the rule holds that specific characters are more variable than generic ones. But the relation between species and varying characters is even closer, as examination of extreme types will show. There is thus such a relation between the species of a genus that each, while maintaining its peculiar modes, varies especially in the direction of the others. A species remains constant only in a constant environment. This is illustrated in every estuary, where the mollusks found up toward the fresher water are smaller than those in the open sea. Insects are darker along the seacoast. So plants growing in cellars are long, and the leaves small and far apart, as compared with those living in the sunlight. Mountain plants are smaller than those of the valley. A passage from one part of the country to another shows that animals gradually become dissimilar, and even the individuals of the same species undergo a change which may be apparently quite independent of environment. This is shown in the Galapagos Islands, whose climatic conditions are practically the same, yet on each island the lizards are peculiar, and only one kind of lizard occurs on an island.

BIBLIOGRAPHY. Darwin, *The Variation of Animals and Plants Under Domestication* (London, 2d ed., 1875); Galton, *Natural Inheritance* (ib., 1889); Bateson, *Materials for the Study of Variation* (ib., 1894); Pearson, *The Grammar of Science* (ib., 2d ed., 1900).

VARIATION. In music, a transformation of a melody by melodic, harmonic, contrapuntal, and rhythmic changes. The subject chosen is called the theme; it is first simply harmonized with or without an introduction, and then repeated in a variety of forms. The oldest variations are the *doubles*, in which the fundamental theme was not altered. But since the time of Haydn and Mozart the form of the variation has become more artistic. The theme appears with new harmonies, the mode is changed from major to minor or vice versa; there is variety of key and rhythm, and the melodic intervals themselves are often altered. Frequently a new melody is added as a counter-subject to the original theme. The only principle to be observed is that the original theme shall always be recognizable by some feature.

VARIATION OF LATITUDE. See LATITUDE, VARIATION OF.

VARIATION OF MAGNETIC ELEMENTS. See MAGNETISM, TERRESTRIAL; COMPASS.

VARICELLA. The medical term for chickenpox (q.v.).

VAR′ICOCELE (from Lat. *varix*, dilated vein, from *varus*, bent, stretched, knock-kneed, awry + Gk. κήλη, *kēlē*, tumor). In surgery, a varicose state of the veins of the spermatic cord. It is caused by the same conditions which give rise to varicose veins (q.v.) elsewhere. The symptoms and treatment may be found in Dennis's *System of Surgery* (Philadelphia, 1895-96).

VARICOSE VEIN (Lat. *varicosus*, full of dilated veins, from *varix*, dilated vein), or VARIX. A dilated and tortuous vein. Varices are of common occurrence in the submucous veins of the rectum (constituting hemorrhoids or piles), in the spermatic veins, giving rise to varicocele (q.v.), and in the veins of the lower extremities. They are very rarely found in other veins, such as those of the scalp, neck, and groin. Cooks, washer-women, and soldiers and others whose occupation involves much standing, are specially prone to varicose veins. Varices may occur at almost any period of life, but are chiefly developed during middle age. Their formation is aided by any condition of the system which impedes the circulation, as certain diseases of the heart, lungs, and liver, and by continued overeating and the use of alcoholic stimulants, which are liable to induce hemorrhoids. Senile degeneration, gout, pregnancy, and the excessive exercise of the athlete may act as causes in certain cases. In varicose veins the coats of the dilated vessels may become thickened or may become thin; they may be lengthened so that the veins become tortuous; the dilatation may be unequal, giving rise to the formation of pouches; and, in consequence of the enlarged calibre of the vessels, the veins act imperfectly, and their walls gradually undergo degeneration. Varices occurring in the leg commonly give rise to deep-seated aching pain in the limb, with a sense of weight, fullness, and numbness, before there is any external appearance of the affection. In a more advanced stage the ankles swell in the evening and the feet are cold. After a time a small tumor of a bluish tint appears, which disappears on pressure, but returns on the removal of the pressure, and is caused by a dilated vein. This dilatation extends, and forms knotty, irregular tumors, soft to touch, diminishing on pressure or on the patient assuming a horizontal posture, and giving a bluish tint to the adjacent skin. These tumors commonly occur in the middle of the leg, along the track of the saphenous veins, but they often extend along the whole of the leg and thigh. The deep as well as the superficial veins may be involved and the varices may be as large in diameter as a lead-pencil.

The treatment of varicose veins is palliative or radical. Garters must be absolutely forbidden. The use of an elastic bandage or elastic stocking upon the limb, the evenly distributed pressure of which supports the veins, is palliative. Such treatment, combined with proper dietetic and hygienic measures, is usually sufficient to meet the requirements of ordinary cases. It is not, however, curative. The radical or curative method of treatment consists in thorough excision of the sections of the enlarged veins at intervals of about two inches. Injection of astringents into the veins has been practiced, but is not devoid of danger.

VARIED THRUSH, or Oregon Robin. See Thrush.

VARIEGATION (from *variegate*, from Lat. *variegatus*, p.p. of *variegare*, to make of various sorts or colors, from *varius*, different, various + *agere*, to drive, to do). The condition of mottled foliage of plants. The causes of variegated structures are practically unknown. Some variegated leaves show colorless spots due to the absence of chlorophyll and other colored bodies. The investigations of the subject seem to show that various external factors influence the appearance of this phenomenon, which hitherto has been commonly regarded as solely due to hereditary causes.

VARIETY (in biology). See Variation.

VARI'NA. The name given by Swift to a Miss Waring, whose brother he had earlier known at Trinity College, Dublin, and who at one time expected him to marry her.

VARI'OLA. See Smallpox; Vaccination.

VARIX. See Varicose Vein.

VAR'LEY, John (1778-1842). An English water-color painter, born at Hackney. He worked at first with a silversmith, and afterwards became assistant and pupil to Joseph Charles Barrow. His first exhibited picture, "View of Peterborough Cathedral," appeared at the Royal Academy in 1798. Ruskin said that Varley was the only painter, except Turner, who could paint a mountain. He was highly successful as a teacher of painting. Some of his paintings, now in the Museum at South Kensington, are: "Beddgelert Bridge" (1800); "River Scene" (1840); "Bolton Abbey" (1842); and "Burial of Saul." He wrote several treatises on landscape painting.

VARNA, vär'nȧ. The chief seaport of Bulgaria, situated on the Bay of Varna, 325 miles by rail east-northeast of Sofia (Map: Turkey in Europe, G 3). It is an old, irregularly built town with an unprotected harbor, recently somewhat improved. The industrial establishments include tanneries and an extensive cotton spinnery. Varna carries on an extensive trade in animals, dairy products, grain, skins, and cloth. In 1900 the exports and imports amounted to £349,800 and £435,300 respectively. In the vicinity of Varna is the summer residence of the Prince. Population, in 1900, 33,443, chiefly Bulgarians, Greeks, and Turks. Varna is identified with the ancient Milesian colony of Odessus. It is memorable as the scene of the defeat of the Hungarians under King Ladislas and John Hunyady by the Turks under Amurath II. in 1444. It withstood an attack by the Russians in 1773, but was taken by them in 1828. In 1854, in the Crimean War, it was used as a base of operations by the allies.

VARNHAGEN, värn'hä-gen, Francisco Adolfo de (1816-78). A Brazilian diplomat and scholar, born in Saõ João do Ypanema. He studied in Portugal, devoting himself especially to the history of Brazil. In 1859 he returned to South America, was appointed Minister to Paraguay, but soon resigned because of his disapproval of Lopez's Government. In 1865 he became Minister to Chile and Peru, whence, in 1868, he was transferred to Vienna, where he died. He wrote: *Florilegio de poesia brasileira* (1850-53); *Examen de quelques points de l'histoire géographique du Brésil* (1858); *Amerigo Vespucci* (1865); *Nouvelles recherches sur les derniers voyages du navigateur florentin* (1869); *Ainda A. Vespucci* (1874); and the *Historia do Brasil* (1854-57).

VARNHAGEN VON ENSE, fôn ĕn'ze, Karl August (1785-1858). A German author. He was born in Düsseldorf, and after studying medicine at Berlin and philosophy at Halle, Berlin, and Tübingen, and helping (1803) to edit Chamisso's *Musenalmanach*, he entered the Austrian Army (1809), and was wounded at Wagram. He joined the Russian Army in 1813, entered the Prussian diplomatic service (1814), accompanied Chancellor Hardenberg to the Congress of Vienna, and (1815) became Minister at Karlsruhe. After 1819 Varnhagen devoted himself chiefly to literature, although he continued to take a keen interest in political affairs, and was from time to time active in diplomatic matters. His first work was an account of experiences in the war of 1813, *Geschichte der Hamburger Ereignisse*, followed by the *Geschichte der Kriegszüge Tettenborns* (1814). In the same year he married Rahel Levin (1771-1833), a Jewess of great intellect, who exercised a remarkable influence upon his subsequent career. At Berlin the Varnhagens became a rallying point for men distinguished in science, art, and letters, and theirs was the most important German salon. Varnhagen wrote stories (1815), poems (1816), a remarkable character sketch of Goethe (*Goethe in den Zeugnissen der Mitlebenden*, 1824), and, between 1824 and 1830, five volumes of similar *Biographische Denkmale*. In 1833 Rahel died, and in 1834 Varnhagen published a memorial of her in three volumes, followed (1836) by two volumes of a *Galerie von Bildnissen aus Rahels Umgang*, and (1843-46) by seven volumes of *Denkwürdigkeiten*. Varnhagen's style, modeled on that of Goethe, is remarkable for elegance and precision. His reminiscences are of permanent historical value. He died in Berlin, October 10, 1858, and left fourteen volumes of *Tagebücher* (1861-70), two volumes of *Denkwürdigkeiten* (1859), a volume of studies in Prussian history, *Blätter aus der preussischen Geschichte* (1868), and a volume of *Biographische Porträte* (1871). *Letters* to him from A. von Humboldt were published (Leipzig, 1860). There is an edition of selected *Works* (19 vols., Leipzig, 1871-77).

VARNISH (OF., Fr. *vernis*, varnish, p.p. of OF. *vernir*, to varnish, probably from ML. *vitrinus*, glassy, from Lat. *vitrum*, glass). A term applied to solutions of gums or resins in such solvents as alcohol or linseed oil, and used to produce a hard, shiny, protective surface on various articles. The solution must be of such consistency as to enable it to be very thinly and smoothly spread over the surface coated, so that when it dries it will leave a thin resinous covering which is either naturally glossy or can be made so by mechanical polishing. The solvent frequently gives the name to the varnish; thus 'spirit varnishes' are those that consist of a resin dissolved in ordinary ethyl alcohol, in methyl (wood) alcohol, in naphtha, turpentine, chloroform, or ether. The 'oil varnishes' are those in which linseed, poppy, or walnut oil is used as the solvent. The resins or gums which are used in the manufacture of varnishes are chiefly amber, animé, colophony, and copal, while asphaltum or pitch is used for dark-colored varieties. Coloring matters, such as aloes, dragon's blood, saffron, etc., are frequently added to give color to the varnish, and are used especially in those that are employed for coating metals. The various uses to which varnishes are put frequently suggest their names; thus there are 'balloon,' 'carriage,' 'paper,' 'patent leather,' 'photographic' varnishes, etc., the composition of such products depending on the uses for which they are intended. Black varnishes, made with asphaltum, are commonly called *japans*. Consult: Brannt, *Varnishes, Lacquers, Printing Inks, and Sealing Waxes* (Philadelphia, 1893); Cameron, *Oils and Varnishes* (London, 1896).

VARNISH TREE. A name given to several trees of the family Anacardiaceæ because the resinous juice is used for varnishing or for lacquering. The black varnish tree (*Melanorrhœa usitata*) is described in the article on MELANORRHŒA, and the Japan varnish tree (*Rhus vernicifera*) in the article on SUMACH. Other trees valuable for the varnish they yield are *Gluta benghas* and *Melanorrhœa Wallichii*, natives of Java, Sumatra, Borneo, Celebes, and other East India islands. The juice is extremely acrid, and soon hardens into a black resin. To obtain it, pieces of bamboo are inserted into the bark, and allowed to remain all night, as the juice flows more freely by night than by day. It is prepared for use by boiling with equal parts of oil, obtained from the fruit of *Mimusops Elengi*.

VAR'NUM, JAMES MITCHELL (1748-89). An American soldier, born at Dracut, Mass. He graduated at Brown (then Rhode Island) University in 1769, was admitted to the bar in 1771, and practiced at East Greenwich, R. I. In 1774 he became commander of the celebrated Kentish Guards, and in May, 1775, was made colonel in the First Rhode Island Infantry. For efficient services at the siege of Boston, at Harlem Heights, and at White Plains, he was appointed brigadier-general of Rhode Island troops in December, 1776, soon afterwards, in February, 1777, taking the same rank in the Continental Army. On his recommendation, Rhode Island passed a law, in 1778, liberating all negro slaves who should enlist in the army. After participating in the battle of Monmouth and in Sullivan's Rhode Island campaign, he resigned on March 5, 1779, and resumed the practice of law. He was major-general of the State militia from 1779 to 1788, was a member of the Continental Congress in 1780-82 and again in 1786-87, and in 1787 was appointed one of the Supreme Court judges of the Northwest Territory, removing to Marietta, Ohio, in June, 1788. He was especially notable as an eloquent speaker and an able debater.

VAROLI, vȧ-rō'lē, COSTANZO (c.1543-75). An Italian surgeon and anatomist, born at Bologna. He was a student and professor at the University of Bologna, and afterwards went to Rome as physician to Pope Gregory XIII. His studies of the human brain are still remembered by the anatomical designation of *pons Varolii*. He wrote *De Nervis Opticis* (1573).

VAROTARI, vä'rō-tä'rē, ALESSANDRO (1590-1650). A Venetian painter, born at Padua, and usually called Il Padovanino. He imitated the style of Veronese and Titian—whose works he studied in Venice—and afterward went to Rome. He was especially happy in portraying children, though he was also successful in landscape. The frescoes in the Church of Saint Andrea, at Bergamo, are also known to be his work, and there are two of his pictures in the National Gallery, London. His best work, "The Marriage of Canea," is in the Academy at Venice. He passed the greater part of his life in Venice and Padua, and his paintings are preserved chiefly in those cities. Consult, Ridolfi, *La Maraviglie dell' Arte* (Venice, 1648).

VAR'RO, MARCUS TERENTIUS (B.C. 116-127). A Latin author, known as the 'most learned of the Romans.' He was born at Reate, and educated first under L. Ælius Stilo Præconinus, and then under Antiochus, a philosopher of the Academy. Varro served with distinction in the wars against the Cilician pirates and Mithridates; afterwards, as legatus of Pompey in Spain, he was compelled to surrender his forces to Cæsar. He continued to share the fortunes of the Pompeian party till its defeat at Pharsalia, after which he obtained his pardon from Cæsar, by whom he was employed to collect and arrange the great library designed for the public. The next period in Varro's life was spent in literary retirement, chiefly at his villas near Cumæ and Tusculum. When the second triumvirate was formed, his name was enrolled in the list of the proscribed; but he succeeded in escaping, and, after some time spent in concealment, he was received under the protection of Octavianus. The rest of his life was spent in the prosecution of his studies. Varro was not only the most learned, but also the most prolific of Roman authors. He himself confesses to having composed no fewer than 490 books; but only two of these have survived, and one of them in a fragmentary state. The most considerable of his writings, whether lost or extant, are as follows: (1) *De Re Rus-*

tica Libri III., the most important treatise on ancient agriculture known to us. (2) *De Lingua Latina*, a grammatical work, which originally extended to twenty-four books, only six of which, however, have come down to us, and even these in an imperfect form. (3) *Sententiæ*, consisting of 165 pregnant sayings strung together, not by Varro himself, but probably by different hands at different times. (4) *Antiquitatum Libri*, comprising two sections, the *Antiquitates Rerum Humanarum*, in twenty-five books, and the *Antiquitates Rerum Divinarum*, in sixteen books. This, the greatest work of Varro, and the one on which his reputation for learning was mainly founded, has unfortunately perished, except for a few fragments. (5) *Saturæ*, composed in various metres, and occasionally in prose. These pieces, copied to some extent from the productions of Menippus the Gadarene, were apparently a series of comments on a great variety of subjects, generally conveyed in the form of dialogue, and aiming at the enforcement of some moral lesson or serious truth in a familiar and even jocular style. Of these we have only fragments; and of the other works little more than the titles. The best edition of the *De Re Rustica* is that of Keil (Leipzig, 1884); of the *De Lingua Latina*, that of Spengel (Berlin, 1885). The *Saturæ Menippeæ* are published in Bücheler's edition of Petronius (Berlin, 1882).

VARSOVIENNE, vår'sō'vyĕn' (Fr., Warsaw dance). A modern dance in three-quarter time, and moderate tempo, beginning on the up beat and having a strong accent on the first beat of the even measures. It originated in France about 1850, and is a modification of the Polish mazurka or redowa (qq.v.).

VARUNA, vä'rōō-nȧ (from Skt. *var*, to cover, surround, encompass, probably connected with Gk. *οὐρανός*, *ouranos*, heaven, sky). In Vedic mythology, the representative of the all-encompassing heaven. Only a dozen hymns in the Rig-Veda are addressed exclusively to his praise, but the picture which they give of him shows him to be the noblest of the Vedic divinities. He is generally invoked in company with Mitra (q.v.). The sun is their common eye; the heaven is their golden abode. As creator and regent of the world, Varuna rules the universe with unswerving laws; the gods are subject to his dominion; nature dares not transgress his decrees. A thousand spies, the stars or rays of light, seek out offenders against his rule; there is no escape from his omniscient knowledge, even by flight unto the farthest heaven; his bonds and fetters are ever ready for the guilty; and inevitable punishment awaits those who have aroused his wrath. At the same time this ruler, whose power controls the moral and the physical world, can be equally kind and beneficent. It is his all-wise providence that cares for and protects the good. In his divine keeping are a thosand remedies that relieve the miseries incurred by sin and hold death afar. The reward of immortality is Varuna's abode hereafter. As sovereign of the vaulted sky King Varuna is the lord of the waters. The sea is his domain, the rivers flow at his bidding, and the rains descend in accordance with his ordinances. His sovereignty over the waters, moreover, is shown in the special disease, dropsy, which he inflicts upon those who sin against his divine law. As an Aditya he is sometimes invoked together with other gods than Mitra, while his great rival for supremacy in the hearts of the people is Indra (q.v.).

In the post-Vedic mythology Varuna sank into insignificance beside Prajapati (q.v.) as a supreme being, and in the later Indian religion his dominion is confined simply to the lordship over the waters, especially the sea, and to the supremacy over the western quarters. He rides upon a fabulous monster called *makara*, and he holds in his hand a noose to bind the guilty. Consult: Macdonell, *Vedic Mythology* (Strassburg, 1897); Kaegi-Arrowsmith, *The Rigveda* (Boston, 1886); Hopkins, *Religions of India* (ib., 1895); Wilkins, *Hindu Mythology* (2d ed., London, 1900).

VARUS (Lat., bent, stretched, knock-kneed, awry). In surgery, a variety of club-foot (q.v.). It may be regarded as the opposite to valgus (q.v.). In the form of club-foot termed varus, the heel is raised, the inner edge of the foot is drawn upward, and the anterior part of the foot is twisted inward, so that the patient walks on its outer edge.

VA'RUS, Publius Quintilius. A Roman general. He belonged to a noble family. He was consul in B.C. 13. About twenty years later he was appointed Governor of Syria, and on his return was sent by Augustus to command the armies of Germany. His instructions were to introduce the regular administration of a Roman province. The Germans under the leadership of a chief of the Cherusci, named Arminius, attacked Varus, who, with three legions, the usual number of auxiliaries, and a strong body of cavalry, had proceeded as far as the Weser. By false intelligence, the proconsul was induced to quit his intrenched camp. The Romans marched in a long straggling line, incumbered with baggage, with their wives and children. Suddenly they were assailed by the Germans in the Teutoberg Forest, and it was with difficulty they forced their way to a clear space to encamp for the night. For the next two days the Romans struggled on, marching and fighting with decreasing forces and exhausted strength, intending to reach, if possible, the fortress of Aliso on the Lippe. Finally they were met by the main force of the Germans, and completely broken. Varus killed himself in despair. This victory of the Germans was gained A.D. 9, and rolled back the tide of Roman conquest. The Rhine, instead of the Weser, again became the boundary of the Empire. See Arminius.

VASA, vä'sȧ. A government of Western Finland, Russia, extending along the Gulf of Bothnia, and covering an area of 16,100 square miles (Map: Russia, B 2). The coastland is low and indented, but the surface rises in the interior into a rocky plateau interspersed with lakes and marshes. The climate is severe and only the coast region and the river valleys are suitable for agriculture. Rye, oats, barley, and potatoes are the principal farm products. The manufactures are of considerable extent and variety, including lumber, paper, metal wares, rubber goods, articles of apparel, food products, etc. There is a lively commerce with the Baltic ports. Population, in 1897, 446,772, of whom the Swedes composed about one-third and the Finns the rest.

VASA, House of. A Swedish royal family, which mounted the throne in the person of Gustavus I. in 1523 and ruled till 1654. The most distinguished member of the house was Gustavus II. Adolphus (1611-32). His daughter Christina, who was unmarried, resigned the throne in 1654 in favor of her cousin Charles X. Gustavus, Count Palatine of Zweibrücken, who inaugurated a collateral female branch. Christina died in 1689. The House of Vasa furnished three kings to Poland, from 1587 to 1668. This branch of the family became extinct with John Casimir, who abdicated in 1668 and died in 1672.

VASA, or **NIKOLAISTAD,** nē'kō-lī-städ'. The capital of the Government of Vasa, Finland, situated a short distance from the Gulf of Bothnia (Map: Russia, B 2). Its industrial establishments include shipyards, woolen mills, and sawmills. Population, in 1897, 13,493. The town was founded in 1611, and was named Nikolaistad in honor of Nicholas I. of Russia, when rebuilt after the fire of 1852.

VASA ORDER. A Swedish order of merit, founded in 1772 by Gustavus III. The decoration is a white enameled cross with eight points, surmounted by a crown and worn on a green ribbon.

VÁSÁRHELY, vä'shär-hĕl-y'. The name of two towns in Hungary. See Hódmezö-Vásárhely and Maros-Vásárhely.

VASARI, vȧ-zä'rē, Giorgio (1511-74). An Italian painter and architect, chiefly celebrated as a biographer of artists. He was born at Arezzo, and on the advice of his kinsman, Luca Signorelli, he first studied painting under Guglielmo di Marsiglia. Pollastra, the poet, taught him Latin, and the lad's ability to recite whole books of the *Æneid* won for him the patronage of the Cardinal of Cortona, who, in 1523, took him to Florence. There he was a pupil of Michelangelo and Andrea del Sarto and studied the humanities with the two Medicean princes, whose guardian the Cardinal was. During the exile of the Medici Vasari's fortunes suffered, but he went in the train of Cardinal Ippolito to Rome, and studied for many months with such assiduity that he was brought back to Arezzo on a litter. Upon his recovery Duke Alessandro de' Medici of Florence made him his Court painter. In this capacity Vasari painted family portraits, frescoed the Medici Palace, and designed the decorations of Florence upon the visit of Charles V. After his master's assassination he spent three years painting for the monks of Camaldoli, visited Northern Italy and Venice, and resided at Rome (1582), and in other parts of Italy. In 1555 he was summoned to Florence by Duke Cosimo the Great, in whose service he remained until his death. From the Duke he received a large pension and many gifts and honors, including the appointment to the office of gonfaloniere (chief magistrate) of Arezzo for life. He transformed the interior of the grand Palazzo Vecchio into apartments suitable for a duke's residence, and frescoed the Great Hall which the Republic had intended for Michelangelo and Leonardo. He also designed a number of buildings for the Duke, including the Uffizi in Florence. Later he served alternately Pope Julius III. and the Duke. In 1573 he finished the decorations of the Sala Regia in the Vatican, but his intended masterpiece, the frescoes of the cupola of Florence, was unfinished at his death, June 27, 1574. He possessed a lovable and upright character, and was as diligent as he was lacking in genius.

Vasari was one of the most versatile artists of the later Renaissance. Modern taste, indeed, does not agree with contemporary opinion of his painting, but finds it mannered and without originality. He succeeded far better in architecture. His masterpiece, the Uffizi, is a fine, harmonious building, admirably adapted for its various purposes. Other chief works are the Vigna di Papa Giulio near Rome, the Church of the Badia, and his own house (now Casa Montauti at Arezzo), the cupola of Madonna dell' Umilta at Pistoja, and the new sacristy of San Lorenzo at Florence.

But Vasari's greatest service by far to art is his world-renowned *Lives*, to which we owe our chief knowledge of the artists of the Italian Renaissance. This monumental work was undertaken at the suggestion of Cardinal Farnese (afterwards Pope Julius III.) in 1542; the first edition appeared under the title *Vite de' più eccellenti pittori, scultori ed architetti*. A second edition, enlarged and improved, appeared in 1568. The work is excellent in style, full of local color, and really remarkable in the acuteness and catholicity of its artistic perception. There has been great progress in art history and criticism since Vasari's day. The archives have yielded up their treasures, and the attribution of paintings is no longer determined by tradition or general impressions of style or feeling. Modern criticism finds him far too dependent on hearsay and gossip, inexact in facts and dates, and even guilty of wholesale plagiarism without acknowledgment. But when all has been said, Vasari's work remains, for its day, a wonderful monument of erudition and sound criticism, and not without justice has he been termed the father of modern art history and criticism. Monumental modern editions of the *Vite*, with complete notes, and biographies of the author, are those of Le Monnier (15 vols., Florence, 1846); Milanesi (9 vols., ib., 1878-85); Venturi (Rome, 1896 et seq.); and (selections) Carl Frey (Berlin, 1885-87). There is an English translation by Mrs. Foster (London, 1850), and an admirable edition of selected biographies in this translation is by Blashfield and Hopkins (4 vols., New York, 1896).

VASCO DA GAMA, väs'kō dȧ gä'mȧ. See Gama, Vasco da.

VASCONCELLOS, väs'kōn-sĕl'lōs, Joaquim Antonio da Fonseca e (1849—). A Portuguese critic, born at Oporto, and educated in Hamburg and Coimbra. He became professor of German at Oporto in 1883, and in 1889 was put in charge of the local Museum of Trade and Industry. His publications in the periodical *A Actualidade*, conducted by himself, and in separate volumes, concern the fine arts in general and music and German literature in particular. They include: *O Faust de Goethe e a traducção de Castilho* (1872); *Luiza Todi* (1873); *Reforma do ensino de bellas artes* (3 vols. 1877-79); *Albrecht Dürer e a sua influencia na peninsula* (1879); *O consummado germanista* (1879); and *Goësiana* (4 vols. 1879-81). His wife (since 1876), Carolina Michaelis (1851—), a Romance philologist, was born in Berlin, and early devoted herself to the languages of the Spanish peninsula. She published: *Erläuterungen zu Herders Cid* (1868); *Romancero del Cid* (1870); *Studien zur romanischen Wortschöpfung* (1876); *Poesias de Francisco de Sa de Miranda* (1885); *Studien zur hispanischen Wortdeutung* (1886); "Geschichte der portugiesischen Litteratur," in Gröber's *Grundriss der romanischen Sprachen* (1894); and *Randglossen zum altportugiesischen Liederbuch* (1896).

VASCULAR TISSUE (from Lat. *vasculum*, little vessel, diminutive of *vas*, vase, vessel). The conducting tissue of the higher plants, consisting of tracheæ or tracheids or sieve vessels. It is also the principal supporting tissue of the plant. See ANATOMY; HISTOLOGY.

VASE. A vessel of circular form used for practical or ornamental purposes. The material is generally pottery, though stone, glass, metal, etc., are frequently used, especially for ornament. The use of vases is common to all peoples, both ancient and modern; but it was in Hellenic lands that vase-making attained highest perfection, both as regards form and artistic decoration; and it is, therefore, to the Greek vase that this article is mainly devoted.

Earthenware vessels were in almost universal use among primitive peoples, and in their clay forms and decorations furnish valuable information to the anthropologist. It is not, however, till a more advanced state of artistic development has been reached, that the vases attract attention for their intrinsic merit. If, moreover, the rich prefer vessels of stone or metal, and the use of clay is confined to the poor, the potter is apt to produce cheap, rude, or carelessly made wares, even when the other crafts show the possession of high artistic skill. Thus, in Egypt, though good clay abounds, the vases are in general of little interest in themselves. The material for the study of early Oriental ceramics is neither so plentiful nor so minutely classified as is that from other lands. Moreover, the essential conservatism of the East is strikingly displayed in the persistence of a limited number of forms and the old linear decorations, in marked contrast to the variety of the Greek types.

The Greek lands and Italy have yielded a vast mass of material, falling into well-defined groups, whose general succession is clear, and whose chronology is in most cases well established. The earliest forms are those found in the lower strata at Troy, the 'island graves,' and some of the pottery of Cyprus. The clay is coarse and the vases are shaped without the aid of the potter's wheel. The decoration, when present, consists of incised lines in geometrical patterns. The color is black or red, according to the firing, and an apparent glaze is due to the polishing of the surface, as no coloring matter seems employed. Toward the end of this period appear vases with decoration in colors, wheel-made, and showing much taste and skill. In addition to geometric designs there now appear plants and animals. Special classes of these vases are those from Thera and the Kamares ware of Crete, whose relation to the following Mycenæan pottery is still a subject of discussion. The earlier group of Mycenæan vases is decorated in dull colors on a highly polished clay. Later a more lustrous paint is used and the clay is very fine. A favorite form is the false-necked jar or amphora. (See Fig. 4 on Colored Plate.) Favorite subjects are representations of sea plants, the cuttlefish, nautilus, and murex, all of which are rendered very successfully, though with a growing tendency to become mere conventional patterns.

With the fall of the Mycenæan civilization near the end of the second millennium B.C., there is a return to a prevailingly geometric style, in which the straight line replaces the curves and spirals. The vases, of pale clay, are covered with mæanders, zigzags, concentric circles, and triangles, to which are later added rows of water-birds and occasionally animals. Some vases show scenes from human life. As the first great discovery of these vases was made outside the Dipylon gate at Athens, they are sometimes called Dipylon vases, though this name should not be given to Bœotian, Argive, or other non-Attic varieties. During the eighth and seventh centuries the increased intercourse with the East is reflected in the vases. On the islands and among the Ionians of Asia Minor was developed a great variety of local schools, all showing great fondness for elaborate decorations covering the entire surface of the vase. Rows of animals often surround the body of the vase, while the field is filled with rosettes, stars, crosses, and similar ornaments. An interesting example is a plate from Rhodes (Colored Plate, Fig. 1) representing the conflict of Hector and Menelaus over the body of Euphorbus; it is the earliest example of an Homeric scene in art. While it is certain that Ionian influence was prominent in this development, it is not yet possible to determine the exact history of the local schools. On the Greek mainland the Oriental influence may be seen in the delicate little vases commonly called Proto-Corinthian (probably of Argive manufacture), and especially in the earlier Corinthian ware. Owing to the commercial importance of Corinth, her vases are found in Sicily and Italy and their manufacture seems to have continued even after the established supremacy of the Attic ware. They are of light clay, rather heavy in form and decorated with figures in black glaze with some use of red and violet. A white slip is also employed to indicate the flesh of women. At Naucratis and Cyrene the body of the vase was covered with this slip, on which were painted decorations in dark color.

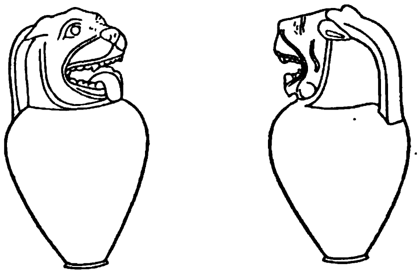
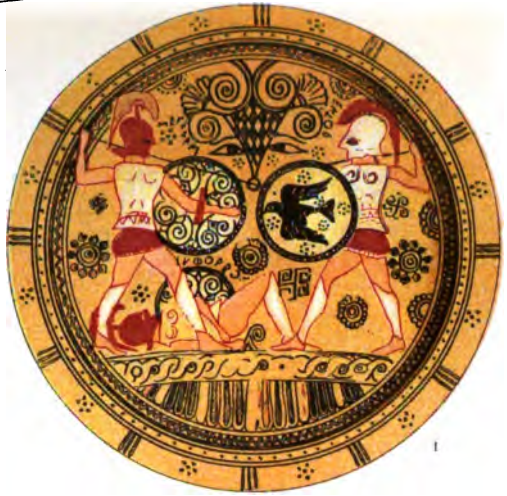


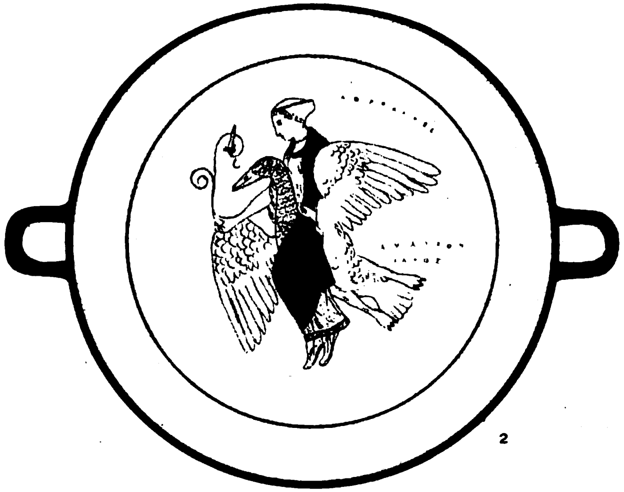
FIG. 1. PROTO-CORINTHIAN LECYTHUS.
(From the Journal of Hellenic Studies.)

Early in the sixth century the Athenian potters began to enter the field, in which they soon won a complete mastery. They heightened the red of the clay by artificial means, and invented a black glaze of exceeding brilliancy. The earlier series is the 'black-figured,' in which the design

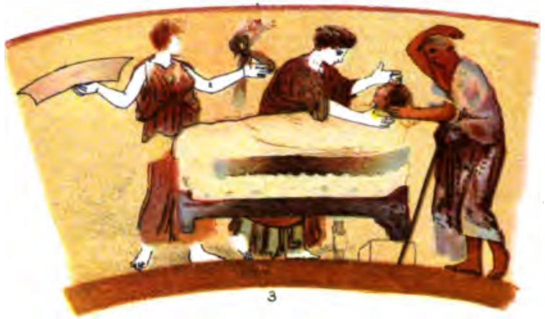
GREEK VASES - I.



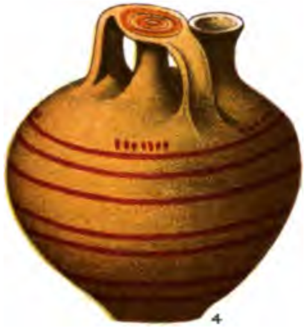
1



2



3



4

COPYRIGHT, 1903, BY DODD, MEAD & COMPANY

JULIUS BIEN & CO. LITH N.Y.

1 PLATE FROM RHODES - COMBAT OF HECTOR AND MENELAUS
2 CYLIX-APHRODITE ON THE SWAN
3 MOURNING SCENE FROM WHITE ATHENIAN LECYTHUS
4 MYCENÆAN VASE - FALSE-NECKED AMPHORA

is in black on the natural color of the clay. The details are indicated by incised lines, and a somewhat scanty use of red and white, though this last is always employed for the flesh of women. Near the end of the sixth century this technique was largely supplanted by the 'red-figured,' in which the body of the vase is covered with black glaze, while the figures appear in the natural color of the clay. The details are indicated by fine lines of black. While the earlier vases in this technique show the characteristics of archaic art, soon after the Persian wars there is greater correctness of drawing and more restraint and dignity of treatment. (See Colored Plate, Figs. 5 and 8.) Later there appears a tendency to substitute prettiness and delicacy for dignity, and while there is astonishing fineness of line, there is a distinct loss of power. In the fourth century the use of gilding and bright colors marks the decline. At this time also the practice, known in the early fifth century, of combining a vase and a figurine (Colored Plate, Fig. 7) grew more common. Here we may perhaps trace the influence of works in metal, and it is certain that this was a large factor in the disappearance of wheel-made pottery and the substitution of vases formed in a mold and decorated with figures in relief, the so-called 'Megarian' ware. Another series of Attic vases is distinguished by decorations in various colors on a white slip (Colored Plate, Fig. 2). The chief examples are the *lecythi*, or jars used to contain oil and perfumes in the service of the dead. These vases are among the most beautiful products of Greek ceramic art; they were not made for export and are rarely found outside of Attica and Eretria. See Colored Plate, Fig. 3, and Pottier, *Etudes sur les lecythes blancs attiques* (Paris, 1883).

In Lower Italy the Greek colonies seem to have developed local styles as early as the fourth century. All show a departure from the purer Attic taste in a love of florid and excessive ornamentation, and the use of bright colors. This leads to scenes introducing many figures, often arranged in rows, with ornamental borders of flowers and tendrils. Some of the vases of the earlier period are, however, fine examples of the potter's art. (Colored Plate, Fig. 6.)

In Northern and Central Italy the history of ceramics is chiefly concerned with the earlier and ruder types, valuable for ethnology, but with little artistic interest. The cemeteries on the Alban Mount, the Esquiline, and elsewhere, yield rude vases of coarse clay, usually of a sooty black or dull gray. In Etruria there developed a distinct type, the *bucchero nero* of Italian writers. These vases are of coarse black clay. They are not painted, but polished and decorated with reliefs impressed in the soft clay by a stamp. The forms and reliefs show plainly the influence of metal vases, as well as of the Oriental and Greek importations. Though this ware seems to have been manufactured as late as the fourth century, the Etruscans were also great admirers of the Greek painted vases, which they imported in large numbers, and imitated, though with but small success.

About the end of the first century B.C. there appears in Italy, and later in Gaul, Germany, and Britain, the Arretine ware, of red clay, highly glazed, and decorated in relief. It commonly bears a potter's stamp, and is hence often called 'terra sigillata' ware. The term Samian is almost certainly a misnomer. The best vases are of fine light clay with decorations evidently derived from the rich gold and silver plate in use among the wealthy.

In the preparation of the clay and the vase on the wheel Greek processes do not differ essentially from those described under POTTERY. Essential in the spirit of Greek ceramics is the absence of the merely mechanical and the presence of the free personality of the potter. Bands around the vase were drawn by the aid of the wheel, but all the other decoration was free-hand. In the black-figured ware the figures were first drawn in outline and then filled with solid color. After firing the details were engraved and the other colors added. A final firing made the vase ready for the market. In the red-figured ware the potter first drew his design on the soft clay with a dry point, thus allowing ample opportunity for alteration in details. The outlines were then marked by a border of lustrous black, and the body of the vase covered with the same color. The details were then added under conditions that made correction impossible, while the full effect could not be seen till the firing brought the color to the surface. That the potter was proud of his art is shown by the frequency of signed vases during the sixth and earlier fifth centuries. Common also during this period was the practice of placing on the vase the name of some youth noted for his beauty or popularity, accompanied by the word *καλός*, *kalos*, beautiful. Consult the three monographs of Klein (Vienna, 1896, 1897, and 1898).

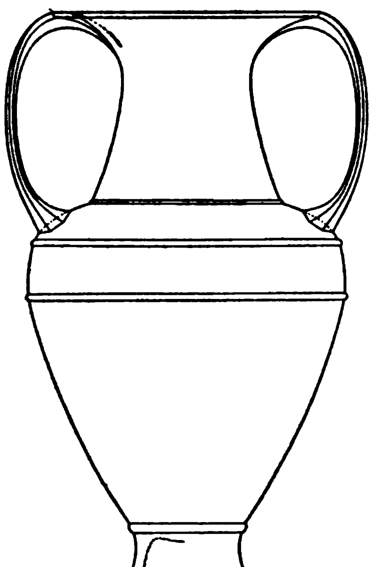


FIG. 2. AMPHORA.
Early type showing imitation of metal forms.

The forms of the Greek vases are manifold, and a comparison of any collection with the tables given in catalogues will show the wonderful subtlety of the Greek artist in devising variations on well-established types.

Of the most important varieties, the *Pithos* was a large jar of coarse clay used for storing grain or liquids, much as a modern hogshead. The *Amphora* was a smaller vessel, primarily intended for storing oil or wine, but later developed as a decorative vase. The body was somewhat large, but the neck and mouth narrow. The *Hydra*, or water-pitcher, is in form much like the amphora, but distinguished by three handles, two on the shoulders for lifting, and one at the neck, for use in pouring. An important vessel was the *Crater*, or mixing-bowl, in which the wine and water were mixed and from which the guests were served. In early times this is a round-bottomed bowl (*Deinos*) on a stand, but later was provided with a low foot, and developed into a number of graceful shapes. (See Colored Plate, Fig. 5.) For oil and perfumes was used the *Lecythus*, a tall rather slender vase, with small neck and bell-shaped mouth. It underwent a series of changes in the shape of the body, the slope of the shoulder, and the details of decoration before the development of the graceful white funeral lecythi, already described. The *Aryballus* was a small round jug with very small neck and broad flat lip. It was a favorite form with the Corinthian potters. Prominent among the cups are the *Cantharos*, a large cup on a foot with high handles rising above the rim, and the *Scyphos*, whose form is well shown in Colored Plate, Fig. 8. The favorite of the Attic potters was the *Cylix*, a rather shallow saucer mounted on a foot. The decoration was applied on the outside, where two fields were marked by the handles and also in a small circular field in the centre of the inside. Consult Hartwig's *Griechische Meisterschalen der Blütezeit* (Berlin, 1893). Other common vases are the *Rhyton*, or drinking-horn, the *Œinochoë*, or small pitcher, and the *Pyxis*, or ladies' toilet-box, commonly decorated with scenes from the life of women.

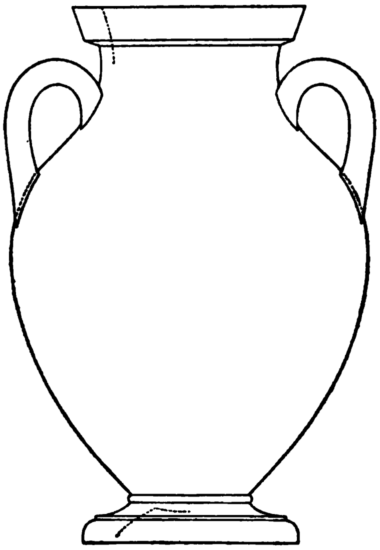


FIG. 3. AMPHORA, EARLY TYPE.

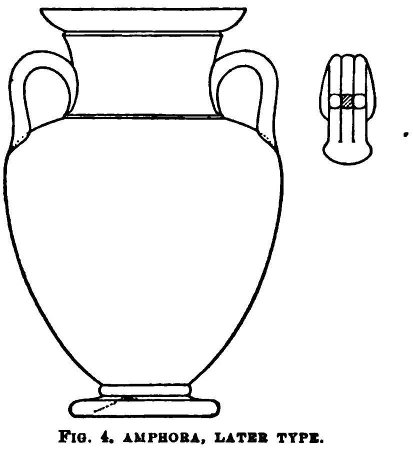


FIG. 4. AMPHORA, LATER TYPE.

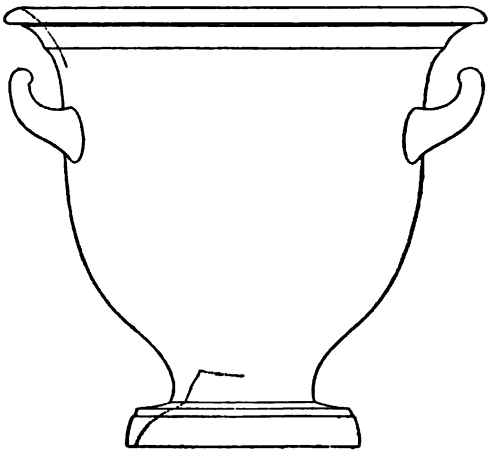


FIG. 5. CRATER.

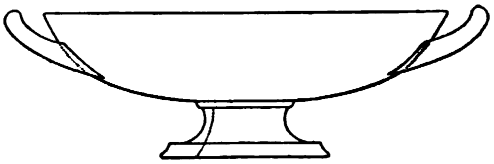


FIG. 6. CYLIX.

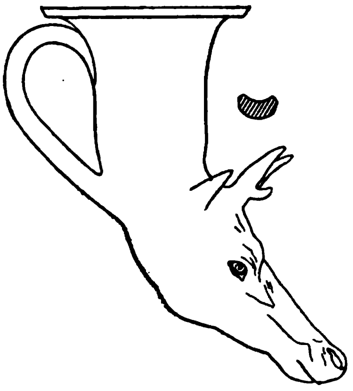
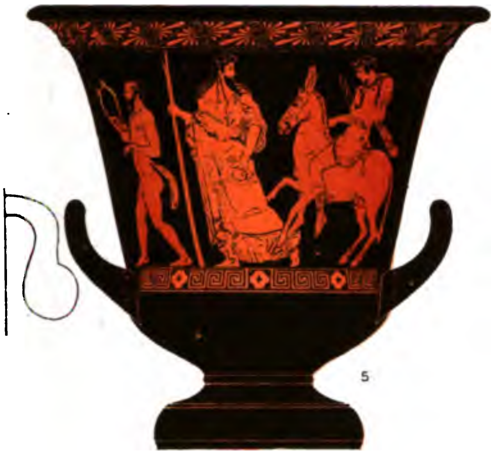


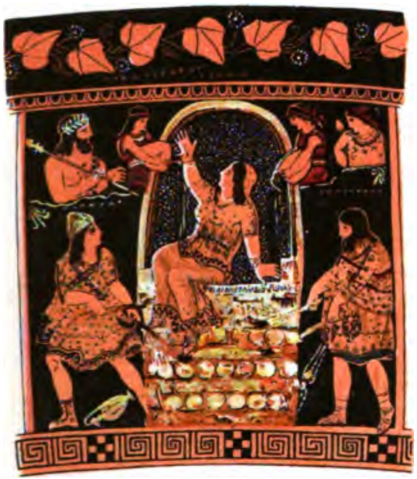
FIG. 7. RHYTON.

There are few fields of Greek study which are not illumined by the light of these earthen ves-

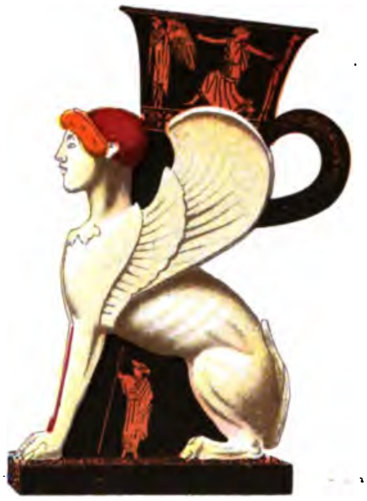
GREEK VASES - II.



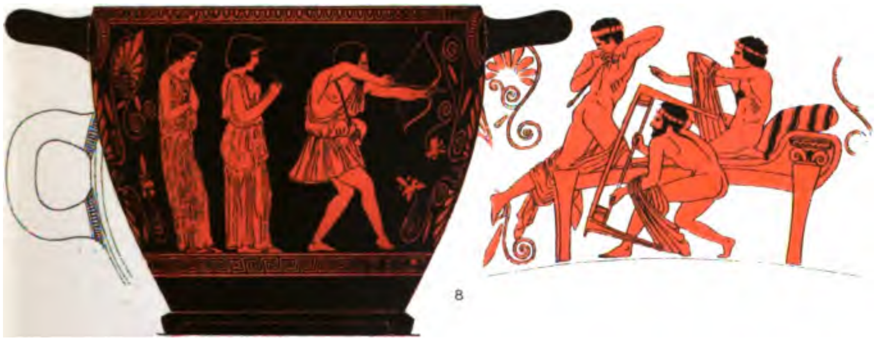
5



6



7



8

COPYRIGHT, 1903, BY DODD, MEAD & COMPANY

JULIUS BIEN & CO. LITH. N.Y.

5 CRATER – RETURN OF HEPHÆSTUS TO OLYMPUS
6 ALCMENE ON THE FUNERAL PYRE – PAINTING BY PYTHON ON A VASE FROM SOUTHERN ITALY
7 VASE IN THE FORM OF A SPHINX
8 SCYPHUS OR CUP – THE SLAUGHTER OF THE SUITORS BY ODYSSEUS

sels. For the history of the language and of the alphabet, the inscriptions are of the utmost value. Consult Kretschmer, *Die griechischen Vaseninschriften ihrer Sprache nach untersucht* (Gütersloh, 1894). It is, however, in the field of the personal life of the Greeks that the importance of the vases becomes most clearly manifest. The scenes represented by the artists cover the entire range of human life. We see the children at play, the young men at their gymnastic sports and at their feasts, amusements, and dissipations, the soldiers arriving for battle or returning home, and the girls and women in their secluded life within the house, spinning, weaving, at their household tasks, and at their toilet. The marriage procession, the sacrifice, the theatrical performance, and finally the various ceremonies connected with the burial of the dead and the offerings at the grave are all vividly shown on the vases. Moreover, the artists drew a very large part of their inspiration from the mythological literature, and freely reproduced the versions then most popular. Hence these works are often valuable authorities for myths imperfectly represented in extant literature.

Bibliography. See the "Bibliography by Authors," in Reinach, *Répertoire des vases peints grecs et étrusques*, vol. ii. (Paris, 1900), and the "Bibliography by Subjects," in Huddilston, *Lessons from Greek Pottery* (New York, 1902). The history of Greek vases is not treated fully from the most modern standpoint in any work. Still valuable are: Rayet and Collignon, *Histoire de la céramique grecque* (Paris, 1888); Dumont and Chaplain, *Les céramiques de la Grèce propre* (Paris, 1881-90); Von Rohden, "Vasenkunde," in Baumeister, *Denkmäler des klassischen Altertums* (Munich, 1885-88); Robinson, *Catalogue of Greek, Etruscan, and Roman Vases in the Boston Museum of Fine Arts* (Boston, 1893); Pottier, *Catalogue des vases antiques de terre-cuite du Louvre* (Paris, 1896, 1899, two volumes of photographic plates with a text), is of great value for the general characteristics of Greek vase-painting, a history of the study, and the early styles. Excellent works are: Furtwängler and Loeschcke, *Mykenische Thongefässe* (Berlin, 1879), and *Mykenische Vasen* (Berlin, 1886); Thiersch, *Tyrrhenische Amphoren* (Leipzig, 1899); Gerhard, *Auserlesene griechische Vasenbilder* (Berlin, 1840-58); Lenormant and De Witte, *Elite des monuments céramographiques* (Paris, 1844-61); Genick and Furtwängler, *Griechische Keramik* (Berlin, 1883); Lau, *Die griechischen Vasen, ihr Formen- und Decorationsystem* (Leipzig, 1877); Benndorf, *Griechische und sicilische Vasenbilder* (Berlin, 1869-83); Harrison and MacColl, *Greek Vase Paintings* (London, 1894); Furtwängler and Reichhold, *Die griechische Vasenmalerei. Auswahl hervorragender Vasenbilder* (Munich, 1900), still unfinished, but probably the most accurate publication of Greek vases yet attempted. The vases scattered in expensive publications and periodicals are collected in small outline drawings in Reinach's *Répertoire*, cited above. Important also are the catalogues of the collections at Athens by Couve and Collignon (Paris, 1902), Berlin by Furtwängler (Berlin, 1885), the British Museum by Smith and Walters, vols. ii.-iv. (London, 1893-96), Vienna by Masner (Vienna, 1892), and Munich by Jahn (Munich, 1855), with an introduction which laid the foundation for the scientific study of Greek vases.

VASELINE. A variety of petrolatum (q.v.).

VA'SEY, George (1822-93). An English botanist, born near Scarborough, Yorkshire, and educated at the Berkshire Medical College, Pittsfield, Mass., where he graduated in 1848. He practiced medicine for twenty years in Illinois and in 1872 became botanist of the Agricultural Department at Washington. His works, which were published by the Government, are: *A Descriptive Catalogue of the Native Forest Trees of the United States* (1876); *The Agricultural Grasses of the United States* (1884); *A Descriptive Catalogue of the Grasses of the United States* (1885); and *Grasses of the South* (1887).

VASILI, vȧ'zē'lē', Comte Paul. The nom-de-plume of Juliette Adam (q.v.).

VASILKOV, vȧ-sêl-y'-kôf'. A district town in the Government of Kiev, Southern Russia, 25 miles southwest of Kiev (Map: Russia, D 4). It manufactures small articles of gold and silver, leather, brick, soap, and candles. Population, in 1897, 17,824.

VASISHTHA, vȧ-sĭsh'tȧ. The name of one of the most celebrated Vedic Rishis, the spiritual adviser of King Sudas in ancient Northern India, and the traditional author of several hymns of the Rig-Veda, particularly in the seventh book. Vasishtha's name is connected with an old Sanskrit law-book known as the *Vasiṣṭha Dharma Sāstra*, another proof of the priestly tradition in the family of the Vasishthas. For legends concerning Vasishtha, see Muir, *Original Sanskrit Texts*, vol. i. (2d ed., London, 1872); and consult: Kaegi-Arrowsmith, *The Rigveda* (Boston, 1886); Dowson, *Hindu Mythology* (London, 1879); Wilkins, *Hindu Mythology* (2d ed., London, 1900).

VASQUEZ DE CORONADO, väs'kȧth dȧ kō'rō-nä'dō, Francisco. See Coronado, Francisco Vasquez.

VASSAL. Under the feudal system, one who was invested with a *fief* and who was bound to render feudal services and homage to a superior lord. The great lords of the realm who held directly of the King were known as *crown* vassals, but the term vassal was also applied to their feudal retainers. The services to be performed by a vassal depended upon his rank and station; if he was a great lord his chief duties were to serve the King in time of war and also furnish men and arms for military purposes; if he was only an insignificant tenant of a noble, his chief obligation might be to assist personally in the cultivation of his superior's lands. See Feudalism and authorities there referred to; also Feudal Tenure.

VAS'SAR, John Ellison (1813-78). An American lay preacher and missionary, a cousin of Matthew Vassar, founder of Vassar College, born at Poughkeepsie. He worked for several years in the Vassar brewery at Poughkeepsie, and then, feeling that his religious convictions would not permit him to continue in the business, withdrew from the company and devoted his time and money to missionary work. In 1850 he became an agent and colporteur of the American Tract Society, and for several years traveled as its representative throughout the West. During the Civil War he was at the front with the Union armies, and after the close of hostilities devoted himself to religious work in the South. He was popularly known throughout the country as "Uncle John Vassar." Consult Vassar, *Uncle John Vassar* (New York, 1879).

VASSAR, Matthew (1792-1868). An American philanthropist, founder of Vassar College. He was born at East Dereham, Tuddenham Parish, England, and in 1796 was brought to the United States by his father, James Vassar, a wool-grower, who in the spring of 1797 settled on a farm near Poughkeepsie, N. Y., and four years later established himself as a brewer in that place. In 1806 Matthew left home, and for four years thereafter worked in a country store near Newburg, N. Y. He then returned to Poughkeepsie and entered his father's business as a bookkeeper and collector. In May, 1811, the brewery was completely destroyed by fire, and the family was thus reduced to comparative poverty. Matthew then began business as a brewer on his own account, and eventually accumulated a large fortune. He contributed liberally to numerous charities, but is chiefly remembered as the founder of Vassar College (q.v.). He died suddenly on June 24, 1868, while reading his annual report to the board of trustees of the college. For a biographical sketch, consult Lossing, *Vassar College and Its Founder* (New York, 1867). See Vassar College.

VASSAR, Matthew, Jr. (1809-81). An American philanthropist, nephew of Matthew Vassar, the founder of Vassar College. He was born in Poughkeepsie, N. Y., and received but little schooling, but at an early age entered the brewery established by his uncle and father, where he showed unusual aptitude for business affairs. For many years he was the manager of the brewery, and accumulated a considerable personal fortune. He was in close sympathy with his uncle in his project for establishing Vassar College, and was named by him a member of its first board of trustees, which position he held, together with that of treasurer of the college, until his death. He gave the college $100,000 for the endowment of professorships. $50,000 for other purposes, and with his brother constructed the Vassar Brothers Laboratory. He gave also largely to various public institutions in the city of Poughkeepsie, his gifts to both city and college amounting to about $500,000. His brother, John Guy Vassar (1811-88), began his business career as a member of the brewery firm, but was compelled by ill health to travel abroad. He traveled about the world for thirty years and wrote an account of some of his experiences under the title of *Twenty Years Around the World* (1861). Like his brother, he was one of the original trustees of Vassar College, and gave jointly with him a considerable amount of money to the institution.

VASSAR COLLEGE. One of the oldest women's colleges in the United States, situated at Poughkeepsie, N. Y. It was incorporated as Vassar Female College in 1861, the present corporate name being adopted in 1867. It received from the founder, Matthew Vassar, 200 acres of land and $788,000 by gift and bequest, and further sums were given by members of the Vassar family. Students are admitted on passing the examinations set by the College Entrance Examination Board or by certificate from approved schools. The course of study, partially elective, covers four years and leads to the baccalaureate degree. The degree of master of arts is also conferred. The college offers eight fellowships for graduate work and a large number of undergraduate scholarships. The grounds of the college occupy 450 acres, three miles from the Hudson River. The main building, 500 feet in length, contains the chapel, administrative offices, and apartments. The Hall of Casts contains specimens illustrative of the chief periods of sculpture in the original size, and the Art Gallery possesses a number of examples of early American artists. In 1903 the student attendance numbered 930, the corps of instructors 83, and the volumes in the library 50,000. The endowment of the college in that year was $994,054, the value of the grounds and buildings was estimated at $1,399,862, and of the entire college property at $1,657,888. The gross income was $372,286.

VASSELOT, vȧs'lṓ', Marquet de (1840—). A French sculptor, born and educated in Paris. He worked for several years in the Bureau of the Minister of the Interior and in 1865 decided to devote himself to art, after serving a year as secretary to the French embassy to Siam. He studied art under Bonnat, Jouffroy, and Le Bourg. His works include busts of Balzac in the Théâtre Français, Boulanger, and Gambetta, and the statues "Chloe" in the Luxembourg, and "Christ at the Tomb" at Montmartre. As an historian of art he gained some repute by his *Histoire du portrait en France* (1880) and the *Histoire des sculpteurs français de Charles VIII. à Henri III.* (1888).

VASTO, väs'tô. A town in the Province of Chieti, Italy, situated on rising ground, 1½ miles from the Adriatic, and 70 miles northwest of Foggia (Map: Italy, G 5). It has a Gothic cathedral, a town hall with a museum, and interesting remains of the period of Roman occupation. The industries are olive-culture, fishing, stock-raising, and the manufacture of wine, wax candles, and brick. Vasto, the ancient *Histonium*, was an important town under the Romans. Population (commune), in 1901, 15,538.

VATHEK, vȧ'tĕk'. An Oriental romance, written by William Beekford in 1782, originally in French; published first in English without the author's sanction by his friend Samuel Henley (who is said to have suggested it), later in 1786, and soon afterwards at Paris and Lausanne in French. While tedious in parts, it has been considered the best Oriental story ever written by an Englishman, and presents a remarkable alliance of the sublime and the fantastic. Consult Garnett, *Essays of an Ex-Librarian* (London, 1901).

VATICAN, Council of the. A council held in Rome in 1869-70 and considered by Roman Catholics as the twentieth ecumenical council. (See Council.) In 1867, 300 years after the Council of Trent, Pope Pius IX., announced his purpose of holding another council. The period between this announcement and the publication of the Pope's encyclical (June 29, 1868), definitely summoning the council, was replete with controversy regarding it. Many of the prelates and of the general body of the clergy, especially of France, Belgium, Germany, and Holland, as well as many Catholic statesmen, considered it inexpedient, largely for political reasons. Austria united in discountenancing the projected meeting, and although Napoleon III. was not indisposed to it within certain limits, his Ministry generally regarded it with distrust. The Government of Italy opposed it openly. On the festival of the Immaculate Conception (December 8, 1869) the council held its first session in the basilica of the Vatican. There were present 719 prelates, 49 of whom were cardinals, 9 patriarchs, 4 primates, 121 archbishops, 479 bishops, and 57 abbots and generals of monastic Orders. This number gradually rose to 764. Although the doctrine of infallibility had not been formally announced as a portion of the programme of the council till its actual convention, yet it may be said that the council had but two real objects: the solemn ratification of this dogma, and the utterance of a protest against infidelity in all its aspects, whether of rationalism, pantheism, materialism, or atheism. Although the decrees setting forth the doctrines of the Church regarding God, the creation, the relation of faith to reason, etc., were unanimously adopted in the third public session (April 24, 1870), the decision in regard to infallibility was not arrived at so harmoniously, and not till a much later period.

It had been arranged that the committee on faith should consider all other matters lying within its sphere, relating to the Church, before treating of its head and his prerogatives, but, on April 22, 1870, those prelates in favor of it addressed a collective note to the council urging that all questions should give way to that of Papal infallibility. The Pope approved of this change, and ordered an inversion of the order of business accordingly. The first vote was not arrived at till July 13th, when, out of 601 members, 88 voted *non placet*, or adversely. These, however, were by no means necessarily to be taken as not believing in the doctrine. In most cases they were simply opposed to its definition, at this time, as an article of faith. On the final vote on the question, July 18, 1870, only two prelates recorded their votes against the definition; and even these, with all the rest of their recusant brethren, ultimately acquiesced in the decrees of the council. For the significance of the definition, see Infallibility. The council was adjourned and indefinitely postponed, October 20, 1870, in consequence of the outbreak of the Franco-Prussian War.

For the history of this momentous council, consult: Fessler, *Das vatikanische Concilium* (2d ed., Vienna, 1871); Manning, *The True Story of the Vatican Council* (London, 1877); the Old Catholic "Quirinus," *Letters from Rome on the Council* (Eng. trans., London, 1870); and J. Friedrich, *Geschichte des vatikanischen Konzils* (Bonn, 1877-87). The documents are in *Acta et Decreta Concilii Vaticani* (Freiburg, 1892).

VATICAN, Palace of the. The residence of the Pope in Rome, and the seat of the great library, museums, and collections of art which constitute one of the chief attractions of the city for visitors. Pope Symmachus (498-514) was the first to build a residence on the site, which was formerly occupied by the gardens of Nero. For a long time, however, the popes resided mainly at the Lateran. Nicholas V. (1447-55) began a systematic policy of improving the Vatican. The same policy was pursued by Alexander VI., Julius II., and above all Leo X. In recent years Pius IX. carried out many important works of completion or restoration. The palace covers about 13½ acres, and is said to contain over 1100 rooms. Some of them are of unrivaled beauty, such as the Chapel of San Lorenzo, the Pauline Chapel, and still more the Sistine Chapel (q.v.), the Sala Regia, and the galleries and halls decorated by Raphael, Giulio Romano, and their scholars. The magnificent library was opened for historical research by Leo XIII. in 1883, non-Catholic scholars with proper credentials being freely admitted. Consult Hare, *Walks in Rome* (15th ed., London, 1900); and see Rome.

VATICAN FRAGMENTS. See Fragmenta Vaticana.

VATTEL, vå'tĕl', Emmeric de (1714-67). A Swiss jurist and publicist, born at Couvet, near Neuchâtel. He studied at Basel and Geneva. In 1741 he published a defense of the philosophical system of Leibnitz. In 1744 he received an office in Dresden and from 1746 to 1758 he was the representative of Augustus of Saxony and Poland at Bern. From there he returned to Dresden, where he became a privy councilor. He wrote: *Loisirs philosophiques* (1747); *Mélanges de littérature, de morale et de politique* (1757); and also his work *Droit des gens, ou Principes de la loi naturelle,* etc. (1758), for which he is justly famous. The work was translated into numerous foreign languages (into English in 1760, and with notes by Chitty in 1838), and has still great value.

VAUBAN, vô'bäN', Sébastien le Prestre de (1633-1707). A French military engineer and marshal, born near Avallon, in Burgundy. When about seventeen he joined the Spanish forces under Condé on the frontier of the Belgian Netherlands. He studied military science and engineering while leading the active life of a soldier. He was taken prisoner by the French in 1653 and joined the French Army, where his extraordinary aptitude won him a commission two years later as a royal engineer. After the cession of Dunkirk by the English Vauban was charged with the task of fortifying it. The renewal of the war (1667) brought him service in Flanders. He was wounded at Douai, which he captured, and laid successful siege to Lille. He had now won his place as the chief engineering authority of France and was made Governor of Lille, with charge of all the works in Flanders. He was called upon to inspect and direct work on fortifications in all parts of France. At the invitation of Louvois he wrote his *Mémoire pour servir d'instruction dans la conduite des sièges*. At the siege of Maestricht in 1673 he introduced in Western Europe the system of approaches by parallels, by which he reduced the city in thirteen days. In 1678 at the conclusion of hostilities he was made commissary-general of fortifications for France. Between 1688 and 1693, in the war against the League of Augsburg, he conducted several sieges—Philipsburg, Mannheim, Frankenthal, Mons, Namur, etc. He was made a marshal of France in 1703. In the course of his military life Vauban strengthened 300 old fortresses and built 33 new ones. He took part in 140 battles, including 53 sieges. Vauban wrote several treatises on technical subjects. The principal of these, in addition to the one previously mentioned, was *De l'attaque et de le défense des places* (1736); The *Œuvres militaires de Vauban*, edited by Gen. Latour Foissac, were published in 1796. Vauban was interested in economic subjects and advocated a single tax in his *Projet d'une dime royale* (1707). Consult: Michel, *Histoire de Vauban* (Paris, 1879); Lloyd, *Vauban, Montalembert, Carnot: Engineer Studies* (London, 1887); Cadet, *Boisguilbert, Vauban, Quesnay, Turgot* (Rheims, 1869).

VAUCLUSE, vô'kluz'. A southeastern department of France, consisting of the Principality of Orange, the County of Venaissin, and other parts of the former Province of Provence. It is bounded by the Rhone and the Durance, the latter separating it from the Department of Bouches-du-Rhône (Map: France, L 7). Area, 1381 square miles. The western part belongs to the Rhone Valley, while the eastern part is filled with the spurs of the Provençal Alps. The greater part of the department is under cultivation, and large wheat crops are raised. Viniculture is extensively carried on. Potatoes and mangold beets are also raised in large quantities, and the silk culture produces nearly 2,000,000 pounds of cocoons annually. The chief manufactures are paper, silk, alcohol, and chemicals, sulphur being the principal mineral product. Population, in 1896, 236,313; in 1901, 236,949. Capital, Avignon.

VAUCLUSE, Fountain of. A noted spring in the south of France, in the department and near the village of the same name. It is a circular pool, surrounded by lofty cliffs, which discharges from 117,000 to 350,000 gallons of water per minute. The waters flow through a ravine and shortly form twenty brooks. The Sorgue takes its rise in the fountain. Here Petrarch lived in a small house for a number of years, composing many of his finest poems to Laura, and writing or beginning most of his other works.

VAUD, vō (Ger. *Waadt*). A canton of Switzerland. It is bounded by France and the Canton of Neuchâtel on the north, the Canton of Fribourg on the east, and France on the south and west. The Jura Mountains are on the west, the Bernese Alps on the east, and Lake Geneva is on the south (Map: Switzerland, A 2). Area, 1244 square miles. The interior of Vaud consists chiefly of an elevated plateau. The canton has a considerable proportion of its area under cereals, but the domestic supply is still insufficient. Wines, chiefly white, are produced. Stock-raising is well developed. Vaud is a prominent industrial canton. Among its manufactures are watches, musical instruments, cigars, and chocolate. It has many tourists' resorts and is noted for its numerous educational institutions, patronized to a large extent by foreigners. The legislative assembly is elected by the people in the proportion of one member for every 300 electors, and it chooses the executive council. The initiative and referendum are in force. Population, in 1900, 281,379, largely French-speaking Protestants. Capital, Lausanne (q.v.). The region, after forming part of the Kingdom of Arles, was annexed to Germany early in the eleventh century. It was later ruled by the House of Zähringen, after whose extinction it passed in the thirteenth century to the counts of Savoy. It was gradually acquired by Bern during the fifteenth and sixteenth centuries, under whose rule it remained till 1798, when it became the Canton of Leman in the Helvetic Republic. In 1803 it entered the Confederation under its present name.

VAUDEVILLE, vōd'vĭl; *Fr. pron.* vôd'vēl'. Originally, a popular song with words relating to some story of the day; whence it has come to signify a species of drama in which dialogue is interspersed with songs of this description and with more or less of dancing and 'variety' acting. The name vaudeville is a corruption of *vau* (i.e. *val*) *de vire*, from *les Vaux de Vire*, the name of two picturesque valleys in the Bocage of Normandy. One Olivier Basselin, a fuller in Vire, composed in the fifteenth century a number of humorous and satirical drinking songs, which became very popular and with others of the sort became known all over France by the name of the place where they originated. Jean Le Houx published many such in the sixteenth century. In Paris *vaux de vire* were sung especially on the Pont Neuf, to airs which therefore were called *ponts neufs;* and as the origin of the name for the songs were forgotten, it was related to the word *ville*, and took its present form. As a kind of popular song, the vaudeville lasted through the eighteenth century. At the same time the dramatic vaudeville came into existence, at first in the theatres of the public fairs and then in connection with the *opéra comique*, and plays of this kind were composed by Le Sage and other well-known writers. In the nineteenth century Scribe, Desaugiers, and many others wrote vaudevilles, and several Parisian theatres have been largely devoted to their production. In other countries the vaudeville is more or less freely patterned after the French type. Consult: Gasté, *Etude critique et historique sur Jean le Houx et le vau de vire à la fin du XVIème siècle* (Paris, (1874); id., ed., *Les vaux de vire de Jean le Houx* (with introduction and notes, Paris, 1875); id., *Olivier Basselin et le vau de vire* (Paris, 1887).

VAUDOIS, vô'dwä'. See Waldenses.

VAUDREUIL, vô'drẽ'y', Louis Philippe de Rigaud, Marquis of (1724-1802). A French naval commander, born at Rochefort, grandson of the following. He entered the naval service in 1740, in 1754 became captain, and in 1777 chief of squadron. In the following year he participated in the battle off Ushant and in the early part of 1779 fought with distinction in Senegal. Later in the same year he took part in the capture of Grenada and was present at the siege of Savannah, where he was wounded. He shared in the French victories off Dominica (April and May, 1780), commanded a squadron in the fight between De Grasse and Graves in Chesapeake Bay (September 5, 1781), and participated in the siege of Yorktown. His failure to come to De Grasse's aid in the battle off Santo Domingo (April 12, 1782) possibly gave Rodney the victory, but certainly saved Vaudreuil's own squadron. He sat in the States-General of 1789, showed himself an ardent Royalist, and defended the royal family from the mob at Versailles (October 5, 1789). In 1791 he fled to England, where he remained during the Reign of Terror.

VAUDREUIL, Philippe de Rigaud, Marquis of (c.1641-1725). A French Governor of Canada. He was born near Castelnaudary, Languedoc, entered the army, and in 1687 was made brigadier-general and sent to Canada. He served under Frontenac and led expeditions against the Iroquois Indians, gaining a notable victory over them in 1693. In 1701 he became Governor of Montreal and in 1703 Governor-General of Canada. He displayed much zeal and ability in the execution of his duties. He died at Quebec, October 11, 1725.

VAUDREUIL-CAVAGNAL, kȧ'vȧ'nyȧl', Pierre François, Marquis of (1698-1765). The last French Governor of Canada, born in Quebec, son of the preceding. He entered the army and in 1733 was appointed Governor of Three Rivers. He became Governor of Louisiana in 1742 and in 1755 was made Governor-General of Canada, succeeding Duquesne. Between him and Montcalm (q.v.) much dissension prevailed. After the battle on the Plains of Abraham (1759) decisive action on the part of Vaudreuil might have driven Wolfe's weakened army from Quebec, but his faltering destroyed all chances of recovering the town. In 1760 he surrendered Montreal to the English against the will of General Levis, the military commander. In Paris he was brought to trial for mismanagement of Canadian affairs, but received full justification.

VAUGHAN, va̤n, Charles John (1816-97). An English clergyman and educator. He was born at Leicester, and educated at Rugby under Dr. Arnold, and at Trinity College, Cambridge, where he took his degree in 1838. He studied law for a time, but turned to theology and was ordained in 1841. He was vicar of Saint Martin's, Leicester, until 1844, in which year he was elected head master of Harrow. In 1860 he became vicar of Doncaster, and gave much of his energy to the training of candidates for ordination. From 1869 to 1894 he was master of the Temple in London, and had a widespread influence as a preacher and as a prominent leader of the Broad Church Party. With this position from 1879 he combined the deanery of Llandaff, where he died October 15, 1897. He published numerous volumes of sermons and commentaries, and *The Church of the First Days* (1864-65; in one vol. 1890).

VAUGHAN, Henry (1622-95). An English poet. He was born at Newton-by-Usk, South Wales, and entered Jesus College, Oxford (1638). He studied law and medicine in London, withdrawing subsequently to his native place, where he became an eminent physician (1650). He wrote poetry on various subjects, chiefly devotional. Among his works are: *Poems with the Tenth Satyre of Juvenal Englished* (1646); *Olor Iscanus* (1651); *The Mount of Olives, or Solitary Devotions* (1652); and *Thalia Rediviva* (1673). His complete works were edited by Grosart (London, 1871) and his poems by Chambers (ib., 1896). His verse, sometimes harsh, has a frequent charm of quaintness and a delicate force.

VAUGHAN, Herbert (1832-1903). An English Roman Catholic prelate. He was born at Gloucester, and studied at Stonyhurst College, at Brugelette, in Belgium, and at the Accademia de' Nobili Ecclesiastici in Rome. After his ordination in 1854 he joined the Oblates of Saint Charles, then under Cardinal Manning's direction. In 1862 he left Saint Edmund's College, Ware, of which he had been for some time vice-president, and devoted himself to missionary work in England and to founding Saint Joseph's College at Mill Hill, near London, for training missionaries. He was especially interested in work among the negroes of America, and in 1871 accompanied thither the first detachment of priests sent from the college. He was chosen Bishop of Salford in 1872. After twenty years of work in this diocese, he was appointed Archbishop of Westminster to succeed Cardinal Manning, and himself received the cardinal's hat in 1893. He was always an active worker on behalf of the cause which he represented: as proprietor of the *Tablet* and the *Dublin Review*, he inspired a vigorous defense of the Roman Catholic position, which appeared also in his public utterances, always marked by an uncompromising attitude toward the other religious bodies in England. It was often said that the Papal decision against the validity of Anglican orders was largely due to his efforts. His interest in the temperance cause, in work among children, and in commercial education under Catholic auspices (for which he built Saint Bede's College) was well known.

VAUGHAN, Robert (1795-1868). A Congregational minister, of Welsh stock, born in the west of England. He was trained for the ministry by an independent divine of Bristol. He became minister of an independent chapel at Kensington (1825), professor of history in the London University (1834), and president of the Independent College at Manchester (1843). Owing to ill health, he resigned his presidency in 1857, and later took charge of a congregation at Torquay, where he died. In 1845 he founded the *British Quarterly*, which he ably edited for twenty years. Among his works are: *The Life and Opinions of John de Wycliffe, D.D.* (1828); *Memorials of the Stuart Dynasty* (1831); *Causes of the Corruption of Christianity* (1834); *The Protectorate of Oliver Cromwell* (1838); *History of England Under the House of Stuart* (1840); *Revolutions in English History* (1859-63); and *English Nonconformity* (1862).

VAUGHAN, William (1577-1641). A colonial pioneer and author, of an ancient Welsh family settled at Golden Grove, in Carmarthenshire, South Wales. He was educated at Jesus College, Oxford, graduating in 1595, and later traveled on the Continent. He established a colony at his own expense on Trepassey Bay, Newfoundland, and went out himself in or about 1622. While in his colony he wrote a quaint tract in prose and verse called *The Golden Fleece* (published 1626) describing the new land. Vaughan was also the author of *The Golden Grove moralised, in three bookes: a Work very necessary for all such as would know how to Gouerne themselves, their houses, or their countrey* (1600), and several other books in English and in Latin, some of which are strangely mystical. *The Newlanders Cure* (1630; reprinted in

North American Review for March, 1817), dealing with the maladies common in the colony, is prefaced with a short autobiography. Vaughan's colony, owing to the severe climate, eventually failed.

VAULT (OF. *volte, voute, voulte*, Fr. *voûte*, vault, from Lat. *volutus*, p.p. of *volvere*, to roll; connected with Goth. *walwjan*, AS. *wealwian*, Eng. *wallow*). A term used to designate the covering of a building constructed of masonry or in imitation of masonry in curved surfaces, as distinguished from ceiling or roof. The principal classes of vaults are: the dome, the barrel vault, the groin vault, and the rib (or Gothic) vault. Each of these classes has many sub-varieties. (For the different forms of the dome, such as the Pelasgic, Assyrian, Roman, Byzantine, Mohammedan, Gothic, Renaissance, Russian, the false dome, the low dome, the high dome on a drum, the bulbous dome, the ribbed dome, the dome on pendentives, see the article on DOME.) It was a form of vault that flourished mainly in the Orient, being only slightly used in Western Europe until the late Middle Ages and in Hellenic lands only by the Byzantine school.

The earliest form appears to have been the barrel or tunnel vault, a continuous vault usually of either semicircular or pointed cross-section. This vault was used by the Babylonians and Assyrians in both these forms, not only in subterranean passages, as at Nippur and Nimrud, but in the large palace halls, as at Khorsabad. The Egyptians, on the contrary, seldom used it where it would show. It was known, although used only in this inconspicuous fashion, to all the Mediterranean peoples—the Hittites, Pelasgians, early Italian races, and Etruscans—competing with the dome in their subterranean constructions such as tombs, treasure-houses, drains, etc. The Cloaca Maxima shows how the early Romans adopted it, and finally developed it as one of their favorite ways of covering large interiors above ground by the sided dome and groin vault. Used inconspicuously by Byzantine and hardly at all by early Christian art, it was adopted by certain schools of Romanesque architecture, especially in France, as in Provence and Burgundy. Gothic art discarded it, but the Renaissance revived it, as it did so many Roman forms.

The groin vault was formed by the intersection of two barrel vaults and appears to have been first used to any extent by the Romans of the late Republican and Imperial periods and by them transmitted to later schools. It could be used only in a square vaulting compartment and had no elasticity of shape. In early mediæval schools it was even more generally used than the barrel vault, especially over the side-aisles of churches and other narrow spaces. When strengthened by ribs at the groins it developed into the Romanesque vaulting of the Lombard, Rhenish, and Norman schools, which was superseded by the Gothic form of ribbed vault.

While the quadripartite ribbed vault might be superficially taken to be a groined vault with the addition of surface ribs along the diagonal intersecting edges, the wall line, and the line of division between the neighboring vault, this would be a fundamental error, because in the ribbed vault each compartment between ribs is an independent structure transmitting thrust to the ribs, and the ribs themselves form an independent framework. There are quadripartite, sexpartite, and other forms, according to the number of such compartments; domical ribbed vaults have more; the curved lines of Gothic choir-aisles and chapels led to other intricate and irregular combinations, so that there is an almost infinite variety in ribbed vaulting. The history of its origin and its importance as the basal unit in Gothic architecture is explained under GOTHIC ARCHITECTURE. (For fancy ribbed vault, see RIB.) For various unusual forms, such as cloistered vault, wagon vault, the various forms of conical vaults, as well as for a technical study, consult "Vault," in Sturgis, ***Dictionary of Architecture*** (New York, 1902). See also "Construction" and "Voûte," in Viollet-le-Duc, *Dictionnaire raisonnée de l'architecture* (Paris, 1854-68); Haase, *Der Gewölbebau* (Halle, 1900).

VAULTING-SHAFT. A small upright column, or pier, supporting the ribs of a Gothic vault. These shafts generally occur in clusters, and may either spring from the ground or be supported on small corbels in the wall. They are usually engaged, but may be free-standing.

VAUTIER, vô'tyȧ', BENJAMIN (1829-98). A Swiss-German genre painter. He was born at Morges, on Lake Geneva, studied at Geneva, then at the Düsseldorf Academy under Schadow, was a pupil of Rudolf Jordan, and for some years devoted himself to the study of peasant life in the Bernese Oberland. After a short sojourn in Paris in 1856 he settled at Düsseldorf and in 1858 achieved a brilliant success with his "Church Scene," which was followed by a series of characteristic episodes in the life of the Swiss and Swabian peasantry. Some of the most prominent among these pictures, distinguished by good drawing, harmonious color, and genuine feeling, are: "Peasants at Cards Surprised by Their Wives" (1862, Leipzig Museum); "Peasant and Broker" (1865, gold medal, Paris) and "Involuntary Confession" (both in the Basel Museum); "Saying Grace" (Bern Museum); "Funeral Repast in Bernese Oberland" (1865, Cologne Museum); "The First Dancing Lesson" (1868) and "At the Sickbed" (1873, both in the National Gallery, Berlin); "Toast to the Bride" (1870) and "Prodigal Son" (1885, both in the Kunsthalle, Hamburg); "A Breathing Interval at Wedding Dance" (1878, Dresden Gallery); "Arrest of Jewish Usurer" (1879), one of his most remarkable works; "Forsaken" (1892, Breslau Museum); and "Market Day in Black Forest" (1896, Henneberg Gallery, Zurich). He also illustrated Auerbach's ***Barfüssele***, Immermann's ***Oberhof***, Goethe's ***Hermann und Dorothea***, and other literary works. For his biography, consult Rosenberg (Bielefeld, 1897), and Pecht, *Deutsche Künstler*, iii. (Nördlingen, 1881).

VAUVENARGUES, vôv'närg', LUC DE CLAPIERS. Marquis de (1715-47). A French moralist, born at Aix, in Provence. He entered the army at seventeen, and served in Italy and Bohemia, devoting himself subsequently to literature. He was a man of lofty character and enjoyed the friendship of Marmontel and Voltaire. His *Introduction à la connaissance de l'esprit humain*, with certain ***Réflexions*** and ***Maximes*** appended (1746). is more famous for the appendix than for the body of the work, and gains its true value from the moral aphorisms based on personal, though vague, observation of the sort familiar in English to readers of Pope. His complete works were edited by Gilbert (1857), and by Plon (1874). Consult Paléologue, *Vauvenargues* (Paris, 1890).

VAUX, vạx, Calvert (1824-95). A British-American architect and landscape gardener, born in London. In 1843-46 he was an indentured pupil of L. N. Cottingham, a prominent London architect, and in 1850 removed to the United States as assistant to A. J. Downing (q.v.), a well-known American landscape gardener. Subsequently he became Downing's architectural partner, with offices at Newburg, N. Y., upon Downing's death conducted the business there from 1852 to 1857, and then established himself in New York City, where he entered into partnership with Frederick Law Olmsted (q.v.). In association with Olmsted he made plans for Central, Riverside, and Morningside parks, in New York City, for Prospect Park in Brooklyn, for parks at Bridgeport, Conn., and Chicago, Ill., and for the New York State reservation at Niagara Falls. He also designed numerous buildings, including the first structures for the Metropolitan Museum of Art and the Museum of Natural History, in New York City. He was appointed landscape architect to the Department of Parks of New York, and also a member of the consolidation inquiry commission for the Greater New York. It was largely owing to his efforts that the Central Park territory was preserved intact and developed in accordance with the original landscape designs. In his professional work he displayed an original artistic faculty, and as a municipal official he was very active. He published *Villas and Cottages* (1857; 2d ed. 1864).

VAUX, Richard (1816-95). An American lawyer and politician, born in Philadelphia. He was admitted to the bar in 1836; was later secretary of the American legations at London and Brussels; member of Congress 1890-92; but he is best known as a penologist, contributing largely to the literature on the subject. Among other things he wrote on that subject; *Brief Sketch of the Origin and History of the State Penitentiary for the Eastern District of Pennsylvania* (1872); *Insideout, or Present Prison Systems and Their Effects on Society and the Criminal* (1888); *The State and the Prison* (1886).

VAUX, Thomas (1510-56). An English poet, second Baron Vaux of Harrowden, Northamptonshire, eldest son of Nicholas Vaux, the first Baron Vaux (d.1523). Apparently he was educated at Cambridge. At the age of seventeen he accompanied Cardinal Wolsey to France (1527), and was with the King at Calais and Boulogne (1532). He was made a knight of the Bath at the coronation of Anne Boleyn (1533), and was for a short time captain of the island of Jersey (1533-36). His extant lyrics, numbering at least fifteen, were contributed to Tottel's *Miscellany* (1557) and to *The Paradise of Dainty Devices* (1576). Consult *Fuller Worthies' Library Miscellanies*, ed. by A. B. Grosart (vol. iv., Edinburgh and London, 1872).

VAUX, William Sandys Wright (1818-85). An English antiquary and numismatist. He was educated at Balliol College, Oxford, in 1841, obtained a post in the department of antiquities of the British Museum, and from 1861 until his resignation in 1870 was keeper of coins and medals. During 1871-76 he catalogued the coins of the Bodleian Library at Oxford. He was particularly expert in Oriental antiquities, and besides an edition for the Hakluyt Society (1854) of *The World Encompassed by Sir F. Drake*, published *Nineveh and Persepolis* (1850; 4th ed. 1855), which presented in popular form the discoveries of Layard and others; and, under the general title, *Ancient History from the Monuments*, the two volumes, *Persia from the Earliest Period to the Arab Conquest* (1875; a new ed., by Sayce, 1893), and *Greek Cities and Islands of Asia Minor*.

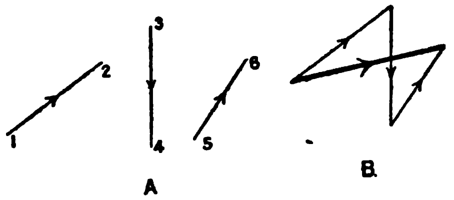
VAUXHALL (vạks'hạl) **GARDENS.** A former place of public amusement, on the outskirts of London, on the Thames above Lambeth. It was laid out in 1661, and was originally called the 'New Spring Gardens at Foxhall.' At first a scene for fashionable pleasure, it became more and more a place of bank-holiday carousal and was finally closed in 1859, the area being now quite covered by modern dwellings. The gardens are vividly described by Addison, Smollett, and Thackeray.

VĀYU, vä'yōō, or **VĀTA,** vä'tȧ (Skt. wind). A deified personification of the wind in the Vedic mythology of the Hindus. Both these names are applied to the wind, but Vayu is rather the divinity and Vata the element. In epic and Puranic mythology Vayu occupies only an inferior position. Legend assigns to him a wife Anjana, and their child is the monkey-god Hanumān (q.v.). In the Avesta (q.v.) Vayu is also a name of the genius of the air. Consult: Macdonell, *Vedic Mythology* (Strassburg, 1897); Wilkins, *Hindu Mythology* (2d ed., London, 1900).

VECCHIETTA, vĕk'ē-ĕt'tȧ, Il. The name sometimes applied to the Italian painter Lorenzo di Pietro (q.v.).

VECELLI, vā-chĕl'lē, Tiziano. See Titian.

VECTOR (Lat. *vector*, one who carries or conveys, from *vehere*, to carry, convey). A vector quantity is such a physical quantity as has the properties of a straight line of a definite length and in a definite direction. Linear displacement, linear velocity, linear momentum, linear acceleration, and force acting on a particle are illustrations. Vector quantities of the same kind can be added geometrically, as straight lines are added, by connecting the ends of a broken line made by joining the lines, keeping them parallel to themselves, and adding them in such a manner that their directions indicate a continuous addition. Thus, in Fig. A the vectors 12, $\overline{34}$, 56, may be added as shown, bringing 3 to coincide



with 2, and 5 with 4, and then joining the two free ends, as in Fig. B. It is evident from geometry that the *order* of the addition is immaterial so long as the arrows indicate continuous action. Thus it would do just as well to make 1 and 4 and 2 and 5 coincide, or 1 and 4 and 6 and 3; the final result is the same as before. See MECHANICS, and especially the article QUATERNIONS, where will be found a full mathematical explanation of vectors.

VEDA, vā'då (Skt. *veda*, knowledge, from *vid*, to know; connected with Gk. *ϝοῖδα*, *foida*, I know, *ϝιδεῖν*, *fidein*, Lat. *videre*, OChurch Slav. *vĕdĕ*, I know, OHG. *wizzan*, Ger. *wissen*, Goth., AS. *witan*, Eng. *wit*, to know). The collective designation of the ancient sacred literature of India, or of individual books belonging to that literature. At an unknown date, which may be conventionally averaged up as B.C. 1500, Aryan tribes began to migrate from the Iranian highlands on the north of the Hindu Kush into the northwest of India, the plains of the river Indus and its tributaries. The non-Ayran aborigines were easily conquered, but the conquest was followed by gradual amalgamation of the fairer-hued conquerors with the dark aborigines. The Aryans brought with them a primitive pastoral civilization, a language which was a mere dialectic variety of the speech spoken in Iran, and religious beliefs which show close connection with the ancient Persian religion of the Avesta, and, to a lesser and more problematic extent, with the beliefs of the remaining Indo-Germanic peoples, such as the Greeks (see GREEK RELIGION) and the Teutons. (See SCANDINAVIAN and TEUTONIC MYTHOLOGY.) From the very start we are confronted by a poetical literature, primitive on the whole, yet lacking neither in refinement and beauty of thought, nor in skill in the handling of language and metre. The literature is throughout religious, and includes prayers and sacrificial formulas, offered to the gods by the priests; charms for witchcraft and medicine, manipulated by magicians and medicine-men; expositions of the sacrifice; theological comments and legends; higher speculations, philosophic and theosophic, growing up in connection with the simpler beliefs; and finally rules for conduct in every-day life at home and abroad. This is the Veda as a whole.

At the base of this entire literature of more than 100 books lie four varieties of metrical compositions known as the four Vedas in the narrower sense. These are the *Rig-Veda*, the *Yajur-Veda*, the *Sāma-Veda*, and the *Atharva-Veda*. These four names come from a somewhat later time, and do not coincide exactly with the earlier names, nor do they correspond with the contents of the texts themselves. The earlier names are *ṛcaḥ*, 'stanzas of praise,' *yajūṅṣi*, 'liturgical stanzas and formulas,' *sāmāni*, 'melodies,' and *atharvāñgirasaḥ*, 'blessings and curses.' The Collection which goes by the name of the Rig-Veda contains not only 'stanza of praise,' but also 'blessings and curses,' as well as most of the stanzas which form the basis of the *sāman*-melodies. The Atharva-Veda contains *ṛcaḥ* and *yajūṅṣi*, as well as blessings and curses. The Yajur-Veda also contains many blessings and curses, in addition to its main topic. The Sama-Veda is merely a collection of a certain kind of 'stanzas of praise' which occur for the most part in the Rig-Veda, but are here set to music by means of definite musical notations.

The Rig-Veda is on the whole the most important as well as the oldest of the four collections. A little more than 1000 hymns, equaling in bulk the surviving poems of Homer, are arranged in ten books called *maṇḍala*, or circles. Six of them (ii.-vii.), the so-called family books, form the nucleus of the collection. Each of these is the work of a different seer and his descendants, as can be seen from the hymns themselves. The eighth book and the first fifty hymns of the first book, belonging to the family of Kanva, are arranged strophically in groups of two or three stanzas. The most marked peculiarity of these hymns is that they form the bulk of the stanzas sung with melodies in the Sama-Veda. The hymns of the ninth book are addressed directly to Soma (q.v.). The remainder of the first book and the entire tenth book are more miscellaneous in character and problematic as to arrangement. On the whole they are of later origin, for themes foreign to the narrower purpose of the *ṛcaḥ*, such as theosophic hymns and withcraft hymns, appear in considerable number. The poems of the latter class frequently reappear, usually with variations, in the Atharva-Veda.

On the whole the Rig-Veda is a collection of priestly hymns addressed to the gods of the Vedic pantheon during sacrifice. This sacrifice consisted of oblations of intoxicating *sōma* pressed from the *sōma*-plant and melted butter or ghee (q.v.) which was poured into the fire. The ritual of the Veda is advanced in character, by no means so simple as was once supposed, though not as elaborate as that of the Yajur-Veda and the Brahmanas. (See below.) The chief interest of the Rig-Veda lies in the gods themselves and in the myths narrated in the course of their invocation. The mythology represents an earlier, clearer stage of thought than is to be found in any other parallel literature. Above all it is sufficiently primitive to show clearly the process of personification by which natural phenomena developed into gods. (See the sub-section *Vedic Religion* under INDIA; NATURE-WORSHIP.) The original nature of the Vedic gods, however, is not always clear; some of them are so obscure in character as to make an analysis of them a difficult and important chapter in Vedic philology. But on the whole the key-note of Rig-Vedic thought is the nature myth.

The Yajur-Veda represents the growth of ritualism or sacerdotalism; its *yajūṅsi*, 'liturgical stanzas and formulas,' are in the main of a later time, and are partly metrical, partly prose. The materials contained in the Rig-Veda are freely adapted, with secondary changes of expression, and without regard to the original order of their composition. The main object is no longer devotion to the gods themselves. The sacrifice has become the centre of thought; its mystic power is conceived to be a thing *per se*, and every detail has become all-important. A crowd of priests (seventeen is the largest number) conducts a vast, complicated, and painstaking ceremonial, full of symbolic meaning even in its smallest minutiæ. From the moment the priests seat themselves on the sacrificial ground and proceed to mark out the altars (*vĕdi*) on which the sacred fire is built, every act has its stanza or formula, and every utensil is blessed with its own fitting blessing. These formulas are no longer conceived as prayers, but as magic. The words as well as the acts have inherent power. If the priest chants a formula for rain while pouring a certain sacrificial liquid, rain shall and must come. In fact, and in brief, the Yajur-Veda means the deification of the sacrifice in every detail of act and word.

The Sama-Veda is the least clear of all the Vedas. Its stanzas, or rather groups of stanzas, are known as *sāmāni*, 'melodies.' The *sāman* stanzas are preserved in three forms. First, in the Rig-Veda, as ordinary poetry, accented in the same way as other Vedic poetry. Secondly, in the *ārcikas*, a kind of libretto forming a special collection of *sāman*-verses, most of which, though not all, occur also in the Rig-Veda. Here also there is a system of accents, peculiar in its notation, but purely with reference to the unsung *sāmans*. In the third *sāman* version, the *gānas*, or song-books, we find the real sung *sāmans*. Here not only the text, but the musical notes are marked. Still this is not a complete *sāman*. In the middle of the sung stanzas appear exclamatory syllables, the so-called *stōbhas*, such as *ōm*, *hāu*, *hāi*, *hōyi*, or *him*; and at the end certain concluding words, such as *atha*, *ā*, *īm*, *nām*, and *sāt*. The Sama-Veda is devoted chiefly to the worship of Indra (q.v.). It seems likely, therefore, that it is the civilized version of savage Shamanism (q.v.), an attempt to influence the natural order of things by shouts and exhortations, for the Brahmans as a rule blended their own hieratic practices and conceptions with what they found among the people. The *sāman*-melody and the exclamations interspersed among the words may, therefore, be the substitute for the self-exciting shouts of the Shaman priests of an earlier time.

The oldest name of the Atharva-Veda is *atharvāñgirasaḥ*, a compound formed of the names of two semi-mythic families of priests, the Atharvans and Angirases. At a very early time the former term was regarded as synonymous with 'holy charms,' or 'blessings;' the latter with 'witchcraft charms,' or 'curses.' In addition to the name Atharva-Veda there are two other names, practically restricted to the ritual texts of this Veda: *bhṛgvañgirasah* or 'Bhrigus and Angirases,' in which the Bhrigus, another ancient family of five priests, takes the place of the Angirases; and *Brahma-Veda*, probably 'Veda of the Brahma, or holy religion in general.' (See BRAHMA.) The Atharva-Veda is a collection of 730 hymns, containing some 6000 stanzas, divided into 20 books. About one-sixth of the mass, including two entire books (xv. and xvi.), is written in prose, similar in style to that of the Brahmanas (see below), the rest being poetry in the usual Vedic metres. These, however, are handled with great freedom, often betraying either ignorance or disregard of the metrical canons, as they appear in the Rig-Veda. The Atharva-Veda did not attain to perfect canonicity until the period of Classical Sanskrit, simply on account of the nature of its contents, which are somewhat apart from the hieratic worship of the gods and the sacerdotalism of the other three Vedas. The contents of the Atharva-Veda are popular rather than hieratic, and superstitious rather than religious. It is a picture of the lower life of ancient India, painted on a very broad canvas. It exhibits the ordinary Hindu not only in the aspect of a devout and virtuous adherent of the gods, and performer of pious practices, but also as the natural, semi-civilized man: rapacious, demon-plagued and fear-ridden, hateful, lustful, and addicted to sorcery.

The themes of the hymns of the Atharva-Veda may be grouped as follows: charms to cure disease and possession by demons; prayers for long life and health; imprecations against demons, sorcerers, and enemies; charms pertaining to women; charms pertaining to royalty; charms to secure harmony, influence in the village assembly, and the like; charms to secure prosperity in house, field, cattle, business, gambling, etc.; charms in expiation of sin; prayers and imprecations in the interest of Brahmans; and wedding and funeral stanzas. Curiously enough, the Atharva has a large number of cosmogonic and theosophic hymns, being in this respect a more significant precursor to the Upanishads (q.v.) than is the Rig-Veda itself.

The redactions of these four Vedas, called *saṁhitas* by the Hindus, have been handed down in various schools, branches, or recensions, which present a given Veda in forms differing not a little from one another. The school differences of the Rig-Veda are of no importance, except as they extend also to the Brahmanas and Sutras. (See below.) There are two Sama-Veda redactions, that of the school of the Kauthumas and the Ranayaniyas; and two of the Atharva-Veda, ascribed to the school of Śaunakiyas and the Paippaladas. The Yajur-Veda especially is handed down in recensions that differ from one another very widely. There is first the broad division into White Yajur-Veda and Black Yajur-Veda. The most important difference between these two is that the Black Yajur schools intermingle their stanzas and formulas with the prose exposition of the Brahmana, whereas the White Yajur schools present their Brahmana in separate works. The White Yajur-Veda belongs to the school of the Vajasaneyins and is subdivided into the Madhyandina and Kanva schools. The important schools of the Black Yajur-Veda are the Taittiriyas, Maitrayaniyas, Kathas, and Kapishthalas. Sometimes these schools have definite geographical locations. For example, the Kathas and the Kapishthalas were located, at the time when the Greeks became acquainted with India, in the Punjab and in Kashmir. The Maitrayaniyas appear at one time to have occupied the region around the lower course of the river Narmada, and the Taittiriyas, at least in modern times, are in the south of India.

The poetic stanzas and the ritualistic formulas of the Vedas collectively go by the name of *mantra*, 'pious utterance,' or 'hymn.' These were followed at later periods by a very different literary type, namely, the theological treatises called *brāhmaṇas*. They are exegetical and commentative, and are bulky expositions of the sacrificial ceremonial, describing its minute details, discussing its value, speculating upon its origin, and illustrating its potency by ancient legends. Aside from the light which these texts throw upon the sacerdotalism of ancient India, they are important because they are written in connected prose, the earliest in the entire domain of Indo-Germanic speech. They are especially important for syntax, representing in this respect the oldest Indian stage even better than the Rig-Veda, owing to the restriction imposed upon the latter by its poetic form. The Brahmanas also were composed in schools or recensions, but the various Brahmana recensions of one and the same Veda differ at times even more widely than the Samhitas of the Mantras. Thus the Rig-Veda has two Brahmanas, the Aitareya and the Kaushitaki or Sankhayana. The Brahmana matter of the Black Yajur-Vedas is given together with the hymns themselves; but the White Yajur-Veda treats its Brahmana matter separately, and with extraordinary fullness, in the famous *Śatapatha-Brāhmaṇa*, the 'Brahmana of the Hundred Paths,' so called because it consists of 100 lectures. Next to the Rig-Veda and Atharva-Veda this work is the most important production in the whole range of Vedic literature. Two Brahmanas belonging to independent schools of the Sama-Veda have been preserved, that of the Tandins, usually designated as the *Pancaviṁśa-Brāhmaṇa* and that of the Talavakaras or Jaiminiyas. To the Atharva-Veda is attached the very late and secondary *Gōpatha-Brāhmaṇa*, though its contents are in reality foreign to the spirit of the Atharvan hymns.

A later development of the Brahmanas are the *Āranyakas*, or 'Forest Treatises.' Their later character is indicated both by the position they occupy at the end of the Brahmanas and by their theosophical character. The name 'Forest Treatise' is of somewhat obscure application, but it seems likely that these works, owing to the superior mystic sanctity of their contents, were intended to be recited in the solitude of the forest instead of in the village. The two important Aranyakas are the Aitareya and the Taittiriya, belonging, of course, to the Vedic schools of these names. The chief value of the Aranyakas is that they form in contents and tone a transition to the Upanishads, which are either imbedded in them, or, more usually, form their concluding portions. See Upaniṣad.

Both Mantra and Brahmana are regarded as part of revelation (*śruti*); the rest of Vedic literature as tradition (*smṛti*) derived from holy men of old. This literature has a characteristic style of its own, being written in the form of brief rules, or *sūtras*, whence it is familiarly known as Sutra literature or the Sutras. They are, in the main, of three classes, each of which is associated with a particular Vedic school, reaching back, as a rule, to the school distinctions of the Samhitas and Brahmanas. The first class of Sutras are the *Śrāuta* or *Kalpa Sūtras*, which may be translated 'Sutras of the Vedic Ritual.' They are rule-books compiled, with the help of oral priestly tradition, from the Brahmanas. They are brief manuals of the Vedic sacrifices, as distinguished from the more diffusive Brahmanas, whose ritual acts are interrupted by elaborate explanation and illustrative legends. To the Rig-Veda belong two Śrauta Sutras corresponding to its Brahmanas, the Aśvalayana to the Aitareya Brahmana, and the Śankhayana to the Brahmana of the same name. To the white Yajur-Veda belongs the Śrauta Sutra of Katyayana, closely adhering to the Satapatha Brahmana. No less than six Śrauta Sutras belong to the Black Yajur-Veda, but only two of them have as yet been published, that of Apastamba, belonging to the school of the Taittiriya, and the Manava, belonging to the school of the Maitrayaniya. The Sama-Veda has two Srautas, that of Latyayana and Drahyayana, belonging respectively to its two schools of Kauthuma and Ranayaniya; and the Atharva-Veda has the late and inferior Vaitana.

Of far greater, indeed of universal interest, is the second class of Sutras, the *Gṛhya Sūtras*, or 'House Books.' These are treatises on home life which deal systematically with a well-defined body of facts connected with the every-day existence of the individual and the family. Though composed at a comparatively late Vedic period, they contain practices and prayers of great antiquity, and supplement most effectively the contents of the Atharva-Veda. They also are distributed among the four Vedas and their schools. The Rig-Veda has the Grihya Sutras of Asvalayana and Śankhayana; the White Yajur-Veda that of Paraskara; the Black Yajur-Veda a large number, as those of the schools of Apastamba, Hiranyakeśin, and Manava; the Sama-Veda has the Gabhila and the Khadira; to the Atharva-Veda belongs the important Kauśika Sutra, which, in addition to the domestic ritual, deals with the magical and medicinal practices specially characteristic of that Veda.

The third kind of Sutras are the ***Dharma Sūtras***, or 'Law Sutras,' which also deal to some extent with the customs of every-day life, but are engaged for the most part with religious and secular law. These Sutras also are either attached to the body of canonical writings of a certain Vedic school, or are shown by inner criteria to have originated within such a school. The oldest legal Sutras are the Apastamba and Baudhayana, belonging to the Black Yajur schools of the same name, the Gautama belonging to the Sama-Veda, the Vishnu belonging to the Katha school of the Black Yajur-Veda, and the Vasishtha of less certain associations. The earliest metrical law-books, written in classical Sanskrit, are also based on lost Sutra collections of definite Vedic schools. The most famous of these, the ***Mānava Dharma Śāstra***, or 'Law-Book of Manu' (see Manu), is founded upon the Dharma Sutra of the Manava, or Maitrayaniya school of the Black Yajur-Veda, while the briefer 'Law-book of Yajnavalkya' derives its origin from a school of the White Yajur-Veda.

Consult the treatises mentioned at the close of the article Sanskrit Literature, especially the full bibliography in Macdonell, ***History of Sanskrit Literature*** (New York, 1900). English readers may obtain ready insight into the contents of Vedic literature in all its important aspects by means of Müller, ***Sacred Books of the East*** (Oxford, 1879 et seq.). Parts of the Rig-Veda are translated by Müller himself (vol. xxxii.) and Oldenberg (vols. xlvi. and xlviii.); the Atharva-Veda by Bloomfield (vol. xlii.); the Satapatha Brahmana by Eggeling (vols. xii., xxvi., xli., xliii., and xlv.); seven of the Grihya Sutras by Oldenberg (vols. xxix. and xxx.); the old Dharma Sutras by Bühler and Jolly (vols. ii., vii., and xiv.); and the Law-Book of Manu by Bühler (vol. xxv.).

VĒDĀÑGA, vā-däng'ȧ (Skt., member of the Veda). The name of six Sanskrit works, the object of which is to teach how to read and understand correctly Vedic texts, and how to apply them correctly to sacrificial purposes. The first four of the six Vedangas are philological in character and the other two deal with the sacrifice and its season. The names and scope of the six are as follows: (1) *Śikṣa,* or phonetics. It is represented by a short treatise of 35, or, in another recension, of 59 verses, which explains the nature of letters, accent, and pronunciation, and is ascribed to Panini (q.v.). (2) *Chandas,* or metre, which is ascribed to Pingala. (3) *Vyākaraṇa,* or grammar, by which native authorities understand the celebrated work of Panini (q.v.). (4) *Nirukta* (q.v.), or etymology. (5) *Jyōtiṣa,* or astronomy, as employed in fixing the days and hours of the Vedic sacrifices. (6) *Kalpa,* or works on the Vedic ceremonial, which systematize the ritual taught by the Brāhmana portion of the Veda, omitting, however, all legendary or mystical detail. They are composed in the Sutra style. (See SŪTRA.) The Vedanga was edited in Bombay, 1902. Consult: Müller, *Ancient Sanskrit Literature* (London, 1859); Weber, *History of Indian Literature* (Eng. trans., Boston, 1878); Macdonell, *Sanskrit Literature* (New York, 1900).

VĒDĀNTA, vā-dän'tȧ (Skt., conclusion of the Veda, later interpreted as ultimate aim of the Veda). The second great division of the *Mīmāṁsā* (q.v.) school of Hindu philosophy. It is chiefly concerned in the investigation of Brahma, or the Supreme Spirit, and the relation in which the universe, and especially the human soul, stands to it; and in contradistinction from the *Pūrvamīmāṁsā,* or the investigation of the former part of the Vedas, especially the *Brāhmaṇas* (see VEDA), it is also called *Uttaramīmāṁsā,* or the investigation of the latter part of the Vedas, the *Araṇyakas* and *Upanishads,* which treat of Brahma, the Supreme Spirit. Sometimes the name given to it is *Śārīrakamīmāṁsā,* or the investigation of embodied Brahma. In its method the Vedanta differs from the Nyāya (see NYĀYA; VAISESHIKA) by endeavoring to explain the universe as a successive development from one ultimate source or principle, and it is distinct from the *Sānkhya* (see SĀNKHYA; YŌGA), inasmuch as that system is based on the assumption of a duality of principles whence the universe derives its origin.

The object-matter of the Vedanta is the proof that the universe emanates in a successive development from a Supreme Spirit, or All Soul, Atman, which is also called *Brahman,* or *paramātman;* that the human soul is therefore identical with Brahma; that the separate existence of the human soul is the result of its ignorance of this identity of itself and the Supreme Spirit; and that its final liberation or freedom from metempsychosis (q.v.) is attained by a removal of this ignorance, that is, by a proper understanding of the truth of the Vedanta doctrine. In essence, therefore, Vedanta is an idealistic monism. Its first beginnings are found in the early Upanishads (q.v.), but as a completed system it dates from about the time of our era, being later than the Yoga. It is referred to Badarayana (eighth century), whose Brahma-Sutra, as explained by Sankara, is the authoritative work of the Vedantists, although the interpretation of Ramanuja (twelfth century) differs in some important particulars from that of Sankara. The former teaches that the individual soul is ever distinct from the Supreme Soul, whereas Sankara holds that when *avidyā,* or ignorance, is removed, the individual soul becomes one with the Supreme, according to the doctrine of 'non-duality.'

According to the Vedanta, as thus interpreted by Sankara, Brahma is both the efficient and material cause of the world, creator and creation, doer and deed. It is one, self-existent, supreme, as truth, wisdom, intelligence, and happiness; devoid of the three qualities of darkness, passion, and truth, in the sense in which created beings possess them; and at the consummation of all things the whole universe is resolved or absorbed into it. From Brahma individual souls emanate, as innumerable sparks issue from a blazing fire. The soul, therefore, is neither born nor does it die; it is of divine substance, and as such infinite, immortal, intelligent, sentient, true. Its separate existence, as distinct from Brahma, is the cause of its ignorance; and this ignorance, which consists in regarding the world as a reality capable of subsisting without Brahma, has the double power of enveloping and projecting. By means of the former it makes the soul liable to mundane vicissitudes, such as the sensations of pleasure and pain. The projective power of ignorance, when encompassing the soul in its condition of pure intellect, produces out of the darkness which then prevails the five subtile elements, ether, which is the substratum of the quality sound; air, which arises from ether, the substratum of touch; from air, fire or light, the substratum of color; from light, water, the substratum of savor; and from water, earth, the substratum of smell. From these subtile elements are then produced seventeen subtile bodies and the five gross elements. The former, also called *liṅgaśarīra,* are the five organs of perception, the organs of hearing, touch, sight, taste, and smell, which arise severally from the pure or inactive particles of each of the subtile elements. There are, further, two intellectual organs, which are produced from the mingled pure or inactive particles of the subtile elements, *buddhi,* understanding, the function of which is to arrive at a certainty or conclusion, and *manas,* an organ of volition and imagination. Lastly, there are the five organs of action, the voice, the hands, the feet, the organ of excretion, and that of generation, which are severally produced from the active particles of each of the subtile elements; and the five vital airs, which are produced from the mingled active particles of the subtile elements, the air breathed forth, which has its place in the fore part of the nose; the air breathed downward, which has its place in the lower intestines; the air which circulates through the whole body; the ascending air, which has its place in the throat; and the descending air in the middle of the body, which causes assimilation and digestion of food, produces semen, excrements, etc. Later Vedantists postulate ten such vital airs, assuming in addition to those already mentioned the airs which severally cause retching, winking, hunger, yawning, and fattening. The five gross elements are the five subtile elements, when they have become so divided and combined that each of them retains a preponderating portion of itself, and consequently of the quality of which it is the substratum, and also contains smaller portions of the other subtile elements, and the qualities of which they are the substrata. From these gross elements then arises the world. The soul, when existing in the body, is incased in a succession of 'sheaths.' The first or interior sheath consists of *buddhi*, associated with the organs of perception; the second, of *manas*, associated with the organs of action; and the third, of the vital airs, together with the organs of action. These three sheaths constitute the subtile body of the soul, which attends the soul in its transmigrations. The collective totality of such subtile bodies is the supreme soul, as regarded in its relation to the world. The fourth and exterior sheath of the soul is composed of the gross elements; and the collective aggregate of such gross bodies is the gross body of the deity. This whole development being the result of ignorance, the soul frees itself from its error by understanding that the different stages in which this development appears do not represent real or absolute truth; and when its error has completely vanished it ceases to be re-born, and becomes reunited with Brahma, whence it emanated. The difference between esoteric and exoteric Vedanta consists in the ability or non-ability to recognize that Brahma is impersonal, without attributes, and that every soul is all Brahma. This knowledge alone is liberating; but the empiricist, who cannot understand this, may be put in the way of attaining enlightenment by moral and religious practices, such as are enjoined by the *Pūrvamīmāṁsā*, as explained above. The doctrine of *bhakti*, or faith, does not belong to the older Vedanta; it is, however, an interesting feature of the later periods of this philosophy (see VAISHNAVA); and the same observation applies to the doctrine of *Māyā* (q.v.), or illusion, according to which the world has no reality whatever, but is merely the product of imagination; for the older Vedanta merely teaches that the world is not the truth, but does not deny its material reality.

The oldest work on this philosophy, attributed to Badarayana or to Vyasa (q.v.), called the *Brahma-Sūtra*, consists of four *adhyāyas*, or lectures, each subdivided into four *pādas*, or chapters, each pada containing a number of Sutras. The number of the latter is 558, and that of the *adhikaraṇas*, or topics treated in them, 191. The most important commentary on this work is the *Śārīraka-bhāṣya*, by Sankaracarya; and this commentary in its turn has been commented on by a great variety of writers. The text of the Sutras and this commentary were edited at Calcutta, 1818: and the text with this commentary, and a gloss on the latter, by Govindananda, in the *Bibliotheca Indica*, by Vidyaratna (Calcutta, 1863). The Sutra and commentary were translated into German by Paul Deussen (Leipzig, 1887). Among elementary treatises on the Vedanta, the most popular is the *Vēdāntasāra*, by Sadananda, which, with the commentary of Ramakrishna Tīrtha, was edited at Calcutta in 1829, and with this and another commentary by Nrisinhasarasvati, at Calcutta in 1849. It was edited and translated also by Ballantyne, *A Lecture on the Vedānta, Embracing the Text of the Vedānta Śāra* (Allahabad, 1850), who also translated the beginning of the Brahma-Sutras. The work was edited also by Jacob (Bombay, 1894). A very useful compendium of the *Adhikaraṇas*, or topics, is the *Adhikaraṇamata*, by Bharatitirtha, which, with the commentary of Anandachandra-Vedantavagisa, was edited at Calcutta in 1862, and as an appendix to the Brahma-Sutras, with extracts from this commentary in the *Bibliotheca Indica* (Calcutta, 1863). More recently Thibaut has published the *Sūtras* with a valuable introduction in the *Sacred Books of the East* (vols. xxxiv. and xxxviii., Oxford, 1890-96), and the system has been explained by Deussen in his *System des Vedanta* (Leipzig, 1883), the best complete exposition of the system, to which may be added the explanation of the system in Müller, *Six Systems of Indian Philosophy* (New York, 1899).

VED'DAS. A people of Southeastern Ceylon, who have sometimes been regarded, chiefly upon somatic and osteological grounds, as constituting a separate race of mankind. The Veddas are one of the most primitive of human types, representing, perhaps, the original stock which, traveling to the north, produced the Dravidian peoples of Southern Hindustan, and going to the south gave rise to the Australians. The features of the Veddas are Hindu rather than Negroid or Mongoloid, while the hair is jet-black, wavy, and frequently curly, but never kinky. They are somewhat darker in color than the neighboring Singhalese. They are of slender build, erect carriage, and small stature (full-grown males about five feet). A noteworthy characteristic of the Veddas is their monogamous form of marriage. Their honesty, hospitality, morality, and good nature are praised by those who have come to know them. They have their primitive songs and dances, but their religious ideas are not much in evidence. They use the fire-drill and have bows and arrows of their own make, but obtain their arrow-heads and axes from the Singhalese, with whom the more secluded Veddas traffic by a sort of dumb-show. From the Singhalese also they have obtained written charms, and occasionally a palm-leaf book serving as an oracle or fetish. The 'Village Veddas' are largely vegetarians, but the 'Rock Veddas' hunt birds and animals. The Veddas still existing are divided into three classes. The 'Coast Veddas' of Balticaloa, who have taken on something of civilization, associate freely with their Singhalese neighbors, devote themselves to fishing, and in appearance only differ from the primitive Singhalese living in the same region. The Village Veddas of the wooded lowlands, known as the Bintenne, are nomadic harvesters of the products of the jungle, making an attempt at building huts, and collecting together in family groups. The most primitive and secluded are the Rock Veddas, as they are called from their cave-life in the jungles of the Badulla and Nilgala hills. They live chiefly by hunting, almost never come in contact with the Singhalese, and do not associate with each other in a tribal life, but band together only in small family groups.

Consult: Virchow, *Ueber die Weddas von Ceylon* (Berlin, 1881); Deschamps, *Au pays des Veddas* (Paris, 1892); Sarasin, *Die Weddas von Ceylon* (Wiesbaden, 1891).

VED′DER, Elihu (1836—). An American painter and illustrator. He was born in New York City, and after some instruction became a pupil of the classicist Picot at Paris. In 1857 he went to Italy, and he remained chiefly in Florence till the outbreak of the Civil War in 1861, when he returned to the United States. Not being permitted to enlist, by reason of a defect in his left arm, he remained in New York City and Boston until December, 1865, when he again went to Paris, and thence to Rome. Vedder is a man of an original, powerful, and weird imagination. His work is pregnant with meaning, with a significance beyond the mere artistic. His feeling for form is largely that of the sculptor, and although his sense of color seems not so sensitive, it has, in the main, a large and decorative meaning. He is not the most productive of painters, but what he has produced is of a high order. His feeling for composition is strong, and his figures, although usually small in scale, are of heroic mien. Among his best known oil paintings are: "The Greek Actor's Daughter;" "Roman Girls on the Seashore;" the "Phorcydes;" the "Cumean Sibyl;" "Venetians on the Main;" a "Crucifixion;" the "Venetian Model;" the "Lair of the Sea Serpent" and five others in the Boston Museum. After 1892 he executed considerable decorative work, including a panel in Bowdoin College, and several pieces, "Good and Bad Government," in the new Congressional Library at Washington. His illustrations of FitzGerald's translation of Omar Khayyam (1884) gained him a world-wide reputation.

VEDDER, Henry Clay (1853—). An American Baptist Church historian. He was born at De Reuter, N. Y., graduated at Rochester University in 1813, and at Rochester Theological Seminary in 1876. He was an associate editor of *The Examiner* in 1876-92, and its chief editor in 1892-94, when he became professor of Church history in Crozer Theological Seminary, Chester, Pa. He edited *The Baptist Quarterly Review* from 1885 to 1892. His publications include: *Baptists and Liberty of Conscience* (1883); *The Decline of Infant Baptism* (1890); *A Short History of the Baptists* (1891, new ed. 1902); *The Higher Criticism* (1892); *The Dawn of Christianity* (1894); *Talks with Baptist Young People* (1895); *American Writers of To-day* (1894); *The Decline of Apostolic Succession in the Church of England* (1894); *A History of the Baptists of the Middle States* (1898); he has also issued a series of translations of documents illustrating Church history, under the name *Historical Leaflets* (1901 sqq.).

VEEN, vān, Martin van. The real name of the Dutch painter commonly called Heemskerk (q.v.).

VEEN, Octavio van (c.1555-c.1629). A Flemish painter, born at Leyden and usually called Otto Vaenius. He studied under Federigo Zucchero at Rome. After his return from Italy he lived at Leyden, Antwerp, and Brussels, where he became superintendent of the mint in 1620. Among his most characteristic works are: Twelve Scenes from the "Revolt of the Ancient Batavi" (1613, Amsterdam Museum); "The Calling of Saint Matthew" (Antwerp); "The Parnassus" (Berlin); and "The Raising of Lazarus," altarpiece in Saint Bavon, Ghent. His portraits display some of the qualities found in his great pupil Rubens.

VEERY. The tawny or Wilson's thrush (*Turdus fuscescens*), one of the best known thrushes (q.v.) of the Eastern and Middle United States. It is about seven and one-half inches long, nearly uniformly cinnamon-brown above, white beneath, tinged with buff, the sides of breast and throat with small wedge-shaped brown spots. The veery is a notable songster, but the notes, though of peculiar attractiveness and resembling somewhat the rhythmic continuous ringing of a bell, are perhaps impossible to describe in words. The nest is of bark, rootlets, and leaves, and is built on or near the ground, and the eggs are usually four and greenish-blue. The veery is found in cold, damp woods, and in some northerly places is the most numerous of our thrushes. See Plate of Eggs of Song Birds.

VEFIK PASHA, vĕ′fĭk pȧ-shȧ′. See Ahmed (or Achmet) Vefik Pasha.

VEGA, vā′gȧ, Garcilaso de la. See Garcilaso de la Vega.

VEGA, Georg, Baron (1765-1802). A German mathematician, born at Sagoritza, Carniola, and educated at Laibach. In 1780 he became teacher of mathematics in a regiment of artillery. He served with distinction in the wars against the Turks and the French, and rose to the rank of colonel. Vega is especially known for his *Logarithmische, trigonometrische und andere Tafeln* (1783, and many subsequent editions); and similar tables, which are still useful. He also wrote: *Hydrodynamik* (2d ed. 1819); *Anleitung zur Zeitkunde* (1801); *Natürliches Mass-, Gewichts- und Münzsystem* (1803). Consult Kaučič, "Georg Freiherr von Vega," in *Organ der militärwissenschaftliohen Vereine*, vol. iii. (Vienna, 1886).

VEGA CARPIO, vā′gȧ kär′pē-ō, Lope Felix de, generally called Lope de Vega (1562-1635). The most ingenious dramatic poet of Spain, surnamed El Fenix de España. Born in Madrid, November 25, 1562, he received his elementary training there at the Imperial college under the Jesuits. The earliest of his extant plays, *El verdadero amante*, was written when he was thirteen years old. It is almost certain that he took part in an expedition against the Azores (1582). His *Hermosura de Angélica* (1602), a long poetical continuation of the *Orlando Furioso* of Ariosto, is far inferior to the work of the Italian. After his return from the scene of Spain's naval humiliation, Lope wrote the *Arcadia* (1598), a pastoral novel, in mingled prose and verse, which, under fictitious names, introduces love episodes in which the author and some of his friends had figured. The epic is a patriotic attack upon Sir Francis Drake. In 1599 appeared a religious poem, the *San Isidro*, in which he celebrated the life and deeds of the patron saint of Madrid. To 1602 may be ascribed the *Rimas*, a collection of sonnets, and to 1604 the prose romance *El peregrino en su patria*. The

Peregrino contains also four *autos* (religious dramas) and a list of more than 200 plays that he had already composed. With the *Jerusalén conquistada* (published 1609) he undertook to surpass Tasso; but the epic of the Italian is in every way superior to Lope's poem.

After some works of minor importance, such as the *Soliloquios* published under the name of Gabriel Padecopeo, there came his beautiful religious pastoral, *Pastores de Belén*. After the death of his second wife (1612) he took holy orders in 1614. His piety appears to have been sincere even if his life was not blameless, and he gave renewed expression to his religious feelings in the *Triunfo de la fé en el Japón* (1618). He essayed the prose tale in four stories, *Las fortunas de Diana, El desdichado por la honra, La prudente venganza,* and *Guzmán el Bravo*. The *Triunfos divinos* is a collection of religious lyrics, and the *Corona trágica* (1627) is a religious epic intended as a defense of Mary Stuart, Queen of Scots. As a poetical catalogue and eulogy of more than 300 Spanish poets, he composed his *Laurel de Apolo*, which can hardly be considered as a model of just criticism. The *Dorotea* (1632) is a prose romance in dramatic form, in which the author undoubtedly embodied many personal experiences; on this account its biographical value has been somewhat stressed. It was a favorite work with Lope himself. Under the pseudonym of "the licenciado Tomé Burguillos" he produced in 1634 certain *Rimas* and the mock-remoic poem *Gatomaquia*. This is both witty and interesting.

Lope was a poet of great versatility. He essayed nearly every kind of writing, but it is on the stage that his genius showed itself in many ways unexcelled. While his dramatic work is impaired by many imperfections, his faults are atoned for by his exuberant invention, by the skill with which he develops character, and by the unfailing spiritedness of his dialogue. His fertility is unparalleled. He is supposed to have written between 1500 and 1800 plays (*comedias*), in addition to several hundred *autos* (religious pieces) and *entremeses* (interludes). Of these there are extant about 400 *comedias* and about 40 *autos*. In the comic and the tragic vein, Lope treated all manner of subjects—historical, legendary, picaresque, religious, and those that have to do with every-day life. It was he who gave the greatest development to the stock comic character called the *gracioso;* and he first gave dramatic emphasis to the *pundonor*, or point of honor, as an all-pervading principle of Spanish cultured life. Of his many pieces the following may be given special mention: *El castigo sin venganza; Porfiar hasta morir; La estrella de Sevilla*, which is one of the best of all; *El mejor alcalde el Rey; El acero de Madrid; La esclava de su galán; El perro del hortelano; La boba para los otros y discreta para si; Los cautivos de Argel; Si no vieran las mujeres; El principe perfeto; Los Tellos de Meneses;* and *La fuente Ovejuna*.

For printed editions of Lope's works, consult the *Colección de las obras sueltas de Lope de Vega* (21 vols., Madrid, 1876-79); the plays and other works contained in vols. xxiv., xxxv., xxxvii., xli., and xlii. of the *Biblioteca de autores españoles* (ib., 1859 et seq.); *Comedias inéditas* (ib., 1873); *La Dorotea, acción en prosa* (ib., 1886); and especially the definitive edition of his *Obras, publicadas por la Real Academia Española*, which, begun at Madrid, 1890, has prefixed to its first volume the *Nueva biografía* of C. A. de la Barrera, and, carried on under the editorship of M. Menéndez y Pelayo, who prepares the *Observaciones preliminares*, has already reached the twelfth volume. Consult also V. Fox (Lord Holland), *Some Account of the Life and Writings of Lope Félix de Vega Carpio* (London, 1806, and again 1817); Fitzmaurice-Kelly, *A History of Spanish Literature* (New York, 1898); Farinelli, *Grillparzer und Lope de Vega* (Berlin, 1894); Dorer, *Die Lope de Vega Litteratur in Deutschland* (ib., 1877); Forster, *Some French and Spanish Men of Letters* (London, 1891); Grillparzer, *Studien ueber das spanische Theater*, in his *Werke*, vol. viii. (Stuttgart, 1871); G. H. Lewes, *The Spanish Drama: Lope de Vega and Calderon* (London, 1846); Ludwig, *Lope de Vega's Dramen aus dem karolingischen Sagenkreise* (Berlin, 1898); Wurzbach, *Lope de Vega* (Leipzig, 1898); and Menéndez y Pelayo, *Estudios de critica literaria*, serie ii. (Madrid, 1895).

VEGETABLE COLORS. A term used to denote natural vegetable dyes as distinguished from mineral colors and those prepared by chemical processes such as the coal-tar colors. They include heart woods, barks, roots, dried leaves and berries, lichens, etc., and though not as much employed as before the introduction of artificial coloring substances, they still are extensively used in dyeing. The more important colors will be found described under their own heads. These include: *Red*, brazilwood, sandalwood, madder, safflower, archil, and kermes; *yellow*, old fustic and young fustic, quercitron, Persian berries, arnatto, and tumeric; *blue*, indigo, woad, logwood, and litmus; *green*, chlorophyl and tokao or Chinese green; *brown*, catechu and kino. These dyestuffs must be extracted, and for that purpose the dye woods are cut or ground into small chips or powder and then either cured or fermented or the dye extracted by heating with water or boiling, while in some cases the coloring matter is subsequently concentrated. All of these processes are apt to involve· in addition chemical treatment of one kind or other. For the use of vegetable colors in dyeing, reference should be made to that article, and especially to the table containing a list of the natural dyestuffs with the artificial coloring matters that have in many cases displaced them. See also Coal-Tar Colors; Mineral Colors.

VEGETABLE IVORY. See Ivory, Vegetable.

VEGETABLE KINGDOM. See Botany and cross-references from that title.

VEGETABLE MARROW. A variety of squash highly esteemed as a summer esculent vegetable.

VEGETABLE OYSTER. See Salsify.

VEGETABLE PHYSIOLOGY. See Physiology.

VEGETABLES (Lat. *vegetabilis*, enlivening, animating, from *vegetare*, to quicken, animate, from *vegetus*, lively, from *vegere*, to move, be active; connected with *vigere*, to flourish). Since the different kinds of vegetables and their culture are treated in separate articles on the individual crops, as beans, beets, cabbage, potatoes, peas, etc., this article is confined to the food value of vegetables.

The various parts of plants eaten as vegetables include roots (turnips, salsify); bulbs (onion, garlic); tubers (potato, Jerusalem artichoke); stems (sea-kale, asparagus); leaf buds (Brussels sprouts); leaves (lettuce, cabbage); flower buds (cauliflower, capers); flowers (lily, artichoke); fruits, green (cucumbers, okra); fruits, ripe (tomato, melon); seeds, unripe (corn, peas); seeds, mature (lentil, bean). Few vegetables are eaten entire; they generally contain more or less inedible matter such as seeds, skin, etc., and when prepared for the table some edible material is also commonly lost, an amount which varies with different vegetables, different specimens of the same vegetable, and with the method of preparation. The pods of fresh beans and peas constitute on an average about 50 per cent. of the entire weight of the unshelled vegetable, and the cob of corn somewhat over 50 per cent. When potatoes, carrots, sweet potatoes, and parsnips are peeled the material removed constitutes on an average 20 per cent. of the original weight. The loss with fresh vegetables is usually less than with withered ones. The following table shows the average percentage composition of the edible portion of various vegetables, fresh and canned:

AVERAGE COMPOSITION OF EDIBLE PORTION OF VEGETABLES

	Water	Protein	Fat	Nitrogen free extract	Crude fibre	Ash	Fuel value per pound
FRESH	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Calories
Artichoke (Jerusalem)	79.5	2.6	0.2	15.9	0.8	1.0	365
Asparagus	94.0	1.8	0.2	2.5	*0.8	0.7	105
Beans (shelled, green)	58.9	9.4	0.6	29.1		2.0	740
Beans (string)	89.2	2.3	.3	5.5	1.9	.8	195
Beets	87.5	1.6	.1	8.8	.9	1.1	215
Cabbage	91.5	1.6	.3	4.5	1.1	1.0	145
Carrots	88.2	1.1	.4	8.2	1.1	1.0	210
Cauliflower	92.3	1.8	.5	3.7	1.0	.7	140
Celery	94.5	1.1	.1	3.3		1.0	85
Collards	87.1	4.5	.6	6.3		1.5	225
Corn (green)	75.4	3.1	1.1	19.2	.5	.7	470
Cucumber	95.4	.8	.2	2.4	.7	.5	80
Eggplant	92.9	1.2	.3	4.3	.8	.5	130
Greens (dandelion)	81.4	2.4	1.0	10.6		4.6	285
Kohl-rabi	91.1	2.0	.1	4.2	1.3	1.3	145
Leeks	91.8	1.2	0.5	5.8		0.7	150
Lettuce	94.7	1.2	.3	2.2	.7	.9	90
Mushrooms	88.1	3.5	.4	6.0	.8	1.2	210
Musk melon	89.5	.6	....	7.2	2.1	.6	185
Okra	90.2	1.6	.2	4.0	3.4	.6	175
Onions	87.6	1.6	.3	9.1	.8	.6	225
Parsnips	83.0	1.6	0.5	11.0	2.5	1.4	300
Peas (green)	74.6	7.0	.5	15.2	1.7	1.0	465
String or sugar peas	81.8	3.4	.4	12.1	1.6	.7	335
Cow pea (green)	65.9	9.4	.6	22.7		1.4	620
Potato	78.3	2.2	.1	18.0	.4	1.0	385
Sweet potato	69.0	1.8	.7	26.1	1.3	1.1	570
Pumpkin	93.1	1.0	.1	4.0	1.2	.6	120
Radish	91.8	1.3	.1	5.1	.7	1.0	135
Rhubarb	94.4	.6	.7	2.5	1.1	.7	105
Ruta-baga	88.9	1.3	.2	7.3	1.2	1.1	190
Spinach	92.3	2.1	.3	2.3	.9	2.1	110
Squash	88.3	1.4	.5	8.1	.9	.8	215
Tomato	94.3	.9	.4	3.3	.6	.5	105
Turnip	89.6	1.3	.2	6.8	1.3	.8	185
Watermelon	92.4	.4	.2	6.7		.3	140
DRIED							
Beans (shelled)	12.6	22.5	1.8	55.2	4.4	3.5	1605
Lentils	8.4	25.7	1.0	59.2	...	5.7	1620
Peas	9.5	24.6	1.0	57.5	4.5	2.9	1655
Cow pea	13.0	21.4	1.4	56.7	4.1	3.4	1590
CANNED							
Artichoke (globe)	92.5	.8	....	4.4	.6	1.7	110
Asparagus	94.4	1.5	.1	2.3	.5	1.2	85
Beans (string)	93.7	1.1	.1	3.3	.5	1.3	95
Beans (green)	72.7	7.0	.2	17.3	1.2	1.6	480
Brussels sprouts	93.7	1.5	.1	2.9	.5	1.3	95
Corn	76.1	2.8	1.2	18.2	.8	.9	455
Okra	94.4	.7	.1	2.9	.7	1.2	85
Peas (green)	85.3	3.6	.2	8.6	1.2	1.1	255
Pumpkin	91.6	.8	.2	5.6	1.1	.7	150
Squash	87.6	.9	.5	9.8	.7	.5	235
Tomato	94.0	1.2	.2	3.5	.5	.6	105

*The figures printed between the columns "nitrogen-free extract" and "crude fibre" indicate the sum total of these two ingredients, which in some instances have not been determined separately.

It will be seen that (excepting the dry legumes mentioned above) vegetables have a high water content and a comparatively low percentage of nutrients in proportion to their bulk. The principal nutrients are carbohydrates, including nitrogen-free extract (starch, sugar, etc.) and crude fibre. Some vegetables, notably the legumes, contain fairly large amounts of protein. The fat (or ether extract) consists of coloring matters, wax, etc., in addition to true fat or oil. This group is not abundant in vegetables commonly eaten. The mineral matter of ash consists chiefly of salts of various organic acids, and also phosphates and chlorides. Vegetables contain various organic acids, ethers, and other similar bodies which are not estimated separately in proximate analysis like those quoted above, but are included in the group nitrogen-free extract. They are largely accountable for flavors, though various salts and sugars also have a similar influence. In few cases have these flavors been studied chemically. (See FOOD.) When vegetables are cooked the chief change in percentage composition is in the water content. They may become drier if baked or fried, or more moist if stewed or boiled. The various chemical bodies are modified by cooking. Thus, albumens are coagulated, starches are to some extent broken down into simpler substances, and other changes take place which are not so well understood. Besides the loss in paring vegetables and otherwise preparing them, there may be a loss during cooking. For instance, when cabbage is boiled the water extracts nearly half of the total food material, which, being ordinarily thrown away, is lost. When potatoes are boiled the loss may be considerable, being greatest when they are peeled and soaked before boiling and least when they are boiled with the skins on. The materials lost in boiling vegetables are albuminoid and non-albuminoid nitrogen, mineral matter, and sugars. Little starch is lost, except that accidentally removed by abrasion. In the case of vegetables like carrots, which contain a fairly large amount of sugar, the amount extracted in boiling has been found nearly to equal 1 pound of sugar in a bushel of carrots. In the ordinary household such losses are not important, but where rigid economy is necessary they are worth consideration.

Although fresh vegetables contain a high percentage of water, they are nevertheless valuable articles of diet. Like other bulky foods, they are eaten in large quantities and thus may furnish a considerable proportion of the total nutrients in the daily diet. This is especially true of vegetables, like potatoes, which contain fairly large amounts of starch. Combined with some concentrated foods, especially those which contain much protein (eggs, cheese, meat, etc.), vegetables contribute to a well-balanced diet.

From a large number of statistics collected in connection with the nutrition investigations conducted by the United States Department of Agriculture it appears that vegetables (other than dried legumes) furnish about 21 per cent. of the total food, 6 per cent. of the total protein, and 13 per cent. of the total carbohydrates in the diet of the average American family.

The cost of vegetables varies with the season, rarity, distance from market, and other factors. High-priced vegetables may increase the cost of living out of all proportion to the nutrients they furnish, though if the purchaser is not compelled to economize this use may perhaps be justified on the ground that they render the diet more attractive. So far as can be judged by the investigations on record, to a great variety of vegetables is not necessary to health, and the man of limited means may provide as wholesome a diet with the aid of the inexpensive vegetables as the man who can afford to purchase hothouse delicacies. Vegetables are very useful in giving variety to the diet, a value which often cannot be measured in dollars and cents. They frequently stimulate the appetite for other foods. The variety of fresh vegetables eaten, as well as the quantity, has been increased in recent years, owing to increased facilities for growing out of season, marketing, transportation, and storage.

Canned vegetables, which are annually becoming more popular, are essentially cooked vegetables in which fermentation is prevented by sterilization and the exclusion of air. Evaporated vegetables, which are also popular, especially for outfitting camps and expeditions, are practically concentrated foods which need only water and cooking to render them edible. Many of them are used in the ordinary household for soups, etc. Besides being used as food, various vegetables are employed for flavoring and for garnishing. Some, like potatoes, are used for the manufacture of starch.

See United States Department of Agriculture Office of Experiment Stations Bulletin 28 (revised), *Composition of American Food Materials* (Washington, 1899); Bulletin 43, *Losses in Boiling Vegetables* (ib., 1897); Farmers' Bulletin 121, *Beans, Peas, and Other Legumes as Food* (Washington, 1900).

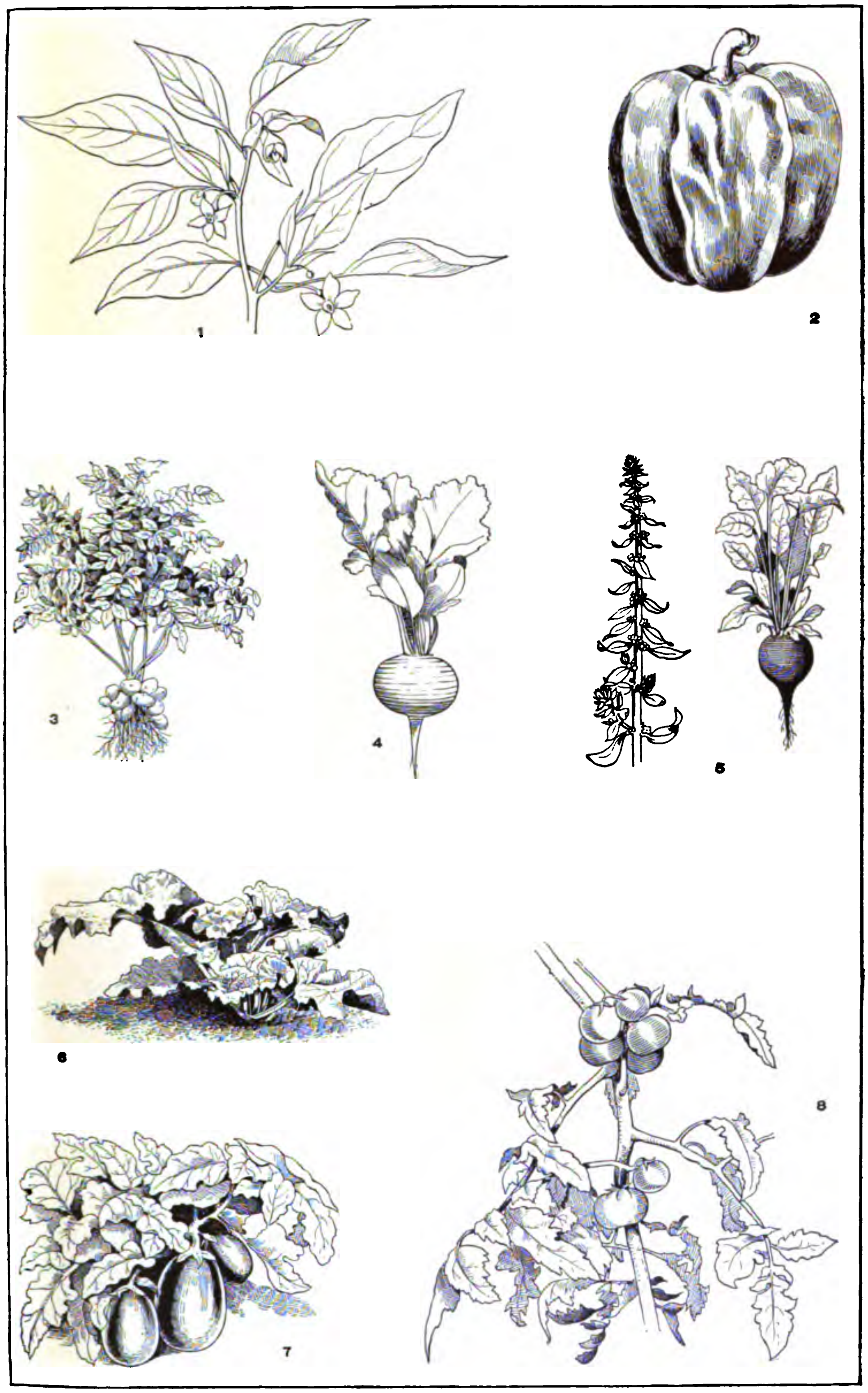
VEGETABLE SPONGE. The netted fibrous interior of the mature fruit of several species of Luffa, more particularly of Luffa ægyptiaca and Luffa acutangula. The fibrous mass contained in this fruit is of a sponge-like nature, and when macerated is much used in bathing and for scrubbing. In appearance the plants resemble cucumber vines. They belong to the family Cucurbitaceæ. The fruits from which the sponge is obtained are gourd-like and 1 to 2 feet long. In the tropics they grow much longer. The centre of the vegetable sponges is like that of the cucumber.

VEGETABLE TISSUE. The structural substance of plants. It is composed of cells which have a common origin and law of development and may consist of one or more of the tissue elements such as parenchyma and its various subdivisions and prosenchyma and its diverse forms.

VEGETARIANISM. The practice or doctrine of living upon foods obtained from the vegetable world, to the exclusion of animal food. In all ages there have been idealists who have advocated an exclusively vegetable diet, chiefly on ethical grounds—among whom may be mentioned Pythagoras, Plato, Plutarch, Rousseau, Shelley, and Swedenborg, but they never had any extensive following. The modern vegetarian movement took its rise about the middle of the nineteenth century. The vegetarian idea was best received in England, where the principal cities are represented by their societies, and where there are many vegetarian restaurants.

The arguments in favor of vegetarianism may be summarized as follows. On physiological grounds it is urged that the formation of the teeth and the intestines in man prove that he was not intended to be a carnivorous, but a fruit and vegetable eating animal. The length of the intestine shows him to be midway between the herbivora and the carnivora, and neither fitted for digesting grasses, which require a long intestine, nor flesh, which needs a short one, but nearer akin to the fruit-eating apes. It is maintained that a vegetable diet is best for man

GARDEN VEGETABLES



1 and 2. PEPPER (Capsicum annuum).
3. POTATO PLANT (Solanun tuberosum).
4. RADISH (Raphanus sativus).
5. BEET (Beta vulgaris).
6. RHUBARB (Rheum Rhaponticum).
7. EGG PLANT (Solanum Melongena).
8. TOMATO (Lycopersicum esculentum).

physically, intellectually, and morally; that with it life is longer, more enjoyable, and bodily strength and symmetry superior; that the use of animal food stimulates unnaturally, begets a fierce disposition, a carelessness about life, and a callousness to the sufferings of men and animals; whereas a vegetable diet has very opposite effects. It is further contended that all the elements necessary for perfect nutrition are contained in vegetables, and that a proper dietary can be selected which is not open to objection on account of enormous bulk. On the score of economy it is urged that a diet of meals and grain can be purchased for much less than one of meat, and confers more working power; that a given acreage of land will support more people if devoted to growing grain and vegetables than if used for the raising of cattle or sheep. On moral grounds it is contended that it is wrong to slaughter animals unnecessarily, that the higher instincts revolt against taking life, and that the constant killing and eating of animals reacts unfavorably on man's higher nature. Lastly, it is pointed out that animal food is often the means of communicating disease to man, e.g. tuberculosis, trichiniasis.

Scientific opinion is not favorable to vegetarianism. The structure of man's stomach and intestines and the variety of intestinal juices are held to prove that nature intended him for an omnivorous animal, his digestive organs being fitted to derive nourishment from every kind of food. The possession of biting, tearing, and grinding teeth (incisor, canine, and molar) is also suggestive of the same conclusion. It has been a matter of almost universal experience that although a vegetable diet may keep a man in apparent health for some time, it eventually results in loss of strength and general resisting power against disease. That a mixed diet (i.e. one including meat) enables the individual to do more physical work and increases the staying powers has often been proved. While there are some races that live almost exclusively on a vegetable diet, and others that exist wholly on animals (for example, the Eskimos), it cannot for a moment be contended that these are the equals of peoples living on a mixed diet.

VEGETATIVE PROPAGATION. The asexual process by which plants reproduce. Organs which assume this office are usually supplied with buds or they may develop them under favorable conditions. For instance, the tips of black raspberry canes develop new plants from the terminal and adjoining buds if these become covered with soil, and the roots of red raspberry develop buds when injured or when severed from the parent plant. Many creeping plants, such as strawberry and hen and chickens (*Sempervivum*), reproduce by means of rosettes, stolons, etc. The term brood bud or brood body is often employed to designate the initial buds in such propagation, and these are frequently employed in artificial propagation, as in layerage, graftage, and cuttage. See ECOLOGY; DURATION.

VEGETIUS, vê-jĕ'shĭ-ŭs, FLAVIUS RENATUS. A Roman military writer of the fourth or fifth century. He was the author of *Rei Militaris Instituta*, or *Epitoma Rei Militaris*. Although the work is an interesting and graceful exposition of the Roman art of warfare, it is merely a compilation from earlier histories. It is usually divided into four books, of which the first treats of the levying and training of recruits; the second, of the different classes into which soldiers are divided, and the organization of the legion; the third, of strategy; and the fourth, of the attack and defense of fortresses and of marine warfare. It has been edited by Schwebel (1767), and by Lang (2d ed. 1885). The work on veterinary art, entitled *Mulo medicina*, is usually ascribed to the same author. It is printed in Schneider's *Scriptores Rei Rusticæ* (4 vols., Leipzig, 1797). Consult Seeck, *Die Zeit des Vegetius* (Berlin, 1876).

VEGLIA, vĕl'yȧ. An island belonging to the Province of Istria, Austria, situated southeast of Triest, in the Gulf of Quarnero, in the Adriatic. It is separated from the mainland by the Morlacca Canal, and by the Mezzo Canal from the island of Cherso on the west (Map: Austria, D 4). Area, 165 square miles. It forms an administrative district with a population (1901) of 21,141. It has forests, and exports grain, wine, silk, and marble. The capital, Veglia, is on the southwest coast, and has a cathedral interesting for its architecture.

VEHMGERICHTE, fām'*ge*-rĭK'*te*, or **FEMGERICHTE** (Ger., tribunals of punishment). Westphalian courts of justice which had considerable influence in Germany during the latter part of the Middle Ages. They arose by natural development from the courts of freemen. When they had reached their fullest development the Vehmgerichte included a vast body of free judges (*Wissende*, i.e. initiated) who constituted a secret society, scattered all over Germany. They met in secret and received complaints, to answer which they had the right to summon any one in Germany, though the trial itself took place ordinarily in Westphalia only. The death penalty was inflicted by means of hanging. The chairman of these courts, which were to a great extent held in the open country, was known as the *Freigraf*, i.e. the free count. Their importance was due to the fact that in the time of turmoil and petty courts, controlled by robber barons, the Vehmgerichte were tribunals which at least made an effort to render impartial judgments. Consult: Lindner, *Die Veme* (Münster and Paderborn, 1888); Thudichum, *Femgericht und Inquisition* (Giessen, 1889); Lindner, *Der angebliche Ursprung der Vemgerichte aus der Inquisition* (Paderborn, 1890); Wiegand, *Das Femgericht Westfalens* (2d ed., Halle, 1893).

VEI, vī, or VAI. A tribe of negroes on the west coast of Africa from Monrovia northward. They are the only negroes who possess a form of writing. They are pagans, of Mandingan race and speech. See MANDINGO.

VEII, vĕ'yī. An ancient city of Etruria, the nearest of the Etruscan cities to Rome, and in early times its most formidable rival. Its site was at Isola Farnese, a village about 12 miles north of Rome. According to Roman historians the struggle between the two cities began as early as the time of Romulus, and continued under each of the kings, except Numa, and always to the advantage of the Romans. The Veientines had their revenge under Porsena; but after his time, being repeatedly defeated, they had recourse to the plan of sheltering themselves behind their walls on the approach of the Roman legions, and of sallying out on predatory expeditions as soon as they had retired. To relieve the Republic from this annoyance, the Fabian clan, to the number of 306, with their followers, probably ten times as numerous, undertook to garrison a fortress near Veii, and to act as a guard against the marauders. They were, however, enticed into an ambuscade, and cut off to a man at the Cremera. For the next sixty years hostilities often broke out, followed by ill-observed truces. At last the Romans determined to rid themselves of their rival by a siege. The city is said to have held out for ten years until it was finally taken by Camillus (c.396 B.C.). After its fall it was gradually deserted; and although, in later times, a colony was planted there by Cæsar, and again by Augustus, it always remained an insignificant place. There are remains of the Etruscan and also of the Roman city.

VEILE, vā′y′-le. A port and the capital of the district of Veile in Jutland, Denmark, situated in a beautiful hilly and forested region, at the mouth of the Veile, and at the head of the Veile Fiord, 16 miles northwest of Fredericia (Map: Denmark, C 3). Fisheries principally engage the attention of the people. Population, in 1901, 14,592.

VEILED PROPHET OF KORASSAN, kō′-räs-sän′, THE. See HAKIM IBN ALLAH.

VEIN (OF., Fr. *veine*, from Lat. *vena*, blood-vessel, from *vehere*, to carry, convey). In anatomy, a blood vessel which conducts the venous (or blue) blood from the capillaries back to the heart. The exceptions to this description are the pulmonary veins, which return the red, oxygenated blood from the lungs to the heart; the portal veins, which received the blood from the pyloric, gastric, cystic, superior mesenteric, and splenic veins, and, entering the liver, break up into small branches which pass through all parts of that organ; and the umbilical veins, which convey the blood from the fœtus to the mother's placenta. The veins enlarge as they proceed, gathering blood from their tributaries, and finally pour it through the ascending and descending *venæ cavæ* into the right auricle of the heart. (See CIRCULATION.) Their coats are similar to those of the arteries, but much thinner, and even transparent. The *internal coat* consists of an epithelial layer, supported on several laminæ of longitudinal elastic fibres. The *middle* or *contractile coat* consists of numerous alternating layers of muscular and elastic fibres, the muscular fibres being disposed circularly round the vessel. The muscular fibres are wanting in some parts of the venous system, and specially developed in others. In the *venæ cavæ* and pulmonary veins near the heart, striped muscular fibres may be detected, continuous with those in the auricles. The *external* or *areolar fibrous coat* consists of connective or areolar tissue, and of longitudinal elastic fibres; within some of the larger veins, as the inferior *vena cava*, through its whole length, the external iliacs, the azygos, etc., there is also a longitudinal network of unstriped muscular fibres. Valves are most numerous in the veins of the extremities, especially the lower ones, these vessels having to act against the force of gravity more than most others. They are absent in the *venæ cavæ*, the hepatic, portal, renal, pulmonary, and some other large veins, and in very small veins generally. The veins are nourished by nutrient vessels, or *vasa vasorum*, like the arteries; but except in a few instances (including the inferior *vena cava*), nerves are not distributed to them.

The chief diseases of the venous system have been already sufficiently described in the articles PHLEBITIS, OR INFLAMMATION OF THE VEINS; PHLEBOLITES; PHLEGMASIA ALBA DOLENS, OR MILK-LEG; THROMBOSIS; and VARICOSE VEINS.

VEINS (in geology). See ORE DEPOSITS.

VEIT, fīt, PHILIPP (1793-1877). A German historical painter, born in Berlin. First instructed by Friedrich Matthäi at the Dresden Academy, he continued his studies in Vienna until 1813, when he entered the German Army, and fought in the War of Liberation. In 1815 he went to Rome, where he identified himself with the Nazarites, painted in the Casa Bartholdi "Joseph and Potiphar's Wife" and "The Seven Years of Plenty" (both now in the National Gallery, Berlin), and in the Villa Massimi the "Paradise" in the Dante room. Among his other works at Rome were the "Triumph of Religion," in the Museo Chiaramonti, Vatican, and the "Coronation of the Virgin," in Trinità de' Monti. In 1830 he was appointed director of the Städel Institute at Frankfort. To this period belong "The Two Marys at the Sepulchre" (National Gallery, Berlin), the portraits of Charlemagne, Otho the Great, Frederick II., and Henry VII., for the Römer, and the great triptych in fresco, "Introduction of the Arts into Germany through Christianity," with "Italia" and "Germania" (1836, Städel Institute). In 1834 Veit resigned his position and settled at Sachsenhausen, whence, in 1853, he was called to Mainz as director of the Gallery. To this period belong the "Assumption" (1846, in the Liebfrauenkirche, Frankfort); "Repose in Egypt," and "Magnificat" (1863, both in the Städel Institute, ib.), and the cartoons for a cycle from sacred history for the Cathedral at Mainz, subsequently executed by his pupils Settegast, Lasinsky, and Karl Herrmann. Of his portraits, that of Abbé Noirlieu (Städel Institute), and one of himself (Mainz Gallery), are among the most noteworthy. His brother JOHANNES (1790-1854) was an historical painter of some note. Consult Spahn, *Philipp Veit* (Bielefeld, 1901).

VEITCH, vēch, JOHN (1829-94). A Scottish philosopher and author, born in Peebles. He was educated at the University of Edinburgh with a view to the ministry in the Free Church, but gave up his intention, owing to a want of sympathy with the current theology. After serving for four years as assistant to Sir William Hamilton and Campbell Fraser, he became professor of logic, rhetoric, and metaphysics in the University of Saint Andrews (1860-64), and professor of logic and rhetoric in the University of Glasgow, from 1864 till his death, September 3, 1894. Among his works pertaining to philosophy are the *Memoir of Dugald Stewart* (1857); *Memoir of Sir William Hamilton* (1869); *Institutes of Logic* (1885); *Knowing and Being* (1889); and *Dualism and Monism* (ed. by R. M. Wenley, 1895). He also joined H. L. Mansel in editing Hamilton's *Lectures*

(1859-60), and translated from Descartes the *Discourse on Method*, *Meditations*, and selections from *The Principles of Philosophy*. To general literature he contributed the excellent *Feeling for Nature in Scottish Poetry* (1887), and the still more valuable *History and Poetry of the Scottish Border* (1893). After his death, his widow prepared for the press *Border Essays* (1896), containing "The Yarrow of Wordsworth and Scott," and other descriptive pieces. In verse Veitch published *Hillside Rhymes* (1872), *The Tweed and Other Poems* (1875), and *Merlin and Other Poems* (1889). Consult the *Memoir* by Mary R. L. Bryce (Edinburgh, 1896).

VEJER DE LA FRONTERA, vâ-Hâr' dâ lâ frôn-tā'râ. A town of the Province of Cadiz, Spain, on the right bank of the river Barbata, 28 miles southeast of Cadiz, and 5 miles east of Cape Trafalgar (Map: Spain, C 4). The surrounding country is covered with orchards and orange groves. Population, in 1900, 11,309.

VELA, vā'lâ, Vincenzo (1822-91). An Italian sculptor, born in Ligornetto, Canton of Ticino, Switzerland. He studied under Cacciatore at Milan, and in 1840 took the first prize in the exhibition of sculpture at Venice, with his relief "Christ Raising the Daughter of Jairus." In 1847 he went to Rome, where he modeled his "Spartacus," completed in 1851, which long stood upon the staircase of the Palazzo Litta in Milan, but is now in Saint Petersburg. In 1852 he became professor in the Academy of Turin, where he produced most of his important works. The best known are "Hope" and "Resignation," two funerary statues; "Harmony in Tears" (1855), for the tomb of Donizetti in Santa Maria Maggiore, Bergamo; "France and Italy;" the charming ideal statue "Primavera;" "Columbus and America," a colossal bronze group at Vera Cruz, Mexico; and the "Dying Napoleon," at Versailles, his most celebrated work. Vela succeeded equally well with ideal and dramatic subjects, and was one of the principal representatives of the realistic school in Italy during the nineteenth century.

VELA'BRUM. A low, marshy district of ancient Rome between the Palatine and Capitoline Hills, reaching from the Vicus Tuscus to the Forum Boarium.

VELAZQUEZ, or **VELASQUEZ**, vâ-läs'kâth, Diego de (c.1460-c.1522). A governor of Cuba, born in Cuellar, Spain. He accompanied Columbus on his second voyage, and later participated in the conquest of Hispaniola. In 1511 Diego Columbus, Governor of Hispaniola, sent him with a force of 300 men to conquer Cuba. This, with the assistance of reinforcements brought by Pánfilo Narvaez, he easily accomplished, and then threw off the authority of Diego Columbus. He founded Baracoa, Bayamo, Trinidad, Puerto Príncipe, Santiago de Cuba, Havana, and other places. In 1517 a slave-catching expedition which went out with his approval discovered Yucatan. In the following year Velazquez sent out an expedition under Juan de Grijalva, and when this commander brought back word of the riches of Mexico, he sent out the expedition under Hernando Cortés. Before Cortés sailed, Velazquez, fearing that he might prove too independent, revoked his commission, but Cortés disregarded his authority and went to Mexico. Velazquez later sent the force under Narvaez to seize Cortés, but Cortés captured Narvaez. Valazquez died shortly afterwards, in 1522 or 1523, as a result, it is said, of vexation over the loss of his riches.

VELAZQUEZ (VELASQUEZ), Diego Rodriguez de Silva y (1599-1660). The chief painter of the Spanish school, one of the greatest masters of all times. He was born at Seville, June 6, 1599, the son of Juan de Silva, of a noble Portuguese family established at Seville, and of Geronima Velazquez. Both were of the petty nobility (hidalgos), and the son, as is frequently the custom in Andalusia, added his mother's name to his own. He was educated in the grammar school of Seville, and in his thirteenth year was placed with the painter Herrera, but, unable to endure his master's ferocious temper, he left him after a year to study with Pacheco. From the former he acquired little besides a taste for genre subjects and a tendency toward naturalism, but with the latter he remained five years. Although a poor painter, Pacheco was an excellent teacher, and the influence of his sound precepts may be seen in the wonderful sureness of Velazquez's drawing and the thoroughness of his work. The reputed influence of Luis Tristan of Toledo upon Velazquez is less evident, and probably applies only to his chiaroscuro.

The earliest works of Velazquez are in the style of the Spanish naturalists, and show no evidence of the prevalent classical Italian influence. They reveal the customary high lights and dark shadows, a sure and able draughtsmanship, and a trenchant naturalistic characterization. Such as survive are genre and religious subjects, and the principal are the "Aguador" (Water-Carrier) and the "Adoration of the Shepherds," suggestive of Ribera, in the National Gallery, London; "Old Woman Cooking Eggs" (Sir Francis Cooke); and an "Epiphany" (Prado, Madrid).

In 1618 he married Pacheco's daughter, and in 1622 he went for the first time to Madrid. The most important result of this visit was his acquaintance with the Sevillian canon Fonseca, who held an ecclesiastical office in the royal chapel, through whose efforts he won the sympathy of Philip IV.'s all-powerful minister, Olivarez. On Velazquez's return to Madrid in 1623 his portrait of Fonseca found such favor with the royal family that he was commissioned to paint an equestrian portrait of the King. His success was such that he was appointed Court painter, with the exclusive privilege of portraying the King, and given a liberal pension and a studio in the Alcázar. His success was insured by his brilliant victory in a competition with the three Italian painters in the King's service, the subject being "The Expulsion of the Moriscos from Spain."

From now on the life of Velazquez was spent in the service of the King. Most of the early portraits of his great patron, Olivares, have disappeared. One is preserved in the well-known plate of Paul Pontius, with emblematic design by Rubens, and there is a full length in Dorchester House. The earliest surviving portrait of Philip IV. is probably the bust in the Prado Museum, which also possesses the fine full-length portraits of the King and Don Carlos, his brother.

The visit of Rubens as ambassador of Isabella, Regent of the Netherlands, to Madrid in 1628, was not without influence upon Velazquez, though it did not directly affect his art. Rubens had a high opinion of the rising Spaniard, and it was through his advice and intercession with the King that the latter obtained the coveted leave to visit Italy. At this time (1629) Velazquez executed the chief genre picture of the early period, the subject of which may betray Flemish influence, though this is not evident in the execution. In "Los Borrachos" (the Topers), more properly entitled "Bacchus," the wine god sits on a cask amidst a band of weather-beaten drinkers, crowning a soldier of the party with vine leaves. His figure is a wonderful example of the artist's treatment of the nude, while the expression and animation on the faces of the topers perhaps surpass anything else in this particular genre. There are curious variations of the Prado original at Naples and in Lord Heytesbury's collection.

After a short stay in Venice, where he admired Titian and copied Tintoretto, he made Rome his headquarters. The Spanish ambassador leased for him the Villa Medici, to which he was attracted by the antique statuary; delightful mementoes of his own stay there are the two sketches of the Medici gardens (Prado). He was, strange to say, less attracted by the grand masters of the past at Rome than by less important contemporary painters, like Guido Reni, whose influence is evident in his chief picture of the period, the "Forge of Vulcan" (Prado). This canvas shows great advance over his previous treatment of the nude in the five fine figures of the smithy, among whom Vulcan listens with indignant amazement to Apollo's account of his wife's follies. To the same period belong "Joseph's Coat" (Escorial), also painted for the King, and the fine youthful portrait of himself in the Capitoline Museum, executed with a few masterly brush strokes. In 1630 Valazquez was summoned to Naples to portray the King's favorite sister, the Infanta Maria (Prado), who was about to become Queen of Hungary. While there, he made the friendship of his compatriot Ribera, head of the Italian naturalists. After an absence of eighteen months he returned to Spain.

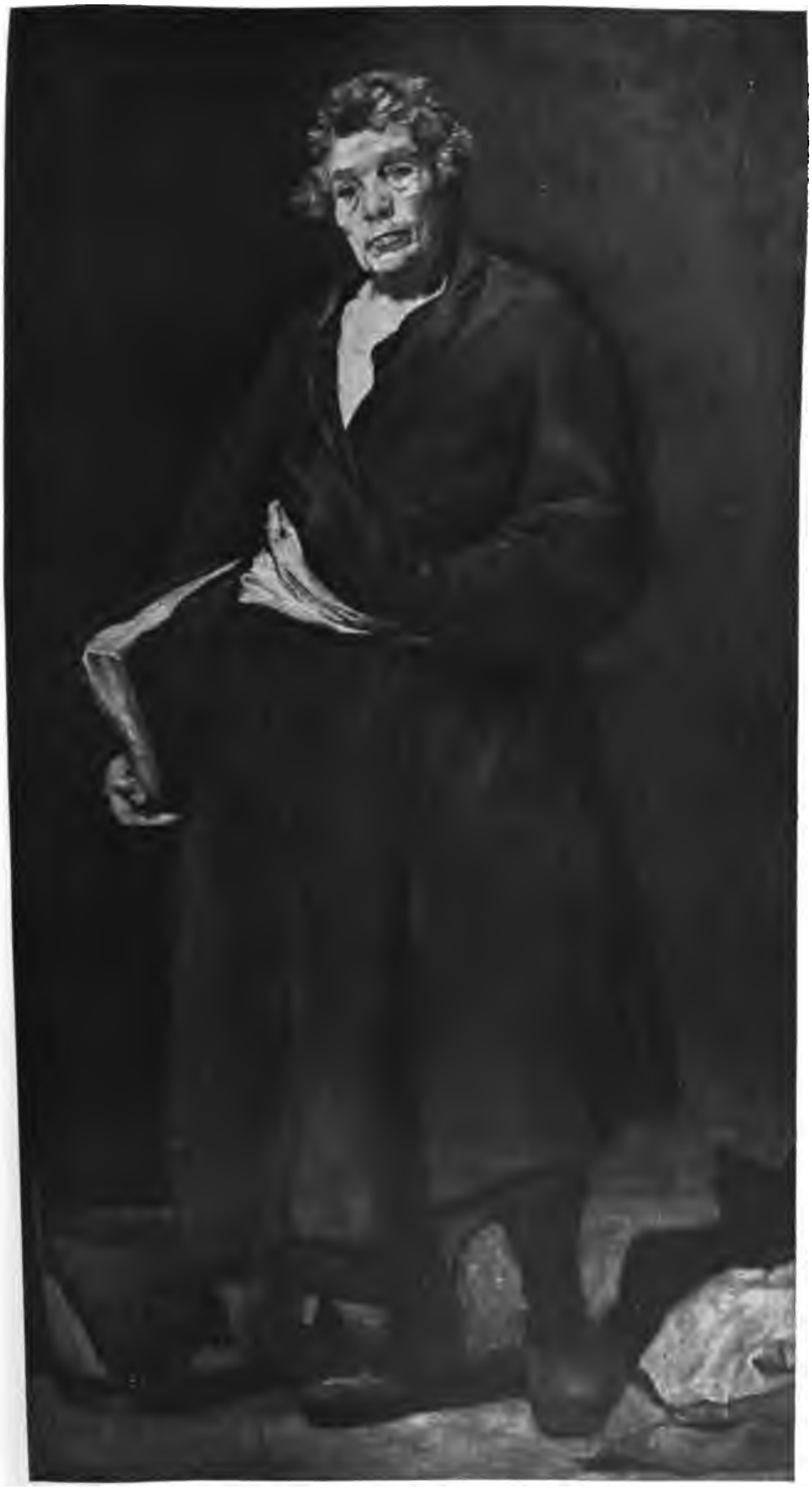
For the next eighteen years (1631-49) he remained in constant attendance on the King, and was in the strictest sense a Court painter. Philip IV. was a mighty hunter; Velazquez portrayed him in a hunting costume, fowling-piece in hand, with his favorite dog, as he did also his brother, the Cardinal-Prince Ferdinand, and Don Balthasar, his little son and heir, with two splendid dogs—all in the Prado Museum. No one painted dogs better than Velazquez. The "Boar Hunt" (National Gallery) and the "Stag Hunt" (Prado) show with admirable realism and fine landscape effect how such courtly pageants—for they were nothing more—were conducted.

To the fact that both the King and Olivares were excellent horsemen we owe Velazquez's splendid series of equestrian portraits. No one could paint a horse better than he. It was always the heavy Andalusian breed, seemingly round and clumsy, but in reality as swift as they were strong. These are his most celebrated portraits. In the portrait of Philip IV. (1635) the King and his horse move as one being in the impressive Castillian uplands. The Queen's horse moves with measured, stately tread, while Prince Balthasar gallops across the plain on his chestnut pony in the fresh spring morning. His green velvet jacket and his gold embroidered red scarf are fine bits of color in the green landscape, and the pony is foreshortened with such consummate skill as to present the outlines of a ball. Fourth in the great series is Olivarez, in shining armor, charging at full speed at the head of a troop of cavalry. Here, too, there is fine foreshortening—the horse gallops from us and we see the Duke's head over his shoulder. All of these august personages were of course painted many other times—the little prince in his riding-school (two copies in England) and as a suitor (Vienna and Buckingham Palace). During the King's military expedition to Aragon (1644) Velazquez painted him in brave military array, the gay colors of which form a pleasing contrast to the usual sombre hues of his costume. This is the so-called Fraga portrait, at Lynford Hall, Norfolk.

Among other famous portraits of the middle period are those of the poet Quevedo (Apsley House), the sculptor Martinez Montañez (Prado), Cardinal Borgia (Frankfort), the Duke of Modena (Modena), Don Antonio Pimentel (Prado), and Admiral Adrian Pulido (National Gallery). Although he portrayed women less often than men, he did it with rare charm, as may be seen in the so-called "Sibyl" (Prado), a true Spanish type; the "Lady with a Fan" (Hertford House); a supposed portrait of the painter's wife (Berlin), and one of his daughter (Prado).

Velazquez was of great assistance to Olivares in the construction of Buen Retiro, a country seat secretly designed for the King's recreation, by superintending its decorations. For it he painted his principal historical picture, the "Surrender of Breda," more widely known under the name of "Las Lanzas" (Prado), the most decorative of all his works and unusually bright in color. The subject, an incident in the war against the Netherlands, furnished the occasion for an admirable contrast between the Germanic and Latin races, from the point of view of the latter. Of the two religious pictures belonging to this period, the "Crucifixion" (Prado) depicts the youthful and symmetrical body of Christ upon the cross, in the midst of black space, but without any attempt to render the agony, which forms the chief theme of his "Christ at the Pillar." The latter is a very original conception, representing the moment the scourgers have gone and the Saviour sinks exhausted upon the floor, turning his face to a little child and an angel. Of the landscapes in the Prado attributed to him the "View of Saragossa" and the "Fortunes of Pamplona" are probably by his son-in-law Mazo; nor does the well-known sketch "Réunion de Gentilshommes" (Louvre) seem to be his handiwork.

On the fall of Olivares, in 1643, Velazquez continued to portray and honor him, notwithstanding the general execrations. Nor did he lose the King's favor on this account, but as director of the partial reconstruction of the Alcazar he received the coveted leave to revisit Italy in 1649. Most of his time was occupied with his task of buying paintings and statuary for the new apartments; but while in Rome he found time for two magnificent portraits—one of his slave, the mes-



VELAZQUEZ

"ÆSOP," FROM THE ORIGINAL IN THE PRADO MUSEUM, MADRID

tizo Juan de Pareja (Earl of Carlisle), a preparatory exercise for his portrait of Pope Innocent X. (Pamfili Gallery, Rome, and Apsley House). So idealistic a judge as Burckhardt has termed the latter "the greatest portrait of the seventeenth century." It seems molded by a broad and masterly brush rather than painted, and it foreshadowed the third style, which he had been gradually evolving, characterized by maximum effect with minimum effort, perfection of naturalism, and light effects to the point of optical illusion.

Soon after his return to Spain, in June, 1651, Velazquez was appointed *aposentador mayor* (marshal of the palace), with a yearly salary of 3000 ducats and quarters in the Alcazar. The position involved the grave responsibility of looking after the quarters of the royal family at home and on its numerous journeys. He had long administered the royal galleries, which owed their chief attractiveness to him, and of these he wrote a sort of description (published in the *Memorias* of the Spanish Academy, August, 1872, and by Daviliers, Paris, 1874). In 1659 he received the cross of Santiago, the highest honor attainable by a Spanish nobleman. As *aposentador* he arranged the Spanish part of the gorgeous festivities on the occasion of the marriage by proxy of Philip's sister to young Louis XIV. of France, on the Isle of Pheasants in the River Bidassoa. But the exertions and responsibilities resulted in a fever, of which he died after his return to Madrid, August 6, 1660. He was noble and courteous in manner, kind and generous in disposition, and loved by all. He was always ready to befriend other artists; Alonzo Cano and Murillo owed much to his kindness and advice. His principal pupils were his son-in-law Mazo, his slave Pareja, by whom many of the works assigned to him were executed, and Careño de Miranda.

Among the many portraits of Velazquez's last period are those of Marianna of Austria (Prado and Vienna), Philip's last queen, in the absurd Court costume of the day; the little Infanta Margarita (Louvre and Vienna); and Philip IV. in his old age (Prado, National Gallery, etc.). The so-called "Las Meninas" (Prado) represents Margarita and her maids of honor being painted by Velazquez. He also appears in the so-called "Family of Velazquez," a group of nine persons; but of his authentic later portraits of himself the best known are in the Uffizi. "Las Hilanderas" (the Spinners, Prado), represents a scene in the royal tapestry manufactory. The treatment of light and color in this painting is so consummate that, according to the painter Raphael Mengs, "it was not painted by the hand, but by pure force of the will." To this period also belong the portraits of the Court fools, dwarfs, imbeciles, etc. (Prado), in which the painter has achieved an apotheosis of the ugly. Such are the jesters, known as "Barbarossa," "Don Juan de Austria," and "Pabilillos de Valladolid;" the dwarfs, Sebastian de Morra and "El Primo;" the idiots, "El Bobo de Coria" and "El Niño de Vallegas." Perhaps in the same category belong two wits, whom the artist has dubbed "Æsop" and "Menippus"—wonderful examples of the broad treatment. Velazquez also attempted mythological subjects, among which were a rather unsuccessful "Mars" (Prado) and "Mercury and Argus," quite imaginative in character. "Venus with a Mirror" (Rokeby Park, Yorkshire) is a nude Andalusian dancing maiden, with nothing of the Greek goddess about her. Near the close of his life he painted two fine religious pieces (Prado): the "Coronation of the Virgin," in which, of all his works, the Italian influence is most predominant, and the "Anchorites," representing two graybeards, Saints Anthony and Paul the Hermit, in a desolate landscape of sublime grandeur.

When the portrait of Juan Pareja was exhibited in the Pantheon at Rome, it was the opinion of painters of all nationalities that "all else seemed painting, this alone truth." The work of Velazquez could not be better characterized, for it was perhaps the most perfect naturalism the world has ever seen. He made no imaginative effort, nor did he ever attempt to render a mental image, but painted simply what he saw. He is the most objective of painters; the subject itself tells the whole story. This wonderful naturalism was achieved by his consummate knowledge of light and shade, and the play of the aerial effect. In the purely technical qualities of painting he has never been surpassed, if, indeed, he has ever been equaled. His draughtsmanship was firm, his modeling delicate, and he possessed a good knowledge of form. His sad color scheme enabled him to use occasional patches of bright color with all the more effect, and no man has ever rendered values more exactly. His brush was light and sure, never a stroke too much or too little, and the modern painter stands abashed before his works, recognizing that there is nothing technical to be improved upon. Small wonder, then, that he has been termed the painter's painter, "le peintre le plus peintre qui fût jamais," as Bürger puts it.

BIBLIOGRAPHY. The chief original materials for the life of Velazquez, besides the original documents, are his father-in-law's (Pacheco) *Arte de la pintura* (Seville, 1649); Palormino, *Museo pictórico* (Madrid, 1724; Eng. trans. 1739); and Bermudez, *Diccionario* (Madrid, 1800). Modern biographies are those of Stirling-Maxwell, in his *Annals of the Artists of Spain* (London, 1848), also published separately (ib., 1855); Bürger (Thoré) (Paris, 1865); Stowe (London, 1881); and Curtis, *Velazquez and Murillo* (New York, 1883). By far the best and most complete work upon Velazquez is by Carl Justi (Bonn, 1888; Eng. trans., London, 1889). Others are by Lefort (Paris, 1894); Armstrong, in the *Portfolio* (London, 1896); Beruete (Paris, 1898), with fine illustrations; Knackfuss (Bielefeld, 1898); and Stokes (London, 1902). Good reproductions of his principal works in the Prado Museum were published at Madrid (1896).

VELBERT, vĕl-bĕrt′. A manufacturing town in the Rhine Province, Prussia, situated on a rocky elevation 15 miles northeast of Düsseldorf. Small iron and brass wares are produced, and cast iron articles and brick are shipped out. Population, in 1900, 16,689.

VELDE, vĕl′de, VAN DE. A celebrated family of Dutch artists.—ESAIAS (1590-1630), born at Amsterdam, lived chiefly at Haarlem, and exercised an important influence upon the development of the Dutch landscape. His pictures were landscapes rich in figures, a favorite subject being attacks and combats of brigands.—JAN (c.1595-1652), probably his brother, was an excellent engraver and etcher, a pupil of Matham, and a member of the Painters' Guild of Haarlem.—WILLEM the Elder (c.1611-93) was a marine painter, born at Leyden and chiefly active at Amsterdam. He was appointed by the States-General to sail with De Ruyter's fleet to commemorate the victories over the English. In 1675 he removed to London, having been appointed marine painter to Charles II., and afterwards to James II. The Museum of Amsterdam and the gallery of Hampton Court are richest in his works.—His son and pupil, WILLEM the Younger (1633-1707), born at Amsterdam, was probably the foremost marine painter of the Dutch school. He studied also under Simon de Vlieger, and accompanied the Dutch fleets, portraying their victories over the English. In 1679 he followed his father to England, and thereafter, celebrating English victories, resided at Greenwich until his death, on April 6, 1707. His best work, however, was done at Amsterdam, before the English journey. His pictures are perfectly executed in all their parts; the tone is usually silver and gray, and a fine harmony pervades them. The English galleries and Museum of Amsterdam are especially rich in his works, the latter possessing the best known, the "Cannon-Shot." Thousands of his drawings survive, the museum of Rotterdam alone possessing over 600.—ADRIAEN (1635-72), youngest son of Willem the Elder, was one of the principal animal and landscape painters of Holland. He was a pupil of his father, of Jan Wynants, and perhaps of Wouwerman. Though he does not seem to have visited Italy, a little of the Italian influence is evident in his work. The figures in his landscapes, whether human or animal, are painted with great finesse, and he succeeded especially well in composition, and in the subtle gradation of neutral tints. Above 200 of the pictures painted during his short life survive. He was also one of the best etchers of the Dutch school, having left 26 excellent plates. Consult: Michel, *Les Van de Velde* (Paris, 1892); Franken and Van der Kellen, *L'œuvre de Jan van de Velde* (Amsterdam, 1883).

VELDEKE, vĕl′de-ke, HEINRICH VON. A German poet of the twelfth century, whose home was near Maestricht, on the Lower Rhine. He is known as the father of Middle High German courtly poetry, for though he wrote in his native dialect, his verses, with the exception of *Servatius*, were rewritten in the former idiom. The *Servatius*, a weak rendering of the legend of Saint Servatius, he undertook at the request of Countess Agnes of Loen. A more important work was the *Eneide*, founded on the French poem of Benoît de Sainte-More. In addition to these poems he wrote *Von Salomo und der Minne*, which has been lost. Consult: Foa, *Enrico di Veldeke e la sua Eneide* (Parma, 1892); and Kraus, *H. von Veldeke und die mittelhochdeutsche Dichtersprache* (Halle, 1899).

VE′LEY, MARGARET (1843-1887). An English novelist and poetess, second daughter of a solicitor of Braintree, in Essex. She was educated chiefly at home, acquiring a good knowledge of French and trying her hand at verse and prose. In 1870 she contributed a poem entitled "Michaelmas Daisies" to the *Spectator* and a short story entitled "Milly's First Love" to *Blackwood's Magazine*. As a novelist she won attention with *For Percival* (1878), which was followed by *Mrs. Austin* (1880); *Damocles* (1882); *Mitchelhurst Place* (1884); and *A Garden of Memories* (1886). Miss Veley's poems were collected under the title, *A Marriage of Shadows* (London, 1888).

VÉLEZ, vā′lås. A town of the Department of Santander, Colombia, 103 miles north of Bogotá (Map: Colombia, C 2). It produces a wide variety of fruits and is noted for its manufacture of sweetmeats and preserves. It is difficult of access and this fact made it of importance, as a place of refuge, during its early history. It was the second city founded in New Granada, dating from 1539. In the vicinity are many natural curiosities. Population, about 11,000.

VELEZ DE GUEVARA, vå-lāth′ då gå-vä′rå, LUIS. A Spanish poet and dramatist. See GUEVARA, LUIS VELEZ DE.

VELEZ-MÁLAGA, vā′låth-mä′lå-gå. A town of the Province of Málaga, Spain, 40 miles southwest of the city of Granada, on the left bank of the river Vélez (Map: Spain, C 4). The town is irregularly built on account of its uneven surface. The ancient Church of San Pedro is its most famous structure. The harbor is well protected and has an excellent anchorage. Raisins form an especial article of export, and the oil produced here has a ready sale in foreign markets. Municipal population, in 1900, 23,492. Vélez-Málaga, called the 'key of Andalusia,' was captured by Ferdinand the Catholic in 1487.

VELIGER (Lat., sail-bearing). The free-swimming larval stage through which gastropod mollusks pass. The veliger is so called from two sail-like flaps (*velum*) on each side of the head, by means of which they move or rotate through the water. Each circular flap is edged with coarse cilia, by whose movements the larva is propelled. See MOLLUSKA.

VELIZH, vå-lyēzh′. A district town in the Government of Vitebsk, Russia, situated on the Düna, 54 miles northeast of Vitebsk (Map: Russia, D 3). It manufactures brick, pottery, and leather. Population, in 1897, 12,201.

VELLETRI, vĕl-lā′trê. A city in the Province of Rome, Italy, situated on the slope of the Alban Hills, 26 miles by rail southeast of Rome (Map: Italy, G 6). The chief features include the seventeenth-century Cathedral of San Clemente and the public library with 34,000 volumes. An excellent quality of wine is produced here. Population (commune), in 1901, 19,574. Velletri, the Volscian *Velitræ*, was captured by the Romans in B.C. 338.

VELLORE, vĕl-lōr′. A city and military cantonment in the North Arcot district, Madras, British India, 80 miles west by south of the city of Madras, on the Palar River, here spanned by a handsome bridge (Map: India, C 6). The Hindu pagoda or temple is noted for its magnificent sculptures and carvings. The eleventh-century fort is of considerable historic note, the mausoleums containing the remains of the family of Tippu Saib. The manufacture of perfumery is the leading industry. Population, in 1901, 43,537.

VELLUM. See PARCHMENT AND VELLUM.

VELOCITY (Lat. *velocitas*, from *velox*, swift; connected with *volare*, to fly), LINEAR. A term used in mechanics (q.v.) to express linear speed in a particular direction, linear speed being the distance a particle goes in a unit of time if the motion is uniform, or the distance it would go in the next unit of time if during that time its motion were not to change. A particle moving northward with a speed 10 is said to have a 'velocity 10, north.' A linear velocity has evidently the same properties as a straight line of definite length drawn in a definite direction, viz. direction and numerical value; therefore, a velocity is a 'vector quantity' and can be pictured by such a line. (See VECTOR.) Angular velocity is angular speed around a particular axis, angular speed being the angle rotated through by a body turning on an axis in a unit of time if the angular motion is uniform; or, if the motion is irregular, the angle which would be turned through in the next unit of time if the motion were to remain unchanged for that length of time. To express the angular velocity of a body three things are necessary: a line to coincide with the axis, this line to be pointed in such a direction as to indicate the sense of the rotation—right or left handed, and the line to have a length equal or proportional to the angular speed. A straight line like this, of a definite length, direction and position, is called a 'rotor' or a 'localized vector.'

VELOCITY OF LIGHT. This quantity through the efforts of many experimenters has been determined with a high degree of precision and plays an important part in both theoretical and practical optics and astronomy. After vain attempts at direct measurements made by Galileo, Roemer in 1675 was able to calculate the velocity of light from observations of the eclipse of Jupiter's satellites, making the value about 192,000 miles per second. Little further was done, however, until the nineteenth century, when Fizeau, using a revolving toothed wheel to interrupt a beam of light, made a direct measurement of light which had traveled a distance of 8633 meters. This method was also employed by Cornu, who had improved apparatus constructed and used a distance of 23 kilometers. A method involving the use of a rapidly rotating mirror was employed by Foucault in 1862, and was noteworthy in that it permitted a short distance, such as could be found in a laboratory, to be used as the pathway of the beam. By this method, which was improved by Michelson and Newcomb, it was possible to measure the velocity in liquids. The values obtained by various experimenters are given in the following table:

	Kilometers.
Foucault, 1862	298,000
Cornu (1), 1874	298,500
" (2), 1878	300,400
Cornu, discussed by Listing	299,990
Young and Forbes, 1880-81	301,382
Michelson (1)	299,910
" (2)	299,853
Newcomb (selected results)	299,860
" (all results)	299,810

A detailed description of the methods will be found in the article LIGHT in the paragraph on *Velocity of Light*, to which reference should be made. Consult: Preston, *Theory of Light* (London and New York, 1895); Cornu, in *Reports of International Congress of Physics* (Paris, 1900); and Michelson, "The Velocity of Light," vol. ix., *Decennial Publications University of Chicago* (Chicago, 1902).

VELOCITY OF PROJECTILES, etc. See BALLISTICS.

VELVET (OF. *velvet*, OI. *veluto*, It. *velluto*, velvet, from Lat. *villus*, shaggy hair, nap of cloth, tuft of hair; connected with *vellus*, fleece, and ultimately with Eng. *wool*). A silk material, made with a single or double filling and with a double warp. The latter is disposed over metal rods so that one set of warp threads is a series of loops secured into the base of the fabric. These loops are afterwards cut and form the pile of the velvet. In figured velvet, portions of the pile are either cut closer or stamped in designs, so as to contrast with the upstanding pile. When the back is of linen or cotton, and only the pile of silk, the material is called velveteen. See WEAVING.

VELVET-ANT. Any one of the hymenopterous insects of the family Mutillidæ. They resemble the true ants in general shape, but lack the scale on the peduncle of the abdomen. They do not form communities and are more closely allied to the digger wasps than to the ants. The body is often densely clothed with hairs, hence the name 'velvet.' The hair is frequently bright-colored, in some species bright red, contrasted with black. The males only are winged and are frequently larger than the females. There are about 160 North American species, most numerous in the South, the largest of which is the Texan 'horse-ant' or 'cow-killer;' it burrows in the ground and provisions its tunnels with insects. Velvet-ants sometimes enter beehives in search of bees, and there do considerable damage. Other species have been found in Europe in the nests of bumblebees, and in the United States in the nests of certain of the burrowing bees. It is probable that all the velvet-ants are parasitic in this way. Many of the females stridulate. These insects sting viciously.

VELVET-BEAN. See COWAGE.

VELVET-GRASS. See SOFT GRASS.

VELVET-LEAF. See SIDA.

VENABLE, vĕn'ȧ-b'l, FRANCIS PRESTON (1856—). An American educator and writer on chemistry, born near Farmville, Prince Edward County, Va. He graduated at the University of Virginia in 1879; studied at Bonn and at Göttingen, Germany, where he received the degree of Ph.D. in 1881; and afterwards became professor of chemistry at the University of North Carolina, of which institution he was made president in 1900. His publications include: *Manual of Qualitative Analysis* (1883); *Short History of Chemistry* (1894); *Development of Periodic Law* (1896); and with J. L. Howe, *Inorganic Chemistry According to Periodic Law* (1898).

VENABLE, WILLIAM HENRY (1836—). An American author and educator, born in Warren County, Ohio, and educated at the National Normal School, Lebanon, Ohio. He became professor of natural science in the Chickering Classical and Scientific Institute, Cincinnati, Ohio, in 1862, and its principal in 1881. In 1882 he founded and directed the Afternoon School of popular science and history. He was professor of English literature at the Hughes High School from 1889 to 1895 and in the Walnut Hill High School in Cincinnati after that time. He published: *A History of the United States* (1872); *June on the Miami, and Other Poems* (1872); *Footprints of the Pioneers* (1888); *Beginnings of Literary Culture in the Ohio Valley* (1891); *The Last Flight* (1894); *Santa Claus and the Black Cat* (1898); *Dream of Empire; or, the House of Blennerhasset* (1901); and *Tom Tad* (1902).

VENATION (from Lat. *vena*, leaf). The arrangement of veins in foliage leaves. The venation is very important in determining the general contour and margin of the leaf, and it is so consistently developed in different groups that it furnishes important characters in classification. See LEAF.

VENDÉE, väɴ'dā'. A western department of France, forming a part of the former Province of Poitou, and lying on the Bay of Biscay between the departments of Loire-Inférieure and Charente-Inférieure (Map: France, E 5). Area, 2588 square miles. The surface is low and marshy along the coast, becoming hilly and wooded in the east. The department is essentially agricultural, though considerable quantities of coal and salt are produced. Nearly the whole area is arable, though much is in pasture land, and large numbers of cattle are raised. The wheat crop amounts to over $7,000,000 annually, and the production of oats, potatoes, and beets as well as of wine is also considerable. Population, in 1896, 441,735; in 1901, 441,311. Capital, La Roche-sur-Yon.

During the French Revolution the Vendée and the neighboring regions (Poitou, Anjou, Brittany) were the scene of a great Royalist uprising of the peasants, who were actuated in part by religious motives. The immediate cause of the insurrection, which broke out in March, 1793, was the proposed levy of 300,000 men by the Revolutionary Government. The war was characterized by frightful massacres; villages were ravaged and burned, and prisoners tortured and killed. The officers sent by the Convention were wholly incompetent and there was a lack of unity of action and definite plans, with the result that the Vendeans under Cathelineau, Larochejacquelein, and Charette de la Contrie (qq.v.) were at first almost universally successful. In the fall of 1793, however, a more vigorous campaign was inaugurated on the part of the Government. The Vendeans suffered a great defeat at Le Maus on December 12th at the hands of Westermann and Marceau, and a few days later sustained another blow at Savenay. The backbone of the insurrection was broken. Frightful atrocities were perpetrated at Nantes by the orders of Carrier, the Deputy of the Convention (see NOYADES), and Turreau with his 'infernal columns' laid waste the rebellious districts. Charette and other Vendean leaders made terms with the Convention in 1795. The war was, however, soon renewed, but order was finally restored by Hoche in 1796, although the complete pacification of the region was not effected until several years later. (See CHOUANS.) In 1815, during the Hundred Days, there was a Vendean insurrection against Napoleon, and in 1832 an abortive attempt was made to excite a rising in favor of the Duchess of Berry.

VENDÉMIAIRE, väɴ'dā'myär' (Fr., from Lat. *vindemia*, vintage, from *vinum*, wine + *demere*, to remove, from *de*, down, away + *emere*, to take, buy). The first month in the French Revolutionary calendar. It ran from September 22d to October 21st in the years I.-III. and V.-VII.; from September 23d to October 22d in the years IV., VIII.-XI., XIII., and XIV.; and from September 24th to October 23d in the year XII. Memorable in the history of the Revolution is the thirteenth Vendémiaire of the year IV. (October 5, 1795), when the Paris sections, instigated by Royalist reactionaries, rose against the National Convention, but were beaten by a military force under Barras and Napoleon.

VENDET'TA (It., feud, vengeance). A family feud, having for its object the execution of blood revenge for an injury by the nearest of kin. This practice has continued in the island of Corsica down to recent times. Not only do the next of kin of the dead or injured man assume responsibility for inflicting punishment, but if the offender escapes, his nearest relatives are held responsible for his aggression. In some cases families have been in a state of siege for long periods of years. The vendetta is held by the Corsican to be one of the most positive of family obligations. Sometimes the feuds are harmonized by mediators (*parolanti*) and an oath is taken to forego the vengeance. This oath, like the original obligation to take revenge, is regarded as especially sacred. Private wars for blood revenge have characterized barbarism and the early stages of civilization among many peoples, but, owing to the isolation of Corsica and its peculiarly primitive social conditions, the practice has survived there in its completeness. An exactly analogous custom is found among the mountaineers of eastern Kentucky and Tennessee and western Virginia, descendants of the old Scotch-Irish stock, who have reverted to many of the primitive customs of their ancestry, under the influence of isolation and pioneer conditions. In Montenegro and among the Albanians, Bedouins, Druses, and many less civilized peoples the same custom is found in a greater or lesser degree. The vendetta seems to have its origin in the idea of clan or tribal responsibility and patriarchal rule, preceding the development of the State and of a system of public justice.

VENDÔME, väɴ'dōm'. The capital of the arondissement of Vendôme, in the Department of Loir-et-Cher, France, on the right bank of the Loir, 20 miles northwest of Blois (Map: France, H 4). The town is attractive for its charming specimens of architecture. The Church of the Trinity (12th-15th century) has a remarkable transition belfry and a fine flamboyant façade. The ruins of the Renaissance abbey (1030) to which it belonged lie near. La Madeleine has a stained glass window (1529) and a handsome spire. On the left bank of the Loir are the ruins of the eleventh-century castle of the counts of Vendôme. There are a Hôtel de Ville, a museum, a library, a lyceum with a flamboyant chapel (1623-39), and a bronze statue of the poet Ronsard. The manufactures are gloves, cotton goods, leather, and cheese. Population, in 1901, 9457. Christianity was introduced here as early as the fifth century. The Dukedom of Vendôme was created by Francis I. for a prince of the Bourbon family in 1515. It finally fell into the hands of Henry IV. He bestowed it on one of his natural sons, who founded the House of Vendôme.

VENDÔME. A noble house of France, founded by César, a son of Henry IV. of France by Gabrielle d'Estrées, who was legitimatized. César, born in 1594, received the Duchy of Vendôme in 1598, and under Louis XIII. played a conspicuous part in politics as one of the most inveterate intriguers against Richelieu, suffering, in return, imprisonment and exile. After joining the party of the Fronde against Mazarin, he made his peace with the Court and fought against his former friends. He became Admiral of France, and in 1655, the year of his death, defeated the Spanish fleet before Barcelona. His son Louis (1612-69) became Viceroy of Catalonia, married Laure Mancini, one of the nieces of Mazarin, and after her death, in 1656, entered the Church and rose to be cardinal. Louis left two sons, Louis Joseph, Duke of Vendôme (q.v.), and Philippe (1655-1727). The latter entered the Order of the Knights of Malta, and became grand prior. In the wars of Louis XIV. he attained the rank of lieutenant-general. With him the line of Vendôme became extinct.

VENDÔME, Place. A square in Paris, laid out under Louis XIV. It has successively borne the names Place des Conquêtes, Place des Piques, and Place Vendôme (from a former palace of the Duke de Vendôme). In it stands the Vendôme Column, which was built at the command of Napoleon, in 1806-10, to commemorate his victories over the Russian and Austrian forces in 1805. It is of masonry, incrusted with bronze plates, the latter having been obtained by melting down 1200 cannon captured from the enemy. These plates, arranged in a spiral nearly 300 yards in length, picture scenes of that memorable campaign. The column is 13 feet in diameter and 142 feet high, and was designed by the architects Denon, Gondouin, and Lepère, after Trajan's Column at Rome. In May, 1871, the column was thrown down by the Communists. The fragments, however, were preserved, and in 1875 it was reërected, with but slight alteration, upon its original site.

VENDÔME, Louis Joseph, Duke de (1654-1712). A French general, the son of Louis, Duke de Vendôme. He was born in Paris, July 1, 1654, served during the Dutch campaign of 1672, and afterward under Turenne in Germany and Alsace, and under Créqui in Flanders. After the Peace of Nimeguen (1678) he retired to his château of Anet, near Dreux, until the outbreak of war in 1688. He fought under Luxembourg in the Low Countries, and later commanded the left wing of Catinat's army at the battle of Marsaglia (October 4, 1693). In 1695 he was assigned to the head of the army in Catalonia, and achieved a series of brilliant successes, closing with the capture of Barcelona. After the outbreak of the War of the Spanish Succession he succeeded Villeroy in Italy (1702), won the victories of Ustiano and San-Vittoria, and compelled the temporary retirement of Prince Eugene. In 1703 he carried on a successful campaign against the Austrians, and in the summer of 1706 he was recalled to supersede Villeroy in the Low Countries. His quarrels with the Duke of Burgundy, who had received a command under him, led to the defeat of the French at Oudenarde (q.v.). After the capitulation of Lille he was recalled. In 1710 Vendôme was sent, at the urgent request of Philip V., to Spain, Where the British and Austrians were carrying all before them. His appearance brought together a numerous army of volunteers, and Philip was restored to his capital before the close of the year. Stanhope and the British troops were defeated at Brihuega, December 9th, and on the following day Starhemberg and the Austrians were routed at Villaviciosa. The King raised his deliverer to the rank of a prince of the blood royal. Vendôme was a great warrior and a man of keen intellect, but indolent and grossly immoral. He died at Vinaroz, Catalonia, June 15, 1712. Saint-Simon, in his *Mémoirs*, gives a highly colored and unfriendly picture of the man. Consult also De Bellerive, *Les dernières campagnes de Louis Joseph de Vendôme* (Paris, 1714); Voltaire, *Le siècle de Louis XIV.*

VENDOR'S LIEN. In the law of real property, an implied lien of a vendor of land for the unpaid purchase price, or any balance thereof. It is of equitable origin, and is available against subsequent purchasers and incumbrances with notice. The most effective way of giving notice to the public is to begin an action in equity to enforce the lien, and at the same time file a *lis pendens* against the property. It does not actually become a specific lien against the property until its existence and validity is established by the decree of a court. This lien may be waived by taking security on which a third person is liable, but not by merely taking a note or other obligation of the vendee alone. In code States the common method of enforcing a vendor's claim for unpaid purchase money is by a single action in equity to enforce the lien and incidentally to recover the amount due. In the law of sales of personal property the term is employed to denote the right of a seller of goods and chattels to retain possession thereof until the purchase price is paid, where no credit is given. See Stoppage in Transitu; Lien; Sale.

VENEER (from Ger. *furniren, fourniren*, to inlay, veneer, furnish, from OF. *fornir*, Fr. *fournir*, to furnish, from OHG. *frumjan*, to provide, from *fruma*, utility). A layer of wood, cut very thin, for the purpose of being glued on to the surface of a commoner kind. Only choice kinds of hard woods are sawn into veneers, and they are usually attached to deal or pine, so as to give all the appearance of solidity. In this way the more costly kinds of furniture woods are economically used by the cabinet maker, for with the improvements which have been effected in the process of sawing veneers as thin as paper have been produced.

VENER, vā'nĕr, or **WENER**, Lake. The largest lake in the Scandinavian Peninsula, and, next to Lakes Ladoga and Onega in Russia, the largest lake in Europe. It lies in the southwestern part of Sweden, its northern extremity being nearly in the latitude of Stockholm, while its southwestern extremity comes within 18 miles of an arm of the Cattegat (Map: Sweden, E 7). It is of oval shape, but contracted near the middle by two outjutting peninsulas. Its greatest length from northeast to southwest is 90 miles, its greatest breadth 45 miles, and its area 2309 square miles. Its greatest depth is 295 feet. The coasts are irregular, in the north high, steep and rocky, or forest-covered, and the lake contains a number of islands, which are chiefly grouped between the two peninsulas. Lake Vener is fed by several streams of considerable size, the largest being the Klar Elf, the upper course of the Göta Elf (q.v.). Its outlet to the southwest is the lower Göta Elf, discharging into the Cattegat. The lake is an important avenue of commerce. It is connected by the Göta Canal with Lake Vetter, and thence with the Baltic Sea on the east, while access through the Göta Elf is afforded by a canal around the Trollhätta Rapids. Another canal connects the lake with Frederikshald in Norway.

VENEREAL DISEASE. See Gonorrhœa; Syphilis.

VENESECTION (from Lat. *vena*, blood-vessel + *sectio*, a cutting, from *secare*, to cut), Phlebotomy, Bloodletting, or Bleeding. An incision into a vein, for the abstraction of blood. Although the operation may be performed on many of the superficial veins, it is usually restricted to the median basilic vein at the bend of the elbow. The patient being placed in a sitting position, a bandage must be tied sufficiently tight around the middle of the arm to arrest the venous circulation without materially affecting the pulse at the wrist. The forearm having been allowed to hang down till the veins are tense, the operator must make his selection, and taking the blade of the lancet between the forefinger and thumb of the right hand, should fix the vein by pressing his left thumb upon it just below the part he is about to open. He should then steadily introduce the point of the lancet obliquely until the interior of the vessel is reached, and the blood is seen rising. Without penetrating deeper, he should thrust the instrument forward, so as to open the vein longitudinally to a sufficient extent. On removing the thumb, the blood should emerge in a full jet. When a sufficient quantity of blood has been abstracted, the thumb of the left hand should be placed on the wound, and the bandage loosened; a small pad of gauze should then be placed over the orifice, the surrounding parts should be cleaned of blood, and the pad of gauze compressed against the arm by the tape or narrow bandage, applied in the figure-of-eight form, with the crossing of the tape lying on the pad. After the operation the arm should be carried in a sling for a day or two. These are the details of venesection as extensively practiced everywhere up to the middle of the nineteenth century. The operation is now practically obsolete, though there has been a tendency to revive its application in a few diseases and conditions.

VENETIAN SCHOOL OF PAINTING. One of the most important and certainly the most widely appreciated of the Italian schools. Its chief note is color. Bright without being gaudy, always harmonious, and with full allowance for all the subtle effects of light and shade, Venetian color has never been surpassed. To other qualities, such as form, ideas, illustration, were subordinated. The Venetian dealt with the beautiful only as it appealed to the eye, with the fullness of material life, with purely pictorial effects. He tended to avoid dramatic action and to portray restful subjects, fraught with the joy of living. Even his religious subjects were worldly, the figures being Venetian noblemen and women. He especially delighted in the pageantry of the powerful Venetian State and in mythological representations. He also brought the landscape, though used primarily as a background, to high perfection.

The color note in Venetian painting is chiefly due to its Byzantine origin, and was promoted by the gorgeous play of natural color in the island city. Until far into the fifteenth century the Byzantine style of painting with gold backgrounds and stiff hieratic figures prevailed in Venice. The first painters to show emancipation from this manner lived on the outlying island of Murano. The earliest representative of this school was Antonio da Murano (c.1435) worked in common with a German, Johannes Alemannus. A greater influence than the German was exercised by the Umbrian painter Gentile da Fabriano upon Murano and its chief representatives, the Vivarini family. The most prominent figures in early Venetian art belonged to the Bellini family, Jacopo (d.1470), a pupil of Gentile da Fabriano, his sons Gentile and especially Giovanni (d.1516), through whom the Paduan influence came to Venice. Adopting the oil technique, introduced by Antonello da Messina, Giovanni Bellini laid the foundation of the greatness of the Venetian school. Of his pupils, Giorgione (d.1511) evolved the High Renaissance in Venice, and Titian brought it to its most perfect development. Other important pupils of Bellini, were Cima da Conegliano, Marco Basaiti and Vincenzo Catena, who may all be classed with the Early Renaissance, and Palma Vecchio; Lorenzo Lotto was influenced by him. Among Giorgione's many pupils was Sebastian del Piombo, among Titian's Paris Bordone, among Palma's Bonifazio Veronese and Rocco Marconi. Jacopo Bansano (d.1591), a pupil of Bonifazio, developed genre and landscape to a high perfection.

The Renaissance lasted longer in Venice than elsewhere. During the second half of the fifteenth century it produced, besides some of those mentioned above, such artists as Tintoretto, the dramatic talent of the school, and Veronese, the principal decorator. Even in the declining Renaissance its artists like Padovanino and Palma Giovane were better than those elsewhere, and during the eighteenth Venice produced good painters of its own life and scenery in Longhi, Canaletto, and Guardi, and one master of the first rank in Tiepolo. Its influence extended to Venetian possessions on the mainland, where in the sixteenth century appeared men like Pordenone, and helped to form the schools of Brescia and Vicenza. It twice exercised determinative influence upon Spanish painting, upon the Flemish through Rubens in the seventeenth, and upon the English through Reynolds in the eighteenth. For a more detailed account of the history see Painting, paragraph *Renaissance*; see also the names of the individual artists mentioned.

Consult: Berenson, *Venetian Painters of the Renaissance* (New York, 1894); Crowe and Cavalcaselle, *History of Painting in Northern*

Italy (London, 1871), and the authorities cited in Florentine School of Painting.

VENEZUELA, vĕn'ê-zwē'lȧ, *Sp. pron.* vå'nå-thwä'lå *or* (locally) vå'nå-swä'lå (It., Little Venice, so called from the pile-dwellings seen by the early explorers on the Maracaibo). A republic on the northern coast of South America, bounded on the north by the Caribbean Sea, on the east by the Atlantic Ocean and British Guiana, on the south by Brazil and Colombia, and on the west by Colombia. Its area, since the most recent adjustment of its boundary lines, is estimated at 593,943 square miles.

Topography. The area may be divided into three fairly definite regions: (1) the agricultural and mountainous district of the north and northwest; (2) the district between this region and the Orinoco; and (3) the Guiana highlands of the southeast. The mountains of the first region may be classed under two great systems. The first, the Venezuela Andes, starts from the Nido de Pamplona in Colombia and runs northward in two branches. The westernmost, passing directly north, forms the boundary between Colombia and Venezuela and ends in the Goajira Peninsula, its highest point being in the Sierra de Perija (10,000 feet); the other runs to the northeast, subdividing north of the highlands of Trujillo into the two chains of the Coro system. This eastern range has the loftiest mountains of Venezuela, with five peaks above the limit of perpetual snow, the highest, the Sierra Nevada de Mérida (Picha Concha), attaining an altitude of 15,400 feet. Inclosed between these two ranges is the lowland region of Lake Maracaibo. The eastern range of the Venezuelan Andes is separated by the valleys of the Yaracui and Cojede rivers from the Caribbean Mountains—the other system of this region—which run eastward from Lake Maracaibo, with a break at the plain of Barcelona, to the Paria Peninsula. These mountains form two parallel ranges—the Coast Range (Sierra de Mar) proper (in many places rising precipitously from the sea), and a somewhat more southerly range, paralleling it about thirty miles distant. Between these two ranges run spurs inclosing valleys and lakes, of which Lake Valencia is the most important. The western portion contains the highest peaks—Naiguata (9127 feet) and Silla; the largest peak of the eastern portion is Turumiquire.

South and southeast of the Cordillera and Caribbean systems and extending to the Orinoco River lies the second great topographical region of the Republic—the Orinoco Valley—which may conveniently be divided into two distinct areas: the lower, commonly designated by the name of *llanos* (q.v.), and the upper, consisting of that portion lying above the junction of the Meta with the Orinoco. This latter region is largely unexplored, but is supposed to consist of elevated plains, traversed by hills and low mountains, and largely covered by forests. The third region belongs topographically to Guiana, and consists of plateaus and generally low mountains, which reach in Roraima an altitude of over 8000 feet, and are varied by open areas and forests. A considerable part of the Brazilian boundary is formed by the Parima and Pacaraima mountains. There are no active volcanoes among the mountains of Venezuela, but destructive earthquakes (Carâcas destroyed in 1812) are common. The coast line of Venezuela is some 1700 miles long, with numerous gulfs and bays, of which Maracaibo (q.v.), Paria, and Coro are the most important. The northern coast is generally short and steep, but the plains of Maracaibo and Coro are low and in some places marshy. Of the numerous islands belonging to Venezuela, Margarita (q.v.) is the only one of importance. The outlet of Lake Maracaibo forms an important harbor, and Puerto Cabello and Cumanâ are also good natural ones, but the shipping of La Guaira renders it the chief port of the Republic.

Hydrography. The fluvial system of Venezuela, with six rivers navigable for large vessels, is probably the most important of South America. Of its thousand or more streams the larger number are affluents of the Orinoco (q.v.), which, with its great tributaries—the Apure, Meta, and Negro (the latter united by the Cassiquiare to the Amazon system)—forms the great outlet for the interior of Colombia, as well as of Venezuela. The other important drainage areas are those of the Caribbean Sea, of Lakes Maracaibo and Valencia (q.v.), and the Gulf of Paria. In addition to the lakes mentioned, there are about 200 others of small importance. Few countries are so well watered as Venezuela.

Climate. Like that of its sister republic Colombia, the climate of Venezuela is affected less by its latitude than by its altitude. Three distinct zones or temperature areas are marked by the altitudes of 2300 and 6500 feet. Below the first come the 'warm lands' of the coast and llanos, with a mean temperature varying from 78 to 90 degrees, but with the trade winds tempering the heat of the coast sections. Scattered cases of yellow and 'pernicious' fever occur in this region, especially around Lake Maracaibo, but epidemics are unknown. On the llanos the rainy season—from April to October—is likely to engender fevers, but in general the 'warm lands' of Venezuela are fairly healthful, much more so than most portions of the Caribbean coast. The temperate zone, extending broadly from the limit of the cocoa palm and cacao, or from about 2300 feet up, to that of the banana and sugar cane, has a delightful and salubrious climate. The rainy and dry seasons divide the year here as in the lower zone, but with much less definiteness. The mean temperature ranges from 50 to 77 degrees, the greatest extremes known at Carâcas, since 1868, being 83.4° and 48°. Above an altitude of 6500 feet come the 'cold lands.' The line of perpetual snow begins at about 14,000 feet.

Flora and Fauna. In a general way the flora may be said to resemble that of Brazil, with a wide variety on account of the presence of lofty mountains. Extensive forests of full tropical luxuriance, overgrown with air plants and lianas, and harboring many vegetal types of striking appearance and economic importance (lignum-vitæ, Brazil wood, coral-trees, numerous palms, etc.) are found on the slopes of the northern mountains and in the south and southwest near the Brazilian and Colombian borders. Above 3000 feet begins the plant life of the temperate zones. The llanos are generally covered with long grass, interspersed near the marshy regions with clumps of trees; but in the dry districts cactus, agave, and hardy shrubs are found. Mangrove swamps are common at the mouth of the Orinoco. The forest products comprise rubber, vanilla, various fibrous plants, dye and cabinet woods, and drugs, but as yet the forest wealth of the country is little utilized. The fauna includes the various species of the neo-tropical region of South America (howling and other monkeys, jaguar, puma, sloth, ant-eater, armadillo, tapir, lamantin, a vast variety of birds of fine plumage, including the ibis, heron, and the guacharo or oilbirds; anaconda and boa, rattlesnake, crocodile, cayman, etc.) and many of the elements of the north and south temperate regions.

Geology and Mining Interests. The Andean ranges of the southwest are for the most part of plutonic formation in which granite and gneiss predominate, with lateral ridges of upper green sandstone and limestone. The valleys and plains on either side of these ranges are covered by detrital deposits. The northernmost range of the coast system is of crystalline formation, but the lower southern chain is largely composed of stratified Cretaceous rocks. The soil throughout this whole region is very deep and fertile, making it one of the richest agricultural centres of the continent. The llanos and the lowlands of Maracaibo are largely made up of Tertiary and Quaternary deposits, composed chiefly of marl, sand, shingle, and conglomerate mixed with alluvial deposits. The foundation of the Guiana highland region is of granite with an outer layer of sandstone, and large barren stretches occur in this region. The mineral resources are supposed to be of great value, but are at present little developed. The greatest yield of gold is found in the Territory of Yuruari, though the exports of that metal from this region have fallen off greatly since the early eighties, when the annual yield averaged nearly 200,000 ounces. The copper mines of the Aroa district, 70 miles west of Puerto Cabello, produce superior ore, but their yield has also greatly lessened within the last few years. The salt mines of the Araya peninsula, worked since the sixteenth century, form an important Government monopoly, and with other *salinas* often produce 100,000 tons annually. Copper, silver, and iron are abundant in the other mountainous regions of the Republic. An inferior quality of coal is found near Barcelona and at the head of the Gulf of Paria. Rich deposits of asphalt are known to exist in the Maracaibo region and in the State of Bermudez, and petroleum of fine quality in the State of Los Andes. Excellent granite is found near Carácas and marble is common.

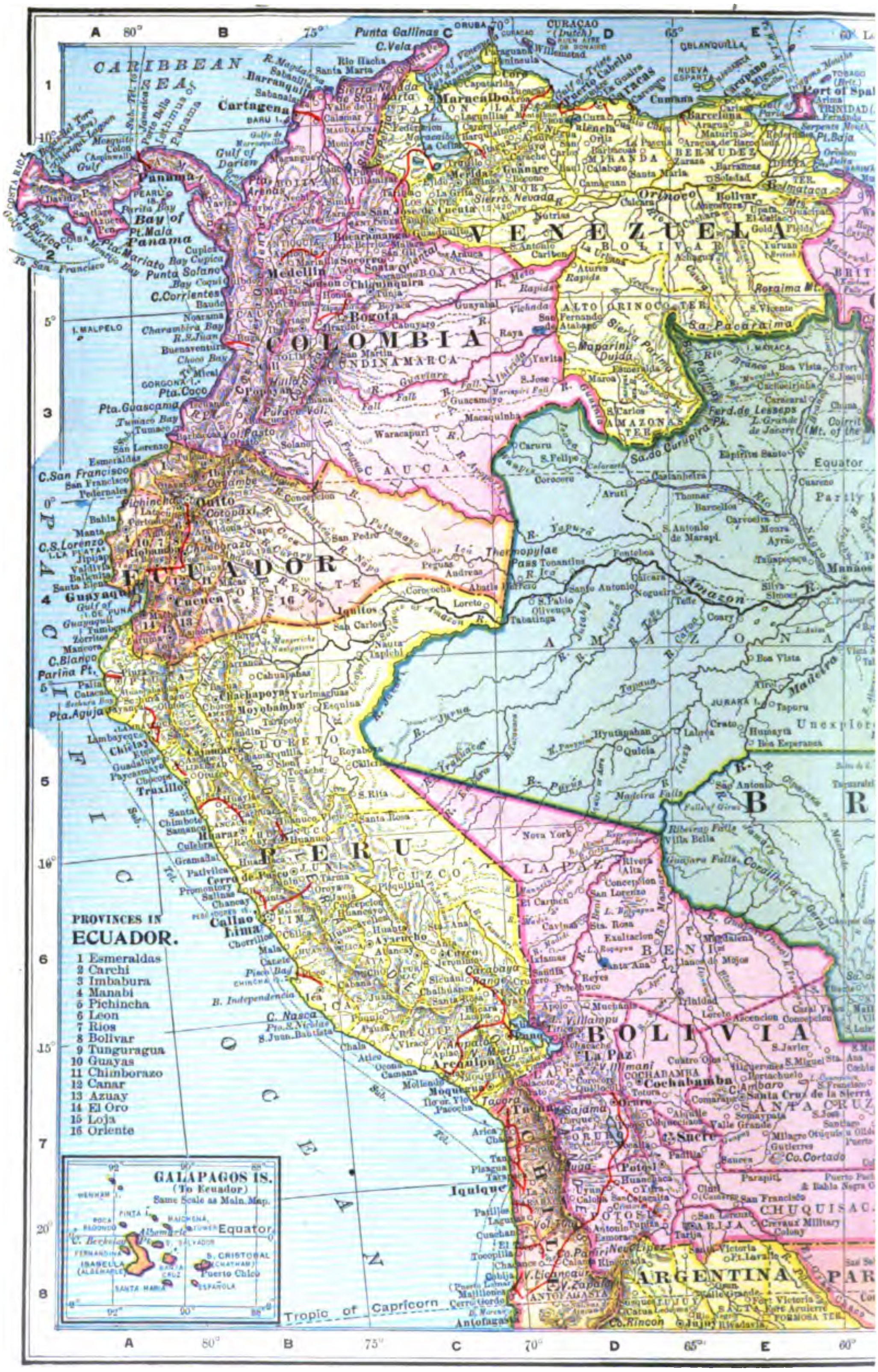
Fisheries. The pearl, sponge, and tortoise-shell fisheries are small, but developing. The annual output of pearls is valued at about $100,000.

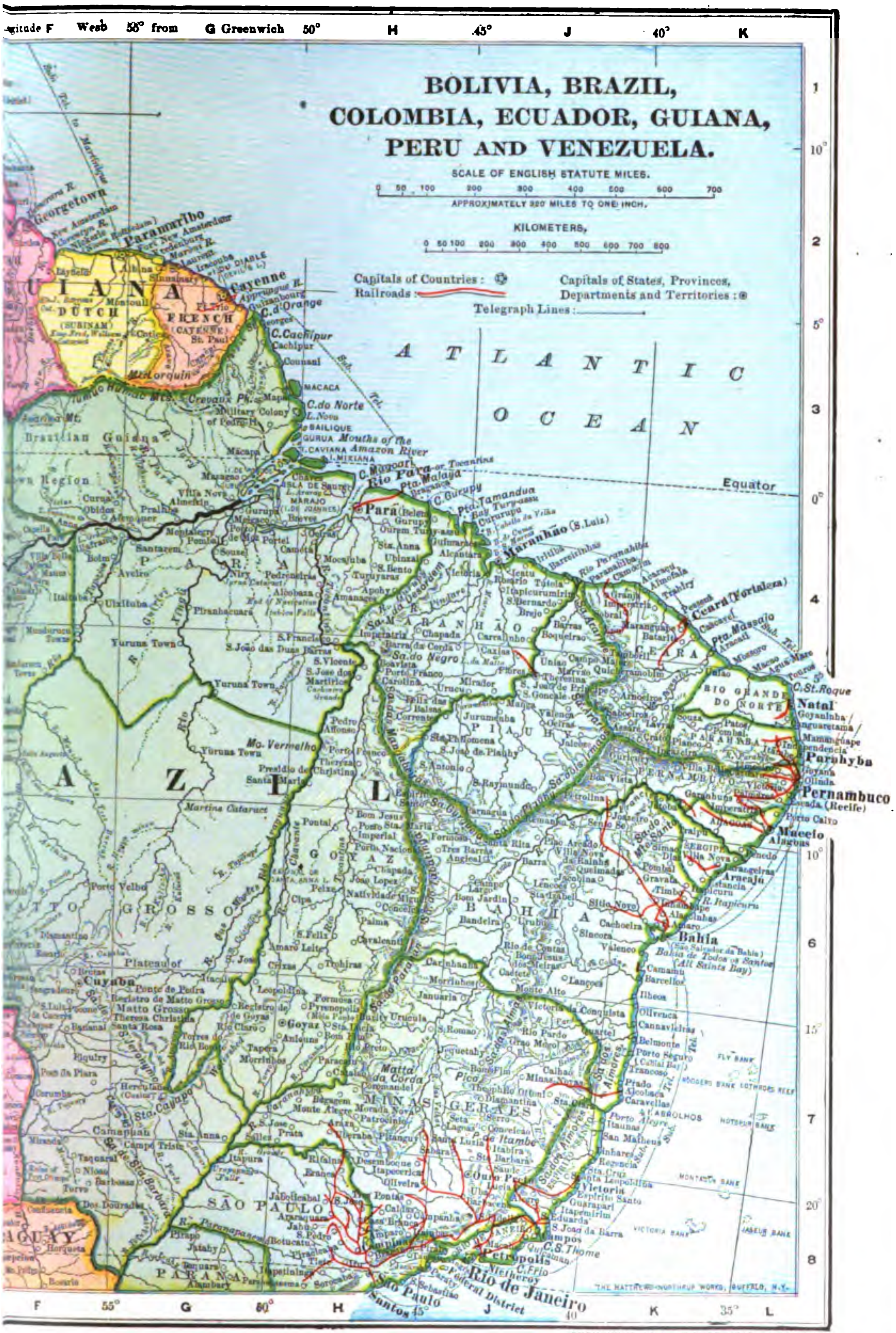
Agriculture and Stock-Raising. Venezuela's chief industry is agriculture. However, only about one-third of the area is estimated as cultivable, and of this cultivable portion only about one-third is tilled. Coffee easily ranks first, both as an agricultural product and as an article of export, but its cultivation has been greatly handicapped by the serious decline in prices. In 1896 the acreage in coffee was estimated at 180,000, with an average yield of five hundredweight an acre. Cacao is an important product, for which the warm moist lands of the coast are especially adapted. Sugar cane is extensively grown, owing to the duties, which exclude foreign sugars, but the product is almost wholly consumed at home, largely in the distillation of native spirits. Cotton is not now grown. The same is true of indigo, displaced by coffee. For domestic consumption cereals, beans, potatoes, manioc, fruits and vegetables are produced, but the demand for wheat exceeds the home supply. Tobacco thrives in the lowland regions, though the present grades are inferior and the cultivation is much interrupted by civil commotions. Some natural forest products, such as copaiba, vanilla, and caoutchouc, are gathered for the purpose of exportation; but in general, the agricultural resources of Venezuela are poorly developed and the methods employed antiquated and wasteful. Cattle-raising has always been an important industry, but the cattle of the llanos were greatly depleted during the revolutionary days between 1860 and 1865. Now, however, these plains are becoming restocked, while in the northwest the raising of sheep and goats has become an important industry. The following holdings are given in round numbers: Oxen, 2,000,000; horses, 191,000; goats, 1,700,000; sheep, 177,000; mules and asses, 400,000.

Manufactures. In the large cities there are some establishments for cotton-weaving and the making of shoes and hats, agricultural implements, vehicles, and furniture, and breweries and distilleries. The more important industries are largely in foreign hands.

Transportation and Communication. The Orinoco, with its great tributaries, the Apure and the Meta, affords excellent communication with the interior. The roads, away from the vicinity of the larger cities, are mere mule tracks. The first railroad, joining Carácas with its seaport, La Guayra, was completed in 1883, at a cost of $100,000 per mile. Though a narrow-gauge road, its construction was a difficult engineering feat, on account of the steep grades involved. In 1899 there were in operation 525 miles of railway, of which the Government owned 12 miles. Venezuela has cable communication with the outside world through a French line.

Commerce. La Guayra and the other ports of Venezuela are connected with the United States and Europe by five lines of steamers, giving the Republic almost daily communication with the outside world. In 1900 the coasting trade of Venezuela (in which foreign vessels are not permitted to engage) was carried on by 12 local steamers, with a tonnage of 2567, and 18 sailing vessels, with a tonnage of 2836. The period from 1883 to 1894 was one of inflation in foreign and domestic commerce, caused by the introduction of some $50,000,000 of foreign capital. The cessation of this influx of speculative money, coupled with the political disturbances between 1890 and 1900, brought about a reaction from which the country has not yet recovered. There are few British or United States merchants in the country. German merchants are numerous, surpassing the Venezuelans, who in turn are followed in order of importance by French, Italians, and Spaniards. In 1900, 1059 vessels visited the four principal ports; in 1901, 938 entered Maracaibo, Puerto Cabello, and La Guayra, the number visiting Ciudad Bolivar not being known. The principal exports for this year (1901) were as follows: Coffee (largely to Germany and the United States), 92,838,946 pounds; cacao (main-


CARIBBEAN SEA
PACIFIC OCEAN
COLOMBIA
VENEZUELA
ECUADOR
PERU
BOLIVIA
ARGENTINA
CHILE
AMAZONAS
Amazon
Equator
Tropic of Capricorn
Panama
Bay of Panama
Cartagena
Barranquilla
Maracaibo
Caracas
Cumana
Port of Spain
Medellin
Bogota
Quito
Guayaquil
Cuenca
Iquitos
Truxillo
Cerro de Pasco
Callao
Lima
Cuzco
Arequipa
La Paz
Cochabamba
Oruro
Sucre
Potosi
Iquique
Antofagasta
Manaos
Orinoco
Madeira
PROVINCES IN ECUADOR.
1 Esmeraldas
2 Carchi
3 Imbabura
4 Manabi
5 Pichincha
6 Leon
7 Rios
8 Bolivar
9 Tunguragua
10 Guayas
11 Chimborazo
12 Canar
13 Azuay
14 El Oro
15 Loja
16 Oriente
GALAPAGOS IS.
(To Ecuador)
Same Scale as Main Map.
A
B
C
D
E
80°
75°
70°
65°
60°
1
2
3
4
5
6
7
8
5°
0°
5°
10°
15°
20°



BOLIVIA, BRAZIL, COLOMBIA, ECUADOR, GUIANA, PERU AND VENEZUELA.

SCALE OF ENGLISH STATUTE MILES.
0 50 100 200 300 400 500 600 700
APPROXIMATELY 220 MILES TO ONE INCH.
KILOMETERS.
0 50 100 200 300 400 500 600 700 800

Capitals of Countries: ⊛ Capitals of States, Provinces, Departments and Territories: ◉
Railroads:
Telegraph Lines:

COPYRIGHT, 1902, BY DODD, MEAD & COMPANY.

ly to France), 9,728,202 pounds; and hides (almost entirely to New York), 3,911,600 pounds. Other important exports were fustic, divi-divi, deer and goat skins, rubber, tobacco, cattle (to Cuba), copaiba, balata gum, and gold. The total exports of gold in 1899 amounted to 42,315 ounces. The exports of Venezuela to the United States in 1901, consisting largely of coffee and hides, and in value exceeding one-half of the whole, amounted to $6,645,848, more than a million less than those of 1898, but surpassing by some $350,000 those of 1902. The following table shows (in bolivars equaling francs) the changes in the commerce of the Republic between 1890 and 1900, exports and imports having greatly decreased since, owing to the blockade by German and English fleets:

	1890	1895	1898
Imports........................	83,614,411	97,500,000	42,797,500
Exports........................	100,917,338	111,455,000	74,497,550

The principal imports of Venezuela from the United States are cotton goods, iron goods, machinery, petroleum, provisions, chemicals, and flour; from Great Britain, cotton and linen manufactures, woolens, jute goods, and ironware; from Germany, hardware and beer; from France, wines and oils. The United States supplies about 44 per cent. of the imports.

Government. The Constitution of Venezuela, adopted in 1830 and amended in 1864 and 1881, was changed March 29, 1901. This recent change has been further complicated by the foreign and domestic difficulties that, since its inception, have beset the present Administration. In general, Venezuela may be said to be a federal republic, organized somewhat on the model of the United States, but allowing greater autonomy to the separate States. The executive power is vested in a President, elected for six years. Under the previous Constitution the Congress elected for two years a federal council of nineteen members, and this council from its own number chose a president, who was also President of the Republic. The council and President were ineligible for a succeeding term. The legislative powers are vested in a Congress, composed of a Senate of forty members (two from each State) and a Chamber of Deputies, each Deputy representing 40,000 inhabitants (or a majority fraction). Under the former Constitution the Senate was composed of three members from each of the eight States and the Chamber of Deputies of one member for each 35,000 inhabitants, although the largest number of Deputies ever reported was 52. Senators and Deputies are elected by popular vote for six years, and qualified electors must be 21 years of age. The federal judicial power is vested in a Federal High Court and a Supreme Court of Appeal. By the Constitution of 1864 the States numbered 20; in 1881 by combination these were reduced to eight States, eight Territories, two national settlements, and a Federal District. By the new Constitution the twenty States of the Constitution of 1864 are restored. The States are practically autonomous in all local affairs, each with its own executive, legislature, and judiciary, and with local executive and judicial officers for the separate municipalities. In general the course of justice in civil and criminal matters is dilatory and ineffective. Carácas is the capital.

Finances. The revenue and expenditures of Venezuela for the year 1901-02 balanced at 37,000,000 bolivars, or francs. Two-thirds of the revenues are derived from customs. The chief expenditures are for the Finance and the War and Marine Departments. The foreign debt in 1902 was computed at £5,262,077 and the outstanding internal debt amounted to about £4,300,000. In addition Venezuela has incurred various very troublesome claims from foreign powers by reason of interference with the property rights of foreign residents. (See *History* below.) The bank of Venezuela and the Bank of Carácas are the leading financial institutions, with a combined capital of about £800,000. The former is the main bank of issue, and to some extent transacts the business of the Government. The metric system is in legal force, but the Spanish weights and measures are commonly employed.

Defense. See under ARMIES.

Population. The population in 1891 was 2,317,627. It was estimated in 1894 to have increased by about 130,000, but a deduction must be made on account of the territory lost in 1899. The foreigners number about 50,000, mostly Spaniards. In 1891 the Indian population was estimated at 66,000 independent, 20,000 semi-civilized, and 240,000 civilized. In no South American country has there been such a complete admixture of the Spanish, native, and negro elements. There are very few pure native whites or pure negroes. Most of the population is gathered in the agricultural and mountainous sections of the northwest. The leading cities are Carácas, Valencia, Maracaibo, and Barquisimeto.

Education and Religion. The early culture of the people of Carácas, commented upon by Humboldt, gained for that city the title of 'the Paris of Latin America,' and Venezuelan writers have occupied a brilliant position in the Spanish-American literary field. (See SPANISH-AMERICAN LITERATURE.) In 1870 education was made free and compulsory. The town schools are fairly well kept up, but in the country districts there is a great indifference shown toward education. Possibly 25 per cent. of the population can read and write. For primary instruction there are about 1450 Federal and 150 State schools. There is a central university at Carácas and there are five universities in other parts of the Republic. The University of Carácas has a school of engineering and other professional schools, an observatory, and a national library. The State religion is Roman Catholicism, but other forms are tolerated, though most of the Protestants (over 4000) are foreigners.

History. The coast of Venezuela was first sighted by Columbus during his voyage of 1498, and a year later Ojeda and Vespucius examined it more carefully, giving to it the name of 'Little Venice' on account of some Indian villages which they observed built upon piles or stakes in Lake Maracaibo. In 1527 Juan Ampues, who was sent from Santo Domingo to settle some differences between the Indians and a small Spanish colony, founded the city of Coro, which remained the seat of government until 1576, when it was transferred to Carácas. About the time of the establishment of Coro, Charles V., whose European wars had obliged him to borrow extensively, agreed with the Augsburg banking and merchant firm of the Welsers to grant them the entire Province of Venezuela, in return for advances of money. In 1528 Ambrose Alfinger sailed for the colony, with a force of 400 adventurers, representing the new rulers. Disappointed in the expectation of finding mines of gold ready to be exploited, he and his successor, George Spira, who brought over another body of retainers in 1533, raided the interior regions for produce, enslaving the natives, and demoralizing the whole country, so that in 1545 Charles V. rescinded the grant. The country was now intrusted to a governor sent from Spain. The rest of the sixteenth century was marked by exploring expeditions, the founding of settlements and cities, and wars with the natives. Early in the seventeenth century the Biscayan merchant organization, Compañía Guipuzcoana, secured the right to control the Venezuelan trade, on condition that it put an end to the illicit trade with Curaçao and chance foreign ships. For fifty years this worked fairly well, but eventually the Compañía found it more profitable to enter into arrangements of mutual advantage with the Curaçao merchants. This soon led to great popular opposition, threatening civil war in 1748, but the Compañía maintained its hold until 1778. The nominal government was in the hands of a Captain-General, subordinate to the royal audiencia at Santo Domingo, for most of the time down to 1786, when an independent audiencia was established at Caracas.

The history of the war for independence against Spain in Venezuela is to a great extent the record of the careers of Miranda and Bolivar. After the failure of the expedition of 1806, Miranda retired to London, where Bolivar found him and took him back to Venezuela, to become the military leader of the patriots. A popular uprising gave the revolutionists command of the capital, and on April 19, 1810, the local council at Caracas deposed the royal Governor and selected a junta or council to rule during the regency in Spain. The next year Bolivar led a popular demonstration which culminated in a formal manifesto or declaration of independence and the proclamation of a republican constitutional government. Meanwhile, Don Domingo Monteverde took command of the royalist forces and gradually gained the upper hand over the patriots. The fortress of Puerto Cabello was betrayed to him, and Bolivar was forced to retire to La Guaira. Miranda, unable to maintain an army in the field, concluded a peace, July 29, 1812, and joined Bolivar, by whom he was arrested and handed over to the Spanish commander. Bolivar took refuge in Cartagena, raised an army, and in August, 1813, reentered Caracas in triumph. In 1815 he was forced to retire to Jamaica, but in January, 1817, he returned, established a government at Angostura, and had himself elected President or dictator, a position which he succeeded in making secure by December, 1819, when the Congress at Angostura elected him President of Colombia, representing a new republic embracing Venezuela and New Granada. On June 24, 1821, the decisive victory of Bolivar and Paez (q.v.) at Carabobo over the royalist army practically ended the Spanish domination in this part of South America. In 1829 Venezuela, under the influence of Paez, seceded from Colombia and constituted itself an independent republic. The subsequent history of the country was uneventful until 1846, when an era of insurrections and civil wars began between the conservative and liberal factions, which lasted, with scarcely a break, down to 1870. In 1854 a law for the abolition of slavery was enacted. In 1864 a federal constitution was adopted.

The current of Venezuelan affairs has been often affected by disputes with the Dutch and English concerning the boundary between Venezuela and Guiana. When the Republic succeeded to the title of Spain, in 1821, the boundary between Venezuela and Guiana was somewhere between the Essequibo and the Orinoco. Spain claimed to the former river, while prospectors and adventurers of all nationalities roamed through the intervening region. English and Dutch settlers had established themselves throughout the region drained by the lower Essequibo, bringing that section practically under the British Government. The rest of the region between the two rivers appears to have contained very few permanent settlements. In 1839-40 a British agent, Schomburgk, traversed this country and mapped it, laying down a boundary line which gave to Guiana the larger part of the territory. Venezuela promptly protested, and in 1844 England disclaimed any responsibility for, or official character in, the Schomburgk line. Six years later, the agitation having been maintained by the Venezuelan agents, a truce was entered into by which both parties agreed to keep out of the disputed area and, as Venezuela understood it, recognized the *de facto* line which had been first laid down in 1768, when the Dutch were driven out of their attempted settlements on the Orinoco and limited to the region beyond the Moroco River. The truce lasted until 1879-80, when each party accused the other of violating the agreement. In 1887 England occupied the main mouth of the Orinoco and fortified her position there. Venezuela promptly broke off all diplomatic relations. Realizing the hopelessness of contending with Great Britain in arms, the Venezuelan Government decided to resort to public opinion. An agent was sent to the United States, who spread abroad pamphlets and statements, and interviewed newspaper men and politicians, and in December, 1894, President Cleveland recognized the widespread public interest in the dispute by an allusion to it in his annual message to Congress. A year later, the British Government having notified the United States that it had nothing to arbitrate with Venezuela, a special message, sharp in its tone with regard to Great Britain, was sent by Cleveland to Congress, leading that body to appropriate funds ($100,000) for a commission to investigate "the true divisional line between Venezuela and British Guiana." In November, 1896, before the commission had reported, Great Britain yielded to the demand of the United States for arbitration. Eventually, in February, 1897, an agreement was reached and a treaty of arbitration duly signed. The arbitration tribunal made its award on October 3, 1899, drawing a line between the claims of the two neighbors, of whom Venezuela was apparently the less satisfied. Consult the *Report* of the Venezuelan Boundary Commission (Washington, 1897), especially the *Official History* of the dispute; British *Blue Books* and

United States Congressional documents for 1894-99.

Internally the close of 1897 witnessed the beginning of a period of political turmoil in Venezuela. In September of that year General Ignacio Andrade was chosen President, to be inaugurated in the following February, and immediately after the election a plot against him, engineered by Señor Hernandez, was discovered. A revolt followed, but it was crushed. In the summer of 1899 General Cipriano Castro led a revolt, defeated the Government troops in a series of sharp engagements, and in October entered Carácas at the head of an army and proclaimed himself provisional President. Andrade fled and the revolutionary Government was securely established, but hostilities were continued throughout 1900. In March, 1901, Castro was elected President by the Venezuelan Congress to fill out Andrade's unexpired term. With the renewal of the Liberal revolt in Colombia, in the success of which Castro was interested, disturbances increased in Western Venezuela and there was more or less actual fighting between Venezuela and Colombian troops, although war was not officially declared. In Venezuela itself innumerable insurrections, directed by the Conservative leader, Matos, from his retreat in Trinidad, occurred in every part of the country, and it was probably only these troubles at home that deterred Castro from declaring war on Colombia. During the first ten months of 1902 the rebels fought on with varying success. In September the Castro Government appeared to be on the point of falling, but after a three days' battle near Victoria on October 13th the revolutionists were signally defeated and their army dispersed. Almost immediately the international complications which had been threatening for several years reached a crisis. For some time France, Germany, Great Britain, and other countries had been pressing for the satisfaction of certain claims, resulting from a great variety of causes, including losses to the property of foreign residents through the successive revolutions, and the non-payment of principal and interest on debts contracted for public works. In the latter category German capitalists were the chief losers. During the summer a settlement was arranged with France. But the British and German governments became more importunate in their demands, and reached an agreement to act together, and to take means to collect their debts forcibly if they were not at once satisfied. By December 7th plans for a joint naval demonstration had been perfected and the British and German ministers filed the ultimatums of their governments and left Carácas. On December 9th the allied naval forces seized a number of Venezuelan gunboats, and on the following day the allies instituted what they termed a 'peaceful blockade' of the Venezuelan ports. On December 11th Italy became a party to the blockade. On December 13th the allies bombarded Puerto Cabello, and Castro, convinced of the hopelessness of resistance, requested Herbert W. Bowen, the American Minister, to begin negotiations for a settlement. On December 17th Mr. Balfour, the British Premier, declared himself in agreement with the contention of the United States that there could be no such thing as a 'peaceful blockade,' and that a state of war therefore actually existed. Three days later an effective blockade was proclaimed. Germany, Great Britain, and Italy then joined in a request that President Roosevelt act as arbitrator. This he declined, with a counter-proposition that the dispute be submitted to the International Court of Arbitration at The Hague. This proposal was finally acceded to, Castro signifying his assent on the last day of 1902. Subsequent negotiations at Washington perfected the details of the arrangement.

BIBLIOGRAPHY. Bates, *Central and South America* (London, 1882); Barry, *Venezuela* (ib., 1886); Karsten, *Géologie de l'ancienne Colombie bolivarienne Venezuela* (Berlin, 1886); Landaeta Rosales, *Gran recopilación geográfica estadística e histórica de Venezuela* (Carácas, 1889); Child, *The Spanish American Republics* (New York, 1891); Vizcarrondo Rojas, *Reseña geográfica de Venezuela* (Carácas, 1895); Bureau of American Republics, *Venezuela* (Washington, 1892, 1895); Curtis, *Venezuela* (New York, 1896); Scruggs, *The Colombian and Venezuelan Republics* (Boston, 1900); Sievers, *Venezuela und die deutschen Interessen* (Halle, 1903); *British Foreign Office Diplomatic and Consular Reports* (London); Biggs, *History of Miranda's Revolution* (ib., 1809); Ducondray Holstein, *Memoirs of Bolivar* (ib., 1830); Flinter, *Revolution of Carácas* (ib., 1829); *Report of the Venezuelan Boundary Commission* (Washington, 1897).

VENEZUELA, GULF OF, or GULF OF MARACAIBO. An inlet of the Caribbean Sea in the northwestern part of Venezuela (Map: Venezuela, C 1). It is confined between the peninsulas of Goajira and Paraguana, which approach so as to leave an opening 50 miles wide. Within this the gulf has a length of 165 miles from east to west, and a width of 50 miles. In the south it communicates by a narrow passage with the Lake of Maracaibo (q.v.), which occupies a portion of the same lacustrine basin, the two sheets of water being separated by very low peninsulas.

VENGEANCE, väɴ'zhäɴs', LE. A French frigate of 54 guns, disabled by the *Constitution* under Commodore Truxton in 1800.

VENIAL SIN (OF. *venial*, Fr. *véniel*, from Lat. *venialis*, pardonable, from *venia*, pardon). A term denoting, in Roman Catholic theology, the less heinous class of offenses against the law of God, as distinguished from those which are called mortal. (See MORTAL SIN.) Venial sins only weaken and diminish, but do not utterly extinguish sanctifying grace in the soul. Sins may be venial either objectively or subjectively; objectively, when the 'object' of the law, or what is technically called the 'matter' of the sin, is light or trivial, as in the case of a petty theft, a slight departure from truth, or a passing ebullition of impatience or anger; subjectively, when, even though the 'matter' or 'object' is grave, there is but imperfect advertence, or not full consent, on the part of the subject or agent, as in the case even of a grievous injury done without full knowledge or intention on the part of the agent, or without full and deliberate consent. It is held that venial sins, on repentance, may be remitted by prayer or by the use of sacramentals (q.v.), without recourse to the sacrament of penance, which is ordinarily necessary in the case of mortal sin. Catholics hold that persons dying in a state of venial sin are not excluded forever from heaven; but the soul departing from life so stained with venial sin is compelled to undergo a purification in purgatory.

VENICE. A port of Italy, the capital of the Province of Venice, 164 miles by rail east of Milan, situated on 120 small islands in the lagoon between the mouths of the Piave and the Po (Map: Italy, G 2). The railway enters over a causeway 2⅓ miles long. The city is seven miles in circumference. A long narrow line of low sand dunes (*lidi*, fortified by masonry) protect it from the open sea on the east. The lagoons are classed as laguna viva, where the tide rises and falls a little over two feet, and the shallow laguna morta, where the water remains about at one level and is somewhat stagnant. At times the winds cause the waters to rise several feet, so that even the main squares of Venice are submerged. The climate is warm in summer and more or less raw and foggy in winter. The mean annual temperature is 56½° F. The city is, however, much frequented as a winter residence, due in part to its freedom from noise and dust. The annual rainfall averages 30.1 inches.

Venice is the most unique and beautiful of cities. It lies like a mirage of marble in the waters of a sea where, under the Italian sun, the constant shifting and massing of lights are magical. Venice outwardly and richly reflects the fact that it had a great school of art. In architecture and in painting it shone particularly, and always distinct from the mainland. It represents in full flower the transition from the Byzantine ideals to the Renaissance through the Romanesque and the Gothic in its numerous notable palaces, public edifices, and churches. These structures are distinguished by their many loggie and colonnades, by their wealth of exterior decoration and colored surfaces; while the interiors are enriched by the brushes of the superb Venetian colorists—Bellini, Giorgione, Palma Vecchio, Titian, Paris Bordone, Tintoretto, and Paul Veronese. Venice yielded but slowly to the rococo invasion. Sansovino, Palladio, and Sammicheli were the prominent figures among the Venetian architects.

The city, with its weather-stained façades, its many decaying edifices, and indolent existence, affects one with an indefinable but fascinating sadness and lethargy. It contains about 16,000 buildings. Its foundations are piling. Over 150 canals curve among its houses and serve for streets and are spanned by some 400 bridges, nearly all of stone. The famous black gondolas and small steamers take exclusive place of horses and vehicles. But the city is also thoroughly penetrated by paved streets and tortuous, picturesque lanes, and abounds in small squares (campi). Venice mainly lies in a compact form, with the Grand Canal (q.v.) zigzagging magnificently through its centre from the railway station in the northwest to the Doge's Palace in the southeast. A large arm of the city extends east. Along the south side of the city, and separated by the wide Canal della Giudecca (nearly a quarter of a mile in breadth), is a long inhabited island called the Giudecca.

The great centre of interest is the far-famed Piazza of Saint Mark (for illustration, see SAINT MARK'S), with the cathedral and also the Doge's Palace occupying the eastern portion—the latter abutting upon the broad Canale di San Marco. West of the Doge's Palace is the open space called the Piazzetta, reaching to the water. West of this is the long Procuratie Nuove (or, in its extended form, the royal palace); while along the north side of the Piazza extends the long Procuratie Vecchie, and on the west of the Piazza stands the Atrio, dating from 1810. This Piazza presents notably three distinct types of architecture, Byzantine (the cathedral), Italian Gothic (the Doge's Palace), and Renaissance (the Procuratie). The Procuratie were the residences of the nine Procurators, high dignitaries of the ancient city. The old wing dates from 1496, the new from 1584. Along these two buildings and the Atrio (Nuova Fabbrica) runs a continuous arcade containing shops and cafés. At night the square is occupied by a picturesque throng of promenaders, and when the band plays and there is moonlight the whole seems like the scene of an enchanted dream. A feature of the Piazza by day is the immense flock of pigeons which throng about any one willing to feed them.

At the cathedral end of the Old Procuratie is a curious clock tower, built in 1496, and forming the portal over the entrance to the busy Merceria. On its top, in the open, are two bronze colossi which strike the hours on a large bell. The royal palace is interesting for the section which formerly contained the library, a superb edifice, the work of Sansovino, facing the Piazzetta. It is distinguished by the colonnades and columns, the lighter Ionic gracing the upper part. The caryatides, metopes, and, in the fine interior, the ceiling frescoes by Venetian masters, fix the attention. At the corner of the library rose the famous Campanile of Venice, which fell July 14, 1902. It was a detached square structure, 322 feet high. Its origin is traced back to 888. A new one will rise in its place. In front of the cathedral stand three ancient splendid pedestals the masts of which formerly bore the colors of the Republic. Adjacent, on the north side of Saint Mark's, is the tomb, supported by lions, of Manin, President of the Republic of 1848. On the front gallery of Saint Mark's stand the four beautiful gilded bronze horses ascribed to Nero's triumphal arch in Rome. They were carried off by Napoleon to Paris, but restored in 1815. On the south side of the cathedral, in the Piazzetta, are two ancient square pilasters with Greek inscriptions, which have stood here since the middle of the thirteenth century. The Pietra del Bando is near, a block of porphyry whence the decrees of the Republic were announced. At the opposite end of the Piazzetta rise the two granite columns brought from the Orient in 1180, surmounted by figures of Saint Theodore on a crocodile and the Winged Lion of Saint Mark.

The interior of Saint Mark's (q.v.) is chiefly memorable for its wonderful mosaics. The Doge's Palace (q.v.) holds many of the finest pictures in Venice. In the rear of the palace, and crossing a narrow canal from the second story, is the noted Bridge of Sighs (q.v.), connecting with the prison. The bridge was completed in 1605, and is architecturally attractive. The prison is used nowadays, but the horrible places of confinement under the palace ceased to exist in 1797. The mole separating the palace from the lagoon connects with the wide and busy Riva degli Schiavoni. This marble quay, a favorite place of the

Venetians, extends easterly some distance, lined by hotels, shops, etc., on one side, and the water on the other. Not far to the northeast of the cathedral is Santa Maria Formosa, famous for Palma Vecchio's masterpiece, Saint Barbara—an altar picture. The district abounds in palaces. Still farther north, near the lagoon and adjacent to the excellent municipal hospital, is the large and splendid Church of Santi Giovanni e Paolo, of the fourteenth century, a domed and columned structure in Italian Gothic. It is one of the principal attractions of Venice. It was the funeral church of the doges, and holds a number of their imposing tombs. Some of these monuments are rare examples, the finest perhaps in the city being that of A. Vendramin. Northeast is the Scuola di San Marco, now a hospital, a fine structure of the best Venetian period. In the vicinity stands the lofty and splendid bronze equestrian statue of Bartolommeo Colleoni. This monument, by Andrea Verrochio, shares with that of Gattamelata, in Padua, by Donatello, the honor of being unsurpassed in the world. To the east, toward the arsenal, is the San Giorgio degli Schiavoni, with the Carpaccio paintings, which are elaborately described by Ruskin. In this eastern arm of Venice are the arsenal and the public gardens, the former dating from the beginning of the twelfth century. The arsenal, long the finest in the world, employs 6000 men, and has been extended and largely improved. Its museum is interesting for a model of the system of piling on which the city stands and for the model and slight remains of the famous Bucintoro—the sumptuous craft of state from which the Doge on Ascension day cast the ring into the waters, in the act of wedding the city to the sea. The public gardens are small but attractive. Adjacent is the Church of San Pietro di Castello, which was the Cathedral of Venice until 1807. Hence islands extend eastward in the direction of the fashionable sea resort of the Lido, one of the finest beaches in the world.

Following the course of the Grand Canal (q.v.) from the Royal Garden by the Piazzetta to the railway station, there may first be noted the imposing Church of Santa Maria della Salute, begun in 1631. It rises into a dome, with rich adornments, and contains good works by Titian. The adjacent Seminario Patriarcale includes in its small art collection one of the two (putative) Giorgiones left in Venice. Farther on comes the renowned Academy of Fine Arts. It presents a series of Venetian canvases from the earliest down to those of Tiepolo. The great masters of color are here seen to good advantage. Bellini is represented by his "Madonna of the Trees;" Titian by his masterpiece the "Assumption of the Virgin," and the "Presentation in the Temple;" Paul Veronese, with the "Supper in the House of Levi;" Tintoretto, with his "Miracle of Saint Mark;" Paris Bordone, with his "Fisherman and the Doge;" and Carpaccio, with his remarkable series of "Scenes from the Story of Saint Ursula and Her Virgins." The Palazzo Rezzonico, with columned balconies, where Browning died; the Palazzo Mocenigo, where Byron lived; the splendid Palazzo Grimani, a Renaissance structure by Sammicheli; the Palazzo Loredan, whose praises were sung by Ruskin, are noted along the canal before reaching the celebrated Rialto Bridge. The Rialto (q.v.) is lined with shops, and is a scene of busy interest. The district is identified as the original site of the city. Beyond, continuing the course of the Grand Canal, are seen the markets, the celebrated Ca' d'Oro; the Vendramin Palace, with an imposing façade, where Wagner died; and the Fondaco de' Turchi opposite, with the Municipal Museum, which contains specimens of the art industries of Venice, antiquities, some good pictures, etc. Diagonally opposite the railway station is the small but pleasant Papadopoli garden. In the region to the north are found the old and new ghetto, the Church of the Madonna dell' Orto, with admirable pictures; and the baroque Jesuit Church, containing Titian's "Martyrdom of Saint Lawrence."

The district of the Merceria—the principal shopping street, and connecting the Piazza of Saint Mark with the Rialto—is full of interest. To the north is the Renaissance Church of San Giovanni Crisostomo containing good altar-pieces by Bellini and Sebastiano del Piombo. To the southwest of the Merceria are the famous theatres, the classic Fenice, the Rossini, the Goldoni—the first seating 3000 persons, but open only between Christmas and Lent; and the fine domed Church of San Salvatore, finished in 1534 and containing Titian's "Annunciation." Directly west of the Piazza of Saint Mark's is the Calle San Moisè, a lively shopping street.

In the large section of the city south and west of and beyond the edifices bordering the Grand Canal, there may be mentioned the San Giovanni Elemosinario, with Titian's striking altar-piece of the same name, and the great and handsome Frari Church, one of the wonders of Venice. It is Gothic and was begun in 1330. It is noted especially for its fine altar-pieces, and for its monuments of many important personages, including Canova and Titian. The pictures include Titian's renowned "Madonna of the Pesaro Family" and Bellini's charming "Madonna and Saints." The monastery of the Frari holds the Venetian archives—a very rare collection, with several million documents, some dating from the close of the ninth century. Farther on is the attractive Scuola di San Rocco, dating from 1517, striking for its architecture and for its mural paintings by Tintoretto. His masterpiece, the "Crucifixion," is here.

Some distance to the south is Santa Maria del Carmine, and southwest, near the Canal della Giudecca, is San Sebastiano, notable for altar pieces by Paul Veronese, and for his tomb. To the southeast stretches the long and straight Fondamenta delle Zattere. The Giudecca district opposite has the island of San Giorgio Maggiore at its northeast end, opposite the Doge's Palace. On this island is the fine domed church of the same name, a creation of Palladio in the middle of the sixteenth century. Its campanile affords one of the best views to be had in Venice. On the island of the Giudecca is another noteworthy church by Palladio—the Redentore, of much interest to architects for special features. Interesting excursions can be made to the island environs of the city. Murano (q.v.) lies to the north, beyond the island of the cemetery. Torcello (q.v.) merits a visit. About two miles southeast of the city is the island of San Lazzaro, the seat of an Armenian archbishopric and monastery with which are connected extensive educational and publishing institutions.

INDUSTRIES AND COMMERCE. The manufactures, commerce, and wealth of Venice have latterly greatly increased. It manufactures heavy machinery, clocks, cotton and woolen goods, and chemical fertilizers. Shipbuilding and the manufacture of torpedoes are also prominent industries. (The arsenal is mentioned above.) The glassware and glass-bead industries, once so flourishing and then so inferior, are now prosperous, and are increasing both in the amount and the variety of their products. The fine artistic goods of Venice—its famous lace, brocades, tapestries, wood carvings, mosaics, bronzes, jewelry, etc.—are once more becoming prominent in the world's markets. The glassware is manufactured on the island of Murano, the lace chiefly on the island of Burano—both north of the city. The Venetian shops are among the most famous in Europe. Most of the trade is transit. In 1901 there entered and cleared 3206 vessels, of 1,778,261 tons. Venice is the seventh Italian port in volume of traffic. Vessels drawing 24 feet can enter at the city's quayage, which is large and constantly being extended. In the western part of Venice is situated the excellent modern maritime station, lined by moles and having basins, warehouses, custom houses, railway connections, etc. Important enlargements are to be made to these facilities. Inland navigation is being promoted, and more iron steamers are being constructed. The sea channels have also been greatly improved.

ADMINISTRATION. For administrative purposes the city is divided into six districts. The budget has constantly gained in surplus. The public debt was only about $1,350,000 in 1895, and bids fair to be extinguished in the near future. Since 1880 the rebuilding and restoration of the decayed and unhealthful sections and houses of the city have been carried on, and thorough improvements of every kind are under way. The reconstruction plan has embraced some twenty-five projects, about half of which have been already carried out. Important new streets have been built. The hygienic conditions have been carefully tested and are constantly watched and improved. An aqueduct passing under the lagoon now provides good drinking water.

POPULATION, EDUCATION, AND CHARITIES. The population in 1901 was 151,841. It was over 200,000 in the period of the city's greatness, and fell to less than 100,000 about 1800. Venice is now the ninth Italian city in size. There has been latterly radical improvement in the conditions of the elementary schools. Among the educational institutions not already mentioned are the Manin Institute, a patriarchal seminary, the Scuola Superiore di Commercio, and a Protestant house for boys. There are many private educational institutions. Venice has a royal academy of fine arts, a gallery of modern art, and other permanent exhibitions. The International Art Exhibition is held biennially. The charitable institutions number about 180. Some thirty are managed by the municipality, the rest by the clergy.

HISTORY. The islands which later formed Venice served as a refuge for the inhabitants of Aquileia, Padua, and the neighboring cities during the barbarian migrations. The invasion of Attila (452), the campaigns of Belisarius against the Goths, and the invasion of the Lombards (568) drove many fugitives to the lagoons. The date commonly assigned for the foundation of Venice is 452, but the beginnings of its history are veiled in obscurity. In 466 twelve tribunes were chosen for the twelve principal islands; in 568 four bishops established their sees on the islands; and in 584 twelve additional tribunes were elected with greater power than the twelve previously chosen. For the next century Venice was practically independent of, although formally subject to, the Eastern Empire. It had continually to fight against the Slavic pirates of the Dalmatian coast and the Lombards on the Italian mainland. These wars and internal dissensions led to the appointment of a common head, the first Doge, in 687. During the following century the islands were still disturbed by internal dissensions, but the danger caused by the attack of Pepin, son of Charles the Great, in 810, brought unity and led to the choice of the Rialto, in the midst of the lagoons, as the seat of government. In 828 the reputed body of Saint Mark, who became the patron saint, was brought to Venice from Alexandria. Attacks by Saracens in 836 and by Hungarians in 900 were repulsed. Orseolo II., who became Doge in 991, made a commercial treaty with the Saracens, thus beginning the long-continued policy of Venice of trading with the Mohammedans rather than fighting with them. Orseolo's reign was marked by a great expansion. He conquered the Dalmatian pirates and assumed the title of Duke of Dalmatia. This victory was celebrated annually by the *Sposalizio del mar* (espousal of the sea), in which the Bucentaur (q.v.) was later the central feature. The family of Orseolo attempted to make the dogeship hereditary, and this led to a revolution. Two privy councilors (later six) were appointed to assist the Doge, and the latter was compelled to invite (*pregare*) the assistance of prominent citizens. This was the germ of the *Pregadi* or senate. The Crusades greatly promoted the growth of Venice as a commercial State. Under Enrico Dandolo (q.v.) she played the leading rôle in the Fourth Crusade, which ended in the conquest of Constantinople in 1204. She received a large share of the Eastern Empire, and became the strongest power in the Mediterranean. Constitutionally the period was marked by the creation of the Grand Council in 1176, destined to curb the power of both the Doge and the people in the interest of the wealthy citizens. In the thirteenth century the Doge's power was lessened, and in 1297 by the closing of the Grand Council to new-comers the oligarchy of nobles secured supreme power. The conspiracy of Tiepolo (q.v.) in 1310 against the rule of the oligarchy led to the appointment of an executive committee, the Council of Ten, which was made a permanent body in 1335. The Ten, although renewed by election each year, became the real governing force in the State. With some changes and additions the government retained the form then fixed until the fall of the Republic. The Grand Council may be said to have contained the whole body politic. The roll of the noble families who were entitled to representation in the council was called the Golden Book. (See LIBRO D'ORO.) Above it were the Senate or *Pregadi* of 160, the chief legislative body, and the Council of Ten with executive and judicial functions. Still higher in power was the college or cabinet of 'sages,' who prepared the State business for the Senate or the Ten. Above the college were the six ducal councilors, who really performed the chief duties of the Doge. The Doge presided over all these bodies. His position was magnificent; his powers were strictly limited. The history of Venice in the thirteenth and fourteenth centuries was marked by struggles with her colonies, with Genoa, and with the Carrara family, who held Padua. Her colonies were reduced to subjection; her great rival, Genoa, was humbled by the war of Chioggia (1378-80); the Carrara were finally forced to become vassals. In these struggles, some of which were almost fatal to her existence, Venice was forced to build up a land empire in the north of Italy as a base of food supplies. By 1405 she held Treviso, Padua, Vicenza, Verona, and the adjacent lands. Brescia and Bergamo were soon after annexed. In 1473 Cyprus came under Venetian dominion. At this time Venice was the leading maritime State of Christendom. She traded with the whole civilized world. The State owned 3300 vessels, manned by 36,000 men. Venice had become a city of merchant princes, who lavished their wealth upon magnificent palaces and the patronage of painters and sculptors. But her success on the mainland aroused new enemies; after the fall of Constantinople in 1453 the Republic had to face a struggle with the Turks, in which she lost gradually most of her possessions in the Morea and the Archipelago; the discovery of the sea route to India by way of the Cape of Good Hope (1497-98) gave a fatal blow to her commerce, and corruption began to appear in the city itself. Outwardly this was the most splendid period in her history; in reality her power was already waning. The decisive blow came in 1508, when the German Emperor, the Pope, France, and Spain combined against Venice in the League of Cambrai to divide her dominions among themselves. In the struggle Venice at one time had lost all of her possessions on the mainland, but by diplomacy she detached one power after another from the League, and in 1516 she again held all her former possessions; but she never regained her former power. From this time, protected by the impregnable position of the capital, she exerted herself by diplomacy merely to retain her position. Only in the East did Venice show her old energy. There, almost single-handed, she struggled against the Turks, but in vain. In 1571 she lost Cyprus, although she and her allies won the naval battle of Lepanto. In 1669 Crete was lost after a war of twenty-five years. In 1718, by the Peace of Passarowitz, the Morea, after having been for a short time again in the possession of the Republic, was ceded to Turkey. The morals of the citizens declined steadily, and in the eighteenth century Venice was a city of pleasure for the rest of Europe, and was marked by its constant fêtes and extravagant life. In 1797 the Venetian Republic was extinguished by Bonaparte, and in the Peace of Campo Formio (q.v.) most of its possessions (including Istria and Dalmatia) were transferred to Austria, France taking the Ionian Islands. In 1805 Austria was compelled to cede her Venetian dominions to the Kingdom of Italy. She regained them in 1814, and in 1815 Venetia and Lombardy were constituted the Lombardo-Venetian Kingdom. In 1848 Venice revolted under Daniele Manin (q.v.), but in 1849 Austrian dominion was reëstablished. In 1866 Austria relinquished Venetia, which was incorporated with Italy.

BIBLIOGRAPHY. Romanin, *Storia documentata di Venezia* (10 vols., Venice, 1853-61); Hare, *Venice* (London, 1884); Wiel, *Venice* (ib., 1894); Molinier, *Venise, ses arts décoratifs, ses musées* (Paris, 1889); Brown, *Venice* (New York, 1893); Papadopoli, *Le monete di Venezia descritte ed illustrate* (Venice, 1893); Balten and Geuter, *Venedig* (Linz, 1895); Molmenti, *Venezia* (Florence, 1897); "Reading List on Venice," in *New York State Library Bulletin Bibliography*, vol. vii. (Albany, 1898); Carew Hazlitt, *The Venetian Republic* (London, 1900).

VENICE PRESERVED. The greatest work of Otway, a tragedy produced at Dorset Gardens in 1682 and published the same year. It was meant partly as an attack on the Whigs, Lord Shaftesbury being pilloried in the licentious senator, Antonio. The plot was drawn from a translation into English (1675) of the Abbé Saint Réal's *Conjuration des Espagnols contre la Venise en 1618*. It deals with the betrayal by Jaffier of his friends and fellow conspirators owing to his wife's frenzied entreaties that he should save her father, Antonio, who, earlier in the play, has cast her off because of her marriage with this insignificant man of the people. The play offered De la Fosse the foundation of his famous *Manlius*, which Voltaire is said to have preferred to the original.

VE'NI CREA'TOR SPIR'ITUS. An ancient and very celebrated hymn of the Roman breviary, which occurs in the offices of the feast of Pentecost, and is used at other times as a solemn invocation of the Holy Spirit. Its author is not known with certainty. It is ascribed by some ancient authorities to Charlemagne, but its correct classical metre, and the purity of its language bespeak an earlier age. It is highly probable that it is the composition of Pope Gregory I. A translation (ascribed to Cranmer) forms a part of the Anglican ordination service. The *Veni Creator Spiritus* must not be confounded with another hymn, *Veni Sancte Spiritus*, which somewhat resembles it. The latter belongs not to the breviary, but to the missal, in which it forms a sequence in the mass of Whitsunday. It is not in classical metre, but in rhyme; and its language is plainly of a later age. The author of the *Veni Sancte Spiritus* is believed to be King Robert of France.

VENIRE FACIAS, vē-nī'rē fā'shĭ-*as* (Lat., cause to come). A common-law writ directed to a sheriff, commanding him to summon a certain number of acceptable citizens of his county to serve as jurors. Formerly the selection of persons legally qualified to serve as jurors was made by the sheriff in his discretion, but in England and most of the United States to-day the requisite number is drawn by lot from a list of persons competent to serve, and the sheriff thus summons the persons whose names are thus drawn. Where a sufficient number do not respond, or are excused from attendance, the above writ may still be used in a number of States to fill up the panel. Where a trial was a nullity for some fatal defect or irregularity, the writ issued to summon a new jury was known as a *venire facias novo.* See JURY; TALESMEN.

VENLO, vĕn-lō'. A town of the Netherlands, in the Province of Limburg, on the right bank of the Meuse, 41 miles by rail northeast of Maestricht, near the southeastern frontier (Map: Netherlands, E 3). The streets are narrow and irregular. The architecture is somewhat different from that usually found in Dutch towns. The sightly town hall dates from the close of the sixteenth century. Manufacturing is active. Tobacco, tannery products, and swine are prominent shipments. Population, in 1899, 14,399.

VENN, JOHN (1834—). An English logician and antiquary, born in Hull, Yorkshire, and educated in Caius College, Cambridge. He became Fellow of Caius College and in 1862 its lecturer in moral science, and in 1869 was appointed Hulsean lecturer. Venn was elected a Fellow of the Royal Society in 1883. In the field of logic he wrote the valuable manuals, *Logic of Chance* (1866; 3d ed. 1888), *Symbolic Logic* (1880; 2d ed. 1894), and *Empirical Logic* (1889). His later literary activity was antiquarian; he was a Fellow of the Society of Antiquaries, editor of the Parish Register of Saint Michael's, Cambridge, extending over the period from 1588 to 1837 (1891), and author of a *Biographical History of Gonville and Caius College* (1897-1901) and of *Caius College* (1901).

VENTADOUR, väN'tȧ'dōōr', BERNART DE. A Provençal poet, born early in the twelfth century at Ventadour, in Limousin. He wandered to Normandy, perhaps even to England, and celebrated Eleanor of Aquitaine, the wife of Henry II. Afterwards he is found at the Court of Raimond V., Count of Toulouse, at whose death, in 1194, he retired to a convent. Bernart's songs deal entirely with love, but there is less artificiality and more true sentiment in them than is usual with the troubadours. There is no separate edition of his works; the collections of Raynouard and Mahn furnish the best accessible material. Consult: Bischoff, *Biographie des Troubadours Bernhard von Ventadour* (Berlin, 1873); Carducci, "Un poeta d'amore del secolo XII.," in the *Nuova Antologia*, vols. xxv. and xxvi.

VENTILATION. See HEATING AND VENTILATION.

VENTIMIGLIA, vân'tê-mēl'yȧ. A seaport and fortified town in the Province of Porto Maurizio, Italy, 94 miles southwest of Genoa, on the Ligurian Sea (Map: Italy, H 10). The Gothic cathedral occupies the site of a temple to Juno. The town hall has a collection of interesting relics. Viticulture and floriculture are important industries. Population (commune), in 1901, 11,500.

VENTRE DE PARIS, väN'tr' de pȧ'rē', LE (Fr., the Belly of Paris). One of Zola's Rougon-Macquart novels (1873), containing graphic descriptions of the picturesque life of the Parisian markets. It represents the extreme of Zola's naturalistic theories.

VENTRICLE. See HEART.

VENTRICULITES, vĕn-trĭk'ū-lī'tēz (from Lat. *ventriculus*, ventricle, stomach, diminutive of *venter*, stomach, womb). A fossil hexactinellid sponge of funnel or cup shape with wide central opening and thin convoluted walls, and the base pointed and provided with roots of siliceous fibres, common in the Middle and Upper Cretaceous rocks of Europe. See SPONGE.

VENTRILOQUISM. See VOICE.

VENUE (OF. *venue*, arrival, from Lat. *venire*, to come; confused in meaning with OF. *visne*, from Lat. *vicinia*, neighborhood, vicinity). In its original and more restricted meaning, the place or locality where the acts or transactions out of which an action arises occur; but the term is more commonly employed to-day to denote the county or judicial district in which an action is to be tried and the jurors selected. For the purpose of determining the proper venue, actions are classified as *local* and *transitory*. A local action is one which, from its nature, could only have arisen in a certain district, as a trespass on land. Criminal prosecutions and practically all actions relating to real property are considered as local actions, and must be tried in the county in which the facts occur or the real estate is situated. Where a cause of action is based upon facts which might easily have happened in any jurisdiction, as a contract, it is said to be transitory, and usually may be tried in any county. The English Judicature Acts practically abolish the above distinction in that country, but it still obtains in many of the United States. In most jurisdictions the defendant may make a motion for a change of venue for the convenience of his witnesses, or because he believes there could not be a fair trial in the jurisdiction in which the action is brought. The matter rests in the discretion of the court, but the fact that most of the witnesses reside in a distant county, and any other reasonable argument, will be considered in deciding the motion. In criminal cases the prejudice of the community against the defendant and the consequent difficulty of obtaining impartial jurors are frequently made the basis of a motion for change of venue. The whole matter is regulated by statute in most States. Consult the authorities referred to under PLEADING; PRACTICE.

VE'NUS (Lat., love, desire; connected with OHG, *wini*, friend, *wunna*, Ger. *Wonne*, joy, Goth. *wunan*, to enjoy, Skt. *van*, to hold dear, wish, win), or APHRODITE. In classical mythology, the goddess of love, in the widest sense. The Greek Aphrodite very probably represents a borrowed cult. The name is still unexplained, but the goddess is clearly the eastern goddess of fertility and reproduction, the Phœnician Ashtoreth (or Astarte), Babylonian Ishtar, and Arabian Alilat, whose cult was prominent throughout the Semitic world. Her worship was orgiastic and sacred prostitution was practiced at many of her temples. This goddess was especially honored at Cyprus by Greeks and Phœnicians, and thence Aphrodite seems to have come to the Greek world. Cyprus, especially Paphos, and Cythera, likewise an early Phœnician trading post, gave the goddess two of her common surnames, Cypria and Cytherea. In Greek legend, however, Aphrodite preserved little trace of her foreign origin. In Homer she is daughter of Zeus and Dione, and completely at home in the Olympian circle. In Hesiod is found the legend, which later became more popular, that she was sprung from the sea-foam which gathered about the mutilated member of Uranus. The new divinity landed on Cyprus, attended by nymphs and tritons. Under her feet flowers sprang to birth, and all nature rejoiced. Other legends told of her love for the mortal Anchises, to whom she bore Æneas, and of her amour with Ares, which was detected and punished by Hephæstus, her husband. It should be said that there are many indications of a union of Ares and Aphrodite in cult, and in some places we hear of an Aphrodite Areia, Aphrodite Nicephoros (Bringer of Victory), and armed statues of Aphrodite, though anything warlike is utterly removed from the ordinary conception. In general Aphrodite appears as the goddess of sexual love, the inspirer of passion, and the enemy of chastity, although the cult had a better side in which she was honored as a goddess of married life and chaste love, as at Sparta and near Athens. Plato and later writers sought to distinguish these two sides as the worship of the Aphrodite Urania (heavenly love) and Aphrodite Pandemus, but the distinction will not hold. Aphrodite also appears as a goddess of vegetation, especially of flowers. And this side appears in the festival connecting with Adonis (q.v.), an eastern legend of the death and restoration of a youthful favorite of the goddess. From the east, too, seems to have come her worship in many towns, especially on the coast, as a goddess of sailors, who gives them fair weather and prosperous voyages. This seems merely a borrowing from the honor paid their great goddess by Phœnician sailors. In art we find at a very early date primitive images of the eastern goddess, sometimes draped, but frequently nude. In the classical art the goddess was regularly clothed until the time of Praxiteles, whose famous Cnidian statue first represented her as nude. This type became very popular later and developed into such works as the Capitoline and Medicean statues. A clothed type is seen in the so-called Venus Genetrix of the Louvre, which probably is derived from the famous Aphrodite in the Garden of Alcamenes. Another famous statue was the Aphrodite Epitragia (riding on a he goat) of Scopas in Elis, known to us only from its appearance on coins.

In Rome Venus seems to have been originally a goddess of vegetation, especially of fruit and flowers, brought to Rome at an early date from Ardea, where she was a prominent divinity of the Latin league. Her name does not appear in the early calendars, but she was early identified with a very different goddess, Libitina, whose name was now connected with *lubido* (lust). Later, the identification with Aphrodite was completely carried out by the introduction into Rome of the worship of Venus Erycina, from the great sanctuary on Mount Eryx in Sicily. Sulla especially honored Venus Felix as a goddess of good fortune, and her worship became prominent in his colony at Pompeii. Pompey built a temple to Venus Victrix, and a great increase in the honor of this goddess developed with the Empire, since the Julian family traced their descent to Ascanius, son of Æneas, and grandson of Aphrodite. In B.C. 46 Julius Cæsar dedicated a temple to Venus Genetrix in his new Forum, and her worship was connected with that of Mars, father of Romulus, in Augustus's temple of Mars Ultor, and with that of Roma in Hadrian's temple of Venus and Rome.

VENUS. A planet whose orbit is between those of the earth and Mercury. Her mean distance from the sun is 67,200,000 miles. The eccentricity of her orbit is smaller than that of any other planet, being only 0.07; and therefore her greatest and least distance from the sun differ by only about 940,000 miles. She performs her sidereal revolution in 224.7 days, in an orbit whose plane is inclined 3° 23½′ to that of the ecliptic, but her synodical revolution requires much more time, 584 days. Between inferior conjunctions and the next superior conjunction Venus is a morning star, and between superior conjunctions and the next inferior conjunction she is an evening star. Her diameter is about 7700 miles; so that her volume is about 0.92 of that of the earth, and her mass is nearly 0.82 of that of the earth. In the telescope Venus presents phases similar to those of our moon, varying from a mere sickle of light to a complete circle. The brilliancy of the planet is at times very great, rendering her visible easily in daylight. The maximum brightness occurs thirty-six days on either side of inferior conjunction, the condition of maximum depending on the planet's phase and proximity to the earth.

The rotation period is still much in doubt, for the surface markings are inconspicuous, and it is only by showing these markings that we can fix the period. Some astronomers (Schiaparelli and Powell) think the period is one of 225 days, the same as the orbital period, and that Venus, like our moon, always turns the same side toward the centre of the orbit. Other astronomers fix the period as approximately equal to that of the earth, namely, 24 hours. Venus probably has some sort of an atmosphere, but no satellites are known. See TRANSIT OF VENUS; PLANETS; SOLAR SYSTEM.

VENUS AND ADO′NIS. An early love poem in stanzas of six lines, by Shakespeare, licensed and published in 1593, but probably written as early as 1589. It was dedicated to Henry Wriothesley, Earl of Southampton, and in the dedication is described by the author as the "first heir of my invention." The poem is marred by its licentious tone and by youthful faults of execution.

VENUSBERG, vă′nụs-bĕrᴋ (Ger., mountain of Venus). A name given as early as 1337 (in the *Children of Limburg*) and often afterwards to mountains in Swabia, elsewhere in Germany, and even in Italy. Here Venus was supposed to hold court, not inaccessible to favored mortals, who led with her a life of delight at the risk of eternal damnation. To warn them Eckhart sat at the entrance and, according to some legends, the torments of some visitants had already begun and their lamentations might on occasion be heard. This legend results from superimposing Christianity on German mythologic belief in the Earth-Mother, known with various attributes as Hel, Hilda, Hulda, and Berchta. To her attendant train of elves, wise women (now become witches), and fallen heroes, Christian superstition added unbaptized infants. The tale was further modified by the needs of the homilist into an allegory against several of the deadly sins. The first mortal visitor to the

Venusberg known to literature is Heinrich von Limburg in the already named Low German chronicle (about 1337); the most famous is Tannhäuser (q.v.).

VENUS CLAM (so called in allusion to the shape of the closed lunule). Any bivalve of the family Veneridæ, which consists of heavy, globose pelecypods, represented on all shores, and often beautifully colored and corrugated. The American 'hard clam' (*Venus mercenaria*) (see Colored Plate of CLAMS) is a typical example. Some, when viewed in section, present an outline like that of the ace of hearts, and are called 'heart-cockles.'

VENUS OF MEDICI. A celebrated statue in the Tribuna of the Uffizi (Florence), by Kleomenes, son of Apollodorus of Athens, a sculptor of the New Attic school, who probably lived in the time of Augustus. It represents the Greek goddess Aphrodite, entirely nude, as she arises from the foam of the sea. Both the face and form are of great youthful charm and beauty; but the motive is that of a maiden conscious of her charms almost to affectation. The hair was formerly gilded and the eyes were blue. The fine effect of the original is much impaired by the injudicious polishing of the marble's surface, and by a wretched modern restoration of the arms and hand. The statue is a free copy of some famous original—derived in turn from the celebrated Cnidian Aphrodite of Praxiteles (q.v.). It was found at Rome in the sixteenth century and brought to Florence from the Villa Medici in 1678. During the transportation it was broken into eleven fragments, which, however, were perfectly fastened together.

VENUS OF MILO. The most celebrated and beautiful of surviving statues of the Greek goddess Aphrodite, and perhaps the most priceless treasure of the Louvre. It is named from the isle of Melos, in the Ægean Sea, where it was found by accident in 1820. Near it was discovered the piece of an upper left arm, probably belonging to the statue, a hand with an apple, of inferior workmanship, and an inscription with the artist's name, now lost. The statue was purchased by the Marquis de Rivière, French ambassador to Constantinople, and presented to Louis XVIII., who gave it to the Louvre. It has suffered much from time and rough treatment. Both arms are gone, and the body, which is nude to the waist, and the draperies, are much battered. But so chaste and noble is the ideal and so wonderful the technical execution, that the effect is incomparable to anything else in art. She is at the same time a woman of indescribable youth and beauty and the majestic incarnation of all-powerful love.

The position of the goddess and the date of the origin of the statue are matters of dispute. The most likely explanation seems to be Furtwängler's that the advanced left foot rested upon a helmet and the goddess regarded herself in a shield supported on the left thigh. The statue was formerly ascribed to the age of Praxiteles, but the prevailing opinion now is that it belongs to the Hellenistic period, to the last half of the second or to the first century B.C. The sculptor has changed the type of the Aphrodite by Scopas to resemble the Melian Tyche, but under direct inspiration of the Phidian epoch. Numerous monographs and articles have been written on the subject; but the best discussion is by Furtwängler, *Meisterwerke der griechischen Plastik* (Leipzig-Berlin, 1893; Eng. trans., New York, 1895).

VENUS'S COMB. See CHERVIL.

VENUS'S GIRDLE. See GIRDLE-OF-VENUS.

VENUS'S FLOWER BASKET. Any of various vitreous sponges, which have a more or less fenestrated and urn-shaped form; especially one of the Oriental genus Euplectella.

VENUS'S LOOKING-GLASS (*Specularia*). A small genus of low annual herbs belonging to the order Campanulaceæ. The best known species, the common Venus's looking-glass (*Specularia speculum*), is a native of Europe and has long been a favorite in flower-gardens on account of its brilliant purple or white blossoms. *Specularia perfoliata*, a native of North America, occurs as a weed on sterile and sandy ground, and is also cultivated. It produces purple-blue flowers from May to August. Specularias thrive in any garden soil and are readily propagated by seeds sown in the spring. They often reproduce themselves from self-sown seeds.

VENUS'S LOOKING-GLASS (*Specularia perfoliata*).

VÊPRES SICILIENNES, vâ'pr' sê'sê'lyĕn', LES (Fr., The Sicilian Vespers). (1) An opera by Verdi. Its first representation was in Paris in 1855 and was not wholly successful. It was produced in London four years later, under the title of *I Vespri Siciliani*. (2) The first play of Casimir Delavigne, a comedy, originally refused by the Théâtre Français, and later performed at the Odéon, in 1819, with great success.

VERA, vā'rȧ, AUGUSTO (1813-85). An Italian philosopher, born at Amelia, in Umbria. He studied at first in Rome and then in Paris, where he devoted himself to philosophy. Afterwards he taught literature and filled various professorships of philosophy, notably at Strassburg and Paris. In 1860 he received a professorship of philosophy in Milan, and the next year a similar post in Naples. He published several philosophical works in French, Italian, and English, and some translations from Hegel, whose philosophy he introduced into France and Italy. These include: *Problème de la certitude* (1845); *Platonis; Aristotelis et Hegelii de Medio Termino Doctrina* (1845); *Introduction à la philosophie de Hegel* (Paris, 1855); *Philosophie de la nature de Hegel* (3 vols., 1863-65); *Philosophie de l'esprit de Hégel* (2 vols., 1867-69); *Problema dell' assoluto* (Naples, 4 parts, 1872-82); *Strauss et l'ancienne et la nouvelle foi* (1873); *Cavour et l'église libre dans l'état libre* (1874); *An Introduction to Speculative Philosophy and Logic* (1875); *Platone e l'immortalità dell' anima* (1881); and *Saggi filosofici* (1885).

VERA CRUZ, vĕr′ȧ krōōz, *Mex. Sp. pron.* vā′rȧ krōōs. A maritime State of Mexico, extending along the Gulf of Mexico, and bounded by Tamaulipas on the north, Oaxaca, Tabasco, and Chiapas on the south, and Oaxaca, San Luis Potosí, Hidalgo, and Puebla on the west (Map: Mexico, K 7). Area, 29,201 square miles. The narrow strip along the coast is, in general, flat and sandy, with a gradual rise toward the interior. The central portion is mostly mountainous, with an altitude of over 18,000 feet in the volcano of Orizaba, on the borders of Puebla. In the northern part of the State the interior retains the general character of the coast land, while in the south it is more mountainous. The coast is lined with numerous lagoons, including the navigable Tamiahua. The State is intersected by many short rivers, mostly unnavigable. The climate is hot and unhealthful in the larger part of the State, and temperate only in the mountains of the interior. The natural conditions are very favorable for agriculture. The products include coffee, tobacco, cacao, cereals, cotton, sugar, and fruits. Stock-raising is also important. Mining is of secondary prominence. The maritime position of the State is very favorable for commerce. Population, in 1900, 960,570, of whom about one-half are *mestizos*. Capital, Jalapa (q.v.).

VERA CRUZ. The most important port of Mexico, in the State of Vera Cruz, situated 193 miles (by rail 263) east of the capital of the Republic, on the Bay of Campeche (Map: Mexico, L 8). The city extends in a semicircle along the coast for nearly a mile, facing the fortress of San Juan de Ulúa on a rocky islet a half mile from the shore. The harbor consists of a rather narrow channel with three openings, only two of which are available for vessels of ordinary draught. Recent improvements have given the harbor ample dock facilities and rendered it safe in all sorts of weather. The situation of the city is especially unhealthful, surrounded as Vera Cruz is by sand dunes and stagnant marshes. The climate is enervating at all seasons of the year, and because of the prevalence of yellow fever Vera Cruz is called the 'City of the Dead.' Its harbor improvements, new sewage and water systems, the reclaiming of waste lands, and modern pavements will do much to remove this reputation. Architecturally the old walled city presents a pleasing appearance with regular streets and plazas and houses generally of two stories, with variegated walls and a suggestion of Moorish style. The city is provided with an artillery school, a national school of seamanship, and a public library. The Hospital Gutierrez Zamora is one of the finest in the country. In the Pasea de la Libertad there is a copy of the Bartholdi statute in New York harbor.

Fisheries and commerce employ the major portion of the inhabitants; in addition there are manufactures of cigars, preserved fruits, confectionery, furniture, brooms, and toys. The imports in 1902, consisting largely of machinery, vehicles, hardware, raw cotton, and textiles (about one-fourth coming from the United States), were valued at $20,986,602, while the exports, nearly half of which went to the United States, consisting of ores, coffee, tobacco, hides, dyewoods, and vanilla, approximated $26,598,850 (the value of the Mexican peso being considered as $0.46). Population, in 1900, 24,085.

In 1519 Cortés established the municipality of Villa Nueva de la Vera Cruz. In 1599 the settlement was transferred to its present site, where during the period of Spanish rule Vera Cruz remained the only Gulf port of New Spain. The Castle of San Juan de Ulúa was begun in 1582 and completed at a cost of 40,000,000 pesos. The city was sacked by buccaneers in 1653 and 1712. Previous to 1810 it was a centre of revolutionary activity, and later occupied a prominent position in the various civil wars that desolated Mexico. Because of its vigorous but unsuccessful defense against the French in 1838 and in 1862, and against the Americans in 1847, it gained the title 'Thrice Heroic.' During the war between Mexico and the United States, General Scott, with an army of about 12,000, landed in the vicinity of Vera Cruz on March 9, 1847, and immediately invested the city, which, together with the Castle of San Juan de Ulúa, contained a garrison of about 4500. On the 22d, assisted by a fleet under Commodore Perry in the harbor, he began a terrific bombardment, which continued with little intermission for four days. On the 29th the Mexicans surrendered. The Americans lost 11 killed and 56 wounded, and the Mexicans fully 1000 in killed alone. From Vera Cruz, in 1859, Benito Juarez promulgated his laws of reform, which made possible a free Church within a free State.

VERAGUA, vȧ-rä′gwȧ, Dukes of. The title borne by the successors of Columbus, bestowed originally upon Luis Colón (Columbus), the grandson of the discoverer. The male line became extinct in 1578 on the death of Diego, son of Luis, and the succession was settled on the descendants of Luis's sister, and in 1733 on those of Diego's sister. The present Duke of Veragua was received with great honor in the United States at the time of the World's Columbian Exposition, 1893.

VERANDA (either from OSp., OPort. *varanda*, balcony, railing, from *vara*, Lat. *vara*, rod, stick, from *varus*, bent, stretched, knock-kneed, awry). A balcony gallery, or platform on the exterior of a building, shaded and sheltered by a roof borne on light columns or posts; a piazza, in the American sense. The veranda originating in the necessities of a warm climate, has been developed in American practice into one of the most characteristic features of suburban and rural domestic architecture, of which it forms a picturesque as well as convenient element. In European practice the veranda is less important, is usually of light construction, narrower than the American 'piazza,' furnished with a gaily painted metal roof and 'apron' or lambrequin, and treated as an adjunct to rather than as an essential feature of the building. The term is not generally applied to the entrance-porch unless this is of considerable extent.

VERANDRYE, vȧ′räɴ′drē′, Pierre Gautier de Varennes de la (1685-1749). A French-Canadian explorer, born at Three Rivers, Quebec. After military service in France he returned to Canada and became distinguished as a pioneer. He built Fort Saint Pierre, west of Lake Superior, in 1731, erected Fort Saint Charles on the Lake of the Woods in 1732, and in 1733 established Fort de la Reine on the site of Portage La Prairie, near Lake Winnipeg. His subsequent expeditions extended as far west as the Rocky Mountains and as far north as the Forks of the Saskatchewan River, where he built Fort Dauphin in 1749.

VERATRINE (from Lat. *veratrum*, hellebore). A mixture of alkaloids occurring in cevadilla (the dried fruit of Asagræa officinalis), and in other vegetable products. Cevadilla is the source from which it is most readily obtained. From this it is obtained by extracting the seeds with alcohol, evaporating the extract, treating the residue with water, filtering, adding ammonia to the filtrate, and separating and purifying the precipitated veratrine. In a state of purity, veratrine is a pale gray amorphous powder, without odor, but, even in the most minute quantity, powerfully irritating to the nostrils, sometimes producing dangerous fits of sneezing. It is strongly and persistently bitter, and highly acrid; insoluble in water, sparingly soluble in spirit and ether, but readily in diluted acids. Heated with access of air, it melts to a yellow liquid, and at length burns away, leaving no residue. In France it is much used as an internal remedy for pneumonia and acute rheumatism, and for the latter its efficacy is well established. It is chiefly employed externally in the form of an oleate, or ointment, for neuralgic affections and for scrofulous diseases of the joints. It is an extremely acrid and violent poison, and must be prescribed with great care.

VERATRUM. See HELLEBORE.

VERAZZANO, vä'rȧ-tsä'nō. See VERRAZANO.

VERB (Lat. *verbum*, word; connected with Lith. *wardas*, name, OPruss. *wirds*, word, OIr. *for*, says, Goth. *waúrd*, OHG. *wort*, Ger. *Wort*, AS., Eng. *word*). In grammar, a word denoting an assertion or declaration. Of the eight so-called parts of speech (see GRAMMAR), the verb is one of the four primitive ones, the others being the noun (q.v.), the pronoun (q.v.), and the interjection (q.v.). In most languages, especially in those of the Indo-Germanic and Semitic groups, the verb is sharply distinguished from the noun not only by its function, but by its inflection (q.v.). On the other hand, the verb possesses certain affinities with the noun and the adjective, particularly in the infinitives and participles, which are nouns and adjectives respectively in form, but verbs in force. Furthermore, in many languages, as in ancient Egyptian and the Vei of the Mande Negro group, there is no distinction in inflection between the noun and the verb, as Egyptian *meḥ-a*, 'I fill;' *meḥ-ten*, 'ye fill;' *pera-a*, 'my house;' *per-ten*, 'your house;' Vei *i-ro*, 'thou sayest;' *mu-ro*, 'we say;' *i-fa*, 'thy father;' *mu-fa*, 'our father.' Certain remnants of this identity seem to survive even in Indo-Germanic, as Latin *amamini*, 'be ye loved,' a participle (compare the Greek passive participle in -μενος and the Sanskrit in *-māna*), and the occasional occurrence even in Latin of a direct object of a noun, as the Plautine *quid tibi hanc tactiost*, 'why do you touch her?' In the American Indian languages the verb tends to absorb within itself the objects and the pronouns, as in the Tarascan *hopo-ni*, 'to wash;' *hopo-ku-ni*, 'to wash the hands;' *hopo-ndu-ni*, 'to wash the feet;' *hopo-ṅgari-ni*, 'to wash the face.' The verb is normally inflected for mood, tense, voice, person, and number, and in some language-groups, as in Semitic, for gender. The number of all these categories may vary greatly in different languages, and numerous sub-conjugations, as causative, reflective, negative, and passive, are also found. In English, as in the other languages of the Indo-Germanic group, verbs are conventionally divided into transitive and intransitive, the former class requiring an object, and the verbal force of the latter being complete in itself. The mood of a verb denotes the degree of certainty of its action, while the tense expresses the time of action. If a verb forms its tenses according to one of the usual systems in a language, it is said to be regular, as in English *love, loved*, but otherwise it is called irregular, as *swim, swam, swum*. A verb is said to be active, passive, or middle (reflexive, deponent) in voice if the subject is an actor, or is the recipient of an action by another, or performs an act which affects himself. Person denotes whether the subject is the person or persons speaking, or spoken to, or spoken of, and number shows whether the subject is one, or more than one. Auxiliary verbs are those which are necessary to complete the meaning of other verbs, especially in the formation of periphrastic tenses and moods, and impersonal verbs are those which, apparently at least, have no subject.

Consult: Fr. Müller, *Grundriss der Sprachwissenschaft*, vol. i., part i. (Vienna, 1876); Von der Gabelentz, *Sprachwissenschaft* (2d ed., Leipzig, 1901); Brugmann, *Vergleichende Grammatik der indogermanischen Sprachen*, vol. ii. (Strassburg, 1889-92); Delbrück, *Vergleichende Syntax der indogermanischen Sprachen*, vol. ii. (ib., 1897); Sigwart, *Impersonalien* (Freiburg im Breisgau, 1888); Zimmern, *Vergleichende Grammatik der semitischen Sprachen* (Berlin, 1897).

VERBECK', GUIDO FRIDOLIN (1830-98). A Dutch-American missionary to Japan. He was born in Zeist, Holland, was educated there in the Moravian Seminary, at the Utrecht Polytechnic, and after going to New York, in 1852, at Auburn Theological Seminary, where he graduated in 1859, although his early training had been for a technical career. In the same year he went as a missionary of the (Dutch) Reformed Church in America to Nagasaki, Japan, whence he was transferred in 1868 to Tokio. There from 1869 to 1873 he was superintendent of teachers and instruction in the foreign department of the Imperial University, having entered the employ of the governmental educational service in 1863. He returned to missionary work in 1879, was prominent in the translation of the Bible into Japanese, taught (1891-98) in the Meiji Gakuin, and was a very successful and tactful missionary. He made many important translations, mostly legal, in behalf of the Japanese Government, and wrote a *History of Protestant Missions in Japan* (1883). Consult Griffis, *Verbeck of Japan* (New York, 1900).

VERBENA, VERVAIN (Lat., foliage, herbage, sacred bough, plant used as a cooling remedy). A genus of about 80 species of annual or perennial herbs or shrubs of the order Verbenaceæ, mostly natives of tropical and subtropical America. A number of native species are distributed through the United States, growing as weeds in waste or cultivated ground. The flowers, borne in terminal spikes, may be seen during nearly the whole summer. The cultivated varieties have creeping or spreading stems and dense spikes of large and showy flowers. They vary greatly when grown from seed and represent a wide range of color. The European verbena (*Verbena officinalis*) is a native of Europe, but has become naturalized in North America. It is an annual with small purplish blossoms in slender panicled spikes. *Verbena teucrioides*, a species cultivated in gardens for its large pinkish white flowers, sweet-scented at night, is a native of Brazil. *Verbena venosa*, also from Brazil, produces lilac flowers from June to October, and is frequently grown in beds or groups with other plants. Verbenas flourish in light garden soil, especially when fertilized with well-rotted manure. They are commonly propagated by seeds. The hard seeds of some species are steeped in warm water for an hour or two before sowing to cause a more rapid germination. The stems pegged down to the soil produce shoots from the axils of the leaves.

A CULTIVATED VARIETY OF VERBENA.

VERBENACEÆ (Neo-Lat., nom pl., from Lat. *verbena*, foliage, herbage, sacred bough, plant used as a cooling remedy). A natural order of about 70 genera and 800 species of chiefly tropical dicotyledonous trees, shrubs, and herbs, allied to Labiatæ in botanical characters, but without oil-glands on the leaves. Some are beautiful ornaments of flower-gardens and hothouses; some are highly esteemed for their fragrance. The fruit of some species, as Premna esculenta and species of Lantana, is eaten; the leaves of Stachytarpheta dichotoma or Jamaicensis are used as a substitute for tea; and the timber of several is valuable, e.g. teak (q.v.) of India. The classification of Briquet, adopted by Engler, is as follows: Stilboideæ, represented by Stilbe; Verbenoideæ, Verbena, Lantana, Lippia, Priva, Citharexylum; Chloanthoidæ, Chloanthes; Viticoideæ, Callicarpa, Tectona, Vitex, Clerodendron; Caryopteridoideæ, Caryopteris; Symphoremoidæ, Symphorema; and Avicenniodeæ, with Avicennea the only genus.

VERBOECKHOVEN, vĕr′bo͞ok-hō′ven, EUGÈNE JOSEPH (1799-1881). A Belgian animal painter and etcher, born at Warneton, West Flanders, son and pupil of the sculptor, Barthélemy Verboeckhoven (1759-1840). He visited England, Germany, France, and Italy, and settled at Brussels, where he painted numerous animal pieces, to be seen in various galleries of Europe and America. Among the best are those in the galleries at Amsterdam, Berlin, and Munich. His etchings comprise "Etudes à l'eau-forte" (22 plates, 1839), "Etudes de paysages" (15 plates, 1839), and "Etudes d'animaux" (13 plates, 1844). His brother LOUIS (1802-89), pupil of has father, was a marine painter.

VERCELLI, vĕr-chĕl′lē. A town in the Province of Novara, Italy, situated in a low fertile plain, on the Sesia, 44 miles by rail west-southwest of Milan (Map: Italy, C 2). It is a thriving manufacturing and commercial town. It has retained its narrow, winding streets, but its ancient walls have given place to boulevards, those on the northwest commanding magnificent views of the Alps. The seventeenth-century cathedral has a library containing a collection of valuable manuscripts. (See VERCELLI BOOK.) The thirteenth-century Romanesque-Gothic San Andrea, and the San Cristoforo, with a fine altarpiece by Gaudenzio Ferrari, are worthy of note. Vercelli has an institute of fine arts and a museum of Roman antiquities. There are manufactures of silk, machinery, matches, silverware, and surgical instruments. Vercelli was the scene of Marius's victory over the Cimbri in B.C. 101. After having been ruled by the Visconti of Milan, it passed to Savoy in 1429. Population (commune), in 1881, 28,999; in 1901, 31,154.

VERCELLI BOOK, or CODEX VERCELLENSIS. The name given to a valuable collection of Old English or Anglo-Saxon sermons and poems preserved in the library of the cathedral at Vercelli, Italy. This manuscript book was discovered in 1822. How it reached Italy is uncertain. It may have been taken out of England by Cardinal Guala, who in the reign of Henry III. was prior to Saint Andrew's, Chester. On his return to Italy the Cardinal built the Monastery of Saint Andrew, in Vercelli. It is to be noted that the longest poem in the manuscript is *Andreas, or the Legend of Saint Andrew*, one of the best of the Old English religious epics. Consult the facsimile copy of the *Codex Vercellensis*, by R. Wülker (Leipzig, 1894); and see EXETER BOOK.

VERDANT GREEN, THE ADVENTURES OF MR. A college story by Cuthbert Bede (Rev. Edward Bradley), published, with illustrations by the author, in 1853. It narrates the life of a simple-minded and gullible Oxford freshman surnamed 'Giglamps,' and was continued and concluded in *Tales of College Life* (1856) and *Mr. Verdant Green Married and Done For* (1856). The title-character has become a proverbial type.

VERDE, vĕrd, CAPE. See CAPE VERDE.

VERDE ANTIQUE, vĕrd än-tēk′ (OF. *verd antique,* Fr. *vert antique,* It. *verde antico,* ancient green, abbreviated from *porfido verde antico,* green antique porphyry). A variety of augite-andesite porphyry (see ANDESITE), which was in ancient times quarried at Marathonisi, on the Gulf of Kolokythia, in Greece, and much employed as an ornamental stone. It has a dark green base, or ground mass, in which are lighter green porphyritic feldspar crystals, their color due to alteration processes. The name is also applied to serpentine marble, a mixture of serpentine and calcite, used for indoor ornamental work and sometimes called *ophiolite* or *ophicalcite.*

VERDEN, vĕr′den. A town in the Prussian Province of Hanover, 21 miles southeast of Bremen, on the Aller and on the Hanover-Bremen line of the Prussian State Railway (Map: Prussia, C 2). Its manufactures include especially cigars and soap. It has a cathedral and several other churches. Population, in 1900, 9842. At this place 4500 Saxons were executed by Charlemagne. Verden became a Swedish duchy in 1648, and in 1719 was joined with Hanover.

VERDI, vĕr′dē, GIUSEPPE (1813-1901). The greatest Italian composer of the nineteenth century. He was born at Roncole, a small town in the Duchy of Parma, October 9, 1813. At the age of seven he received regular instruction from Baistrocchi, the organist of the village church. The boy's progress was so rapid that after three years his father decided to give him a liberal education, and sent him to Busseto, where he attended the academy. Two years later, upon the completion of the course, he was apprenticed to Antonio Barezzi, president of the Philharmonic Society of Busseto. Provesi, the conductor of the society, instructed him in composition and orchestration. When Provesi retired as conductor Verdi was unanimously chosen his successor. When Verdi had reached his sixteenth year Barezzi and Provesi sent him to Milan to enter the conservatory. The director, Francesco Basili, rejected him for lack of musical ability, but, nothing daunted, the young man applied to Vincenzo Lavigna, at that time conductor at La Scala. Lavigna quickly detected his pupil's talent and confined his instruction chiefly to the practical side of operatic composition. Of the pieces written at this time none has been published, although Verdi used a few of them in his earliest operas.

When Provesi died in 1833 Barezzi asked Verdi to come back to Busseto as conductor of the Philharmonic Society. Verdi returned, and bound himself for three years at a salary of 300 francs. Upon the expiration of his contract he went back to Milan. There Verdi met a young poet, Solera, who wrote for him the text of his first opera, *Oberto, Conte di San Bonifacio,* which was produced with a splendid cast on November 17, 1839. Ricordi offered the young composer 2000 lire for the score of *Oberto,* and guaranteed the sum of 4000 lire for each of three operas to be written at intervals of eight months. Verdi at once began work on a book furnished by Merelli, *Un Giorno di Regno,* a comic opera. But the death of his children and his wife in succession so affected him that the opera was a failure. Reluctantly, Merelli released him from his contract. After a two years' retirement, Verdi came out again with a new opera, *Nabuccodonosor* (1842). The success of this opera made the young composer a celebrity. In the following year *I Lombardi* appeared, and thereafter Verdi was regarded as the foremost composer of Italy. In 1844 *Ernani* was produced at Venice, and proved the greatest of successes.

For a number of years Verdi's genius seemed to have suffered an eclipse, for of all the operas written between 1844 and 1851 none rises above mediocrity. Some were complete failures. These works are: *I due Foscari* (1844), *Giovanna d'Arco* and *Alzira* (1845), *Attila* (1846), *Macbeth* and *I Masnadieri* (1847), *Il Corsaro* (1848), *La Battaglia di Legnano* and *Luisa Miller* (1849), *Stiffelio* (1850). With the *Stiffelio* closes the first period of Verdi's career.

In 1844 Verdi married the famous prima donna Giuseppina Strepponi, who had appeared in several of his operas. The second period of his life is ushered in by *Rigoletto* (1851), followed at the end of 1852 by *Il Trovatore,* and only a few weeks later by *La Traviata.* The success of each of these works was phenomenal and carried the composer's name over the civilized world. For the Paris Exposition of 1855 Verdi was commissioned to write a festival opera. This was *Les Vêpres Siciliennes,* produced with very moderate success at the Grand Opéra. Still more coolly the next work, *Simone Boccanegra* (1857), was received. *Un Ballo in Maschera* (1859) once more was an emphatic success, whereas *La Forza del Destino* (1862) was received with less favor. The next five years Verdi was busy with revising and partly rewriting older operas. Another French opera, *Don Carlos,* was written for and produced during the Paris Exposition of 1867. The score of this work is written far more carefully than that of any of his former works, and there is less evidence of Verdi's chief faults. These operas constitute the composer's second period. All of them show the influence of the style of the Paris Grand Opéra, but instead of being influenced by the grace and esprit of this school, Verdi seems to have been attracted chiefly by its worst qualities, as shown in its brutal effects of masses, its violent contrasts, commonplace melodies, distorted rhythms, and an instrumentation which is either overloaded or too meagre. But in spite of these glaring faults the works of this period are full of passages which show Verdi's great creative genius in its most favorable light.

Although he wrote very little between 1860 and 1870, he was not idle, for he devoted his time to a close study of the great Italian masters, thus perfecting his own technic and educating and refining his artistic taste. Close upon the age of threescore Verdi turned his back upon the style that had made him famous and wealthy. *Aida* (1871), written for the Khedive of Egypt, was the first opera produced in accordance with his newly acquired artistic convictions. The success of this new work was most emphatic. Verdi had a still greater surprise in store for the musical world when he came out with the *Manzoni Requiem* (1874). After this work Verdi was silent for thirteen years, but in 1887 *Otello* appeared, a work that surpasses all his previous efforts, and which is a real drama. On the same lines is constructed his last and perhaps greatest work, *Falstaff* (1893). It is remarkable that Verdi, whose only comic opera had been a signal failure, should close his career with the most delightful musical comedy which the world possesses, with the single exception of Wagner's *Meistersinger*. The list of Verdi's works is completed by the mention of a dramatic cantata, *Inno delle Nazioni* (1862), a string quartet (1873), several romances, a *notturno* for three voices with flute obligato, and his last composition, *Quattro Pezzi Sacri* (1898).

In 1874 Verdi was made Senator. In 1896 he donated the sum of one million lire to the city of Milan for the purpose of erecting a home for old and invalid musicians of both sexes. The last years of his life were spent in retirement at his villa, Sant' Agata, where he died. Consult: Berinello, *Giuseppe Verdi* (Berlin, 1899); Soffredini, *Le opere di Verdi* (Milan, 1901); Crowest, *Verdi, Man and Musician; His Biography* (New York, 1897); Pougin, *Verdi, an Anecdotic History of His Life and Works* (translated from the French by Matthew, London and New York, 1887).

VERDICT. The finding of a jury upon the issues tried before it. The jurors must determine upon the state of facts which they all consider to have been established by the evidence, and make a proper application of the law relating thereto as charged by the court. Where a court wishes to reserve the application of the law to itself, it may direct the jury to find the facts only, and such a finding is known as a *special* verdict. A verdict must be the result of the fair and unbiased consideration of all the jurors, and if it is arrived at in any other way it may be set aside. For example, if the jurors differ as to the amount of damages to be awarded to a plaintiff, and in order to reach an agreement, add together the various sums contended for by each, and divide the total by twelve, such a 'quotient' or 'compromise' verdict may be set aside. A verdict which is the result of chance or lot is also illegal and void. In civil proceedings if the verdict is against the weight of evidence or illegal for any reason it may be set aside. In criminal proceedings a verdict of acquittal is conclusive. A verdict must be unanimous, and it has been held that in trials for felony the accused cannot waive the right to the verdict of twelve jurors. The courts in many States may receive a verdict on Sunday. An accused person has the right to be present in court when the verdict is rendered. If it is not convenient for a judge to receive a verdict at the hour the jurors arrive at their conclusion, he may authorize them to write it out, affix their signatures to the paper, seal it up securely, and deliver it to a court officer for custody until they assemble again in court to announce it. This is often done where the verdict is determined upon late at night, especially on the eve of a holiday. The verdict of a jury is announced by its foreman and must be in a proper form to answer the issues presented. For example, a general verdict is 'for the plaintiff' or 'for the defendant,' specifying the amount of recovery, and in criminal cases, 'guilty' or 'not guilty.' In Scotland the peculiar and unsatisfactory form of verdict 'not proven' is permitted in criminal cases. This does not exonerate the prisoner, but is a bar to a second trial. Consult Stephen, *Commentaries on the Law of England* (14th ed., London, 1903); *New York Code of Civil Procedure;* and the authorities referred to under Pleading. See Jury.

VERDIGRIS (OF. *verd de gris, vert de gris*, Fr. *vert-de-gris*, verdigris, green of the Greeks). A green pigment consisting of basic copper acetates in varying proportions. It was known to the ancient Romans, and is prepared by exposing thin sheets or strips of copper to the vapor of acetic acid rising from the marcs or residues from wine factories, and is manufactured largely in the wine districts of France. After a few weeks, the surface of the copper becomes coated with a crust of verdigris, which is then detached, and finds its chief use as a pigment, especially when mixed with white-lead. It is also used in dyeing and calico printing, and for the preparation of Schweinfurt green and other copper paints. Verdigris has long been employed in medicine in the form of an ointment or liniment, chiefly as a caustic application to warts. It is an irritant poison, and the free administration of the white of eggs and milk is its best antidote.

VERDIN. A bird. See Goldtit.

VERDUN, vâr'dĕɴ' (officially *Verdun-sur-Meuse*). A fortified town of the first class, capital of an arrondissement in the Department of Meuse, France, on the right bank of the Meuse, 43 miles by rail west of Metz (Map: France, M 2). The river separates here into five branches. Since the Franco-Prussian War it has been made the strongest town of Eastern France. The defenses consist of eleven forts in a circle about the town, four on the left and seven on the right bank of the Meuse. Those on the right bank are connected with a series of forts reaching to Toul. Among the noteworthy buildings are the cathedral, built in the eleventh and twelfth centuries, and altered in the fourteenth and seventeenth. Other features are the Hôtel de Ville, the Palais de Justice, the new college, and the Bishop's Palace. There is a valuable public library. Hardware, leather, liqueurs, and famous confectionery are manufactures. Verdun, the Roman Verodunum, was included in the Kingdom of Austrasia. In the ninth century it became part of Lorraine and remained a German town till the Reformation, rising to the position of a free Imperial city. The surrounding district was ruled by the bishops of Verdun, with whom the citizens had to wage long struggles. In 1552 Henry II. of France seized the town and the bishopric, which were formally relinquished by the German Empire in the Peace of Westphalia (1648). In 1870 Verdun surrendered to the Prussians after a severe bombardment. Population, in 1901, 21,360. See Verdun, Treaty of.

VERDUN, Treaty of. The peace concluded on August 10, 843, by Louis the German, Charles the Bald, and the Emperor Lothair, the three sons of Louis the Pious, by which the Frankish Empire was divided among them. By the terms of the treaty Lothair retained the honorary title of Emperor with Italy and the country between the Rhine on the east, and the Rhone, Saone, Meuse, and Scheldt on the west; Aix-la-Chapelle was given to him as his capital. Louis received the countries east of the Aar and the Rhine, also the gaus of Speier, Worms, and Mainz. Charles received the countries west of the Rhine, including Neustria and Aquitaine, with western Burgundy and the Spanish March.

VERE, vă′rȧ. A town of the Netherlands. See Campvere.

VERE, Sir Aubrey de, and Aubrey Thomas de. Two Irish poets. See De Vere.

VERESHTCHAGIN, vĕ′rĕsh-chä′gĕn, Vassili (1842—). A Russian military painter, born at Tcherepovets, Government of Novgorod, October 26, 1842. He studied at the Saint Petersburg Academy, and later removed to Paris, where in 1864 he began his work with Gérôme at the Ecole des Beaux-Arts. In 1867 he joined the expedition against Samarkand, and after a sojourn in Paris went in 1869 to Siberia. After his return he spent two years in Munich. His travels during the subsequent four years took him to China and India, but in 1877 he quitted Paris, whither he had gone to live, to join the Russian army in the Russo-Turkish War. He was present at the attack on the Shipka Pass and the siege of Plevna, and acted as secretary to General Skobeloff in the peace negotiations of San Stefano. From this time he abandoned the art of war to become its severest denouncer. Striving to teach his detestation of war by depicting its horrors, he has restrained his art from no extravagance of emphasis or realism of subject. From the technical side, his pictures are crude in color, and filled with figures that contribute a multitude of facts to the history of the subject; but as paintings they are lacking in artistic significance. Among his works dealing with war are "The Pyramid of Skulls;" "Forgotten;" "The Road After Plevna;" "Skobeloff in the Shipka Pass;" "The Emir of Samarkand Visiting the Trophies." His war pictures are arranged in cycles, among which, besides those mentioned, are an Indian series, executed during a stay in that country; a splendid series representing Napoleon's campaign in Russia, and another on the Spanish-American War from studies made in Cuba. He has held repeated exhibitions in the United States, and a number of his works are in private possession here. He is best represented in the Tretyakoff Collection, Moscow, which possesses the Indian and Central Asiatic subjects, and his best known battle-pieces. Vereshtchagin is also a writer of note. Selections from his memoirs have been published in English under the title *Vereshtchagin, Painter, Soldier, Traveler* (New York, 1888); as has also been his *Napoleon I. in Russia* (London, 1899).

VERGA, vĕr′gȧ, Giovanni (1840—). An Italian novelist and dramatist, born in Catania, Sicily. His earliest efforts, *Storia di una peccatrice* (1865) and *I Carbonari della montagna* (1865), had little merit, but *Eva* (5th ed., 1880) and *Storia di una capinera* (1869), psychological studies of deep insight, established his reputation. *Eros* (1875) and *Il marito di Elena* (1882) showed him advancing on a new path, and before long in *Medda* (1874) and the *Vita dei campi* (1880), a series of masterly sketches, dealing with the passions and privations of the Sicilian peasantry, he struck his true vein, abandoning for good his earlier romanticism to become a realist. Two of these sketches he has since dramatized, *La lupa* and *Cavalleria rusticana*. The latter work has been rendered doubly famous by the acting of Eleanora Duse and the music of Mascagni. Among Verga's latest and strongest novels are *I Malavoglia* (1881) and *Maestro Don Gesualdo* (1889), forming the opening volumes of a series of Sicilian stories, under the general title of *I Vinti*. With his fellow-townsman Capuana, Verga stands at the head of the Italian *veristi* and his manner has often been compared to that of Zola.

VERGENNES, vĕr′zhĕn′, Charles Gravier, Count de (1717-87). A French statesman, born at Dijon. After serving for nearly a quarter of a century in various diplomatic capacities, first as Minister to Treves, then as Ambassador to Turkey, and finally as Ambassador to Sweden, he was made Minister of Foreign Affairs by Louis XVI. in 1774. He arranged an alliance with the Swiss Confederation; and the negotiations that brought France into alliance with the new United States of America were conducted by him. Largely as a result of negotiations conducted by him, also, Spain joined in the war against Great Britain in 1779.

VERGIL, vẽr′jĭl, Polydore (1470?-1555?). An English ecclesiastic and historian, of Italian origin. He was born at Urbino, Italy. He studied at Bologna and Padua; at the latter place became secretary to the Duke of Urbino, and there wrote *Proverbiorum Libellus* and *De Inventoribus Rerum*, two books which went through several editions and translations, and established his fame. He received the appointment of chamberlain to Pope Alexander VI. About 1501 he was sent to England as collector of Peter's pence (of which office he was the last holder). He became naturalized, and with the exception of three visits to the Continent, remained in England almost to the end of his life. He received successively the rectorship of Church-Langton, the archdeaconry of Wells, and prebends in the cathedrals of Hereford, Lincoln, and Saint Paul's, London. On a charge of libeling Wolsey he was imprisoned in 1515, but was soon released. After a residence of nearly fifty years in England, he returned to end his days in his native land, with permission to hold his archdeaconry, as also his Hereford prebend. His principal work, written at the instigation of Henry VII., is *Polydori Vergilii Urbinatis Anglicæ Historicæ Libri XXVI.* (1534), which comprises a history of England from the earliest times to the end of the reign of Henry VII.; it went through numerous editions, and in 1844-46 an Old English translation of the first eight books was edited and published for the Camden Society. His *De Inventoribus Rerum*, translated by John Langley and edited by W. A. Hammond, with an "Account of the Author and His Works," was published for the Agathynian Club of New York in 1868.

VERGIL, Publicus Vergilius Maro (b.c. 70-19). One of the most celebrated of Roman poets. The orthography Vergilius is established beyond question by the evidence of inscriptions, as well as by the earlier manuscripts and the Greek transliterations Οὐεργίλιος and Βεργίλιος, and is now generally employed. Virgilius appears for the first time in the fifth century, and became current during the Middle Ages. It was due to popular etymology, which connected the name with *virga*, 'wand,' on account of the association of Vergil with magic rites, and perhaps also with *virgo*, either on account of the purity of his character, or because of the belief in later times that he was born of a virgin. Among modern nations the spelling varies between Vergil and Virgil. The former is, strictly speaking, correct, but conservatism has preserved the latter in many cases, especially in England and America.

Unlike his friend and contemporary, Horace, Vergil gives us but little information about himself in his own writings. Our knowledge of his life is derived from casual allusions in other Roman writers, and from three ancient biographies, of which the best is that of Ælius Donatus, a grammarian of the fourth century of our era. The account of Donatus is doubtless based on the *De Viris Illustribus* of Suetonius, and derived from good sources, but it has been amplified and distorted in many particulars. Some few details may, however, be regarded as authentic.

Like nearly all, if not all, the great Roman writers, Vergil was not a native of Rome, and he was not even a Roman citizen by birth; yet no writer in the history of Roman literature is more intensely patriotic or more thoroughly Roman in spirit than he. He was born in Cisalpine Gaul, near Mantua, in the district of Andes, which appears to have been the name of a people, rather than that of a town, on the 15th of October, in the year B.C. 70. His birthplace has been identified by some with Pietola, three miles below Mantua, on the river Mincio; but the exact location must be regarded as a matter of uncertainty. He was thus a fellow countryman of Catullus, for whom he had a warm admiration, of Cornelius Gallus, and of Nepos; and the same region afterwards produced Livy, the Plinys, and perhaps Tacitus. His parentage was humble and obscure. His father was said by some to have been a potter, by others the hired laborer of a certain Magius, whose daughter, Magia Polla, he took to wife. In any event, Vergil's father became an independent landholder, and he appears to have acquired a competency from farming and bee-keeping. He was certainly able to give his son a thorough education, following the usual curriculum of grammar, rhetoric, and philosophy. Vergil studied first at home and in the neighboring town of Cremona. On his sixteenth birthday he assumed the manly gown (*toga virilis*), and went to Mediolanum (Milan) for further instruction. He continued his studies at Naples under Parthenius, who taught him Greek, and finally, in the year B.C. 53, he went to Rome, where he studied rhetoric and philosophy. Here the teacher who had the most influence on him seems to have been the Epicurean Siro. Through him he probably became acquainted with the work of Lucretius, by which he was strongly influenced. He also acquired a love of philosophical study which lasted throughout his life and doubtless helped to give him that psychological insight which characterizes all his work. At Rome he seems to have busied himself also with the study of mathematics, natural philosophy, and medicine. At this point in his life we lose sight of Vergil for about ten years. Being of a delicate constitution and a retiring disposition, instead of following the usual military or political career, he appears to have returned to his native place, where he devoted himself to the management of his paternal estate and to study. Throughout his life he was a diligent student, and read widely in the Grecian literature, as well as in that of his own country. After the battle of Philippi (B.C. 42) Vergil's property was included in the proscriptions which were made in Cisalpine Gaul for the benefit of the veterans of Antony and Octavian. The details of the affair are somewhat confused and uncertain. The influence of C. Asinius Pollio, who held an important military command in that region, and took a friendly interest in the gifted young man, seems to have saved the estate for a while. After Pollio was succeeded by Alfenus Varus, although the latter was also a friend of Vergil's, the poet was driven from his home, and he is said to have had a narrow escape from death at the hands of one of the soldiers. At the advice of his friend Cornelius Gallus, Vergil moved to Rome, where he made the acquaintance of Mæcenas and of Octavian. He soon became a member of the former's circle of literary friends, into which he was afterwards the means of introducing Horace. He did not succeed in recovering his property, but he was given another estate by way of compensation, perhaps the one which he is known to have possessed near Nola in Campania. The patronage of Mæcenas relieved him forever of financial cares and allowed him to devote himself wholly to literary pursuits and to study.

In the year B.C. 19 Vergil set out on a journey to Greece and Asia, with the intention of spending three years in a revision of the *Æneid*, of which he had already completed a preliminary draft, and of then devoting the rest of his life to his favorite philosophical studies. It is not impossible that he may have formed the plan of writing a philosophical poem. In Athens he met Augustus, who prevailed on him to accompany him on his return to Italy. When he embarked, Vergil was ill with a fever caused by a visit to Megara on an intensely hot day, and shortly after landing at Brundisium he died, on the 21st of September, of the year 19. He was buried near Naples, where his tomb is said to have been marked with the following epitaph, which briefly sums up his life and works:

Mantua me genuit: Calabri rapuere: tenet nunc
Parthenope: cecini pascua rura duces.

These lines cannot be regarded as written by Vergil himself, to whom tradition ascribed them, and the exact location of his place of burial must be regarded as uncertain.

Vergil's life was a singularly quiet and uneventful one. He suffered much from ill health, particularly dyspepsia and headache, but in all other respects he was fortunate. He counted among his friends the most distinguished men of his day, both in literature and in political life; and his own position in the world of letters was generally and cordially recognized during his own lifetime. He is said to have accumulated a considerable fortune from the generosity of his patrons, and he possessed several country places, as well as a house on the Esquiline Hill at Rome. On account of his ill health, he spent the greater part of his time in Campania and in Sicily. Vergil never married, and in contrast to most of his contemporaries his name is associated with no love affairs, nor has his morality been seriously questioned. He left his property to his half-brother, Valerius Proculus, and to his literary executors, Varius and Tucca, with legacies to Mæcenas and to Augustus.

In appearance he is described by Donatus as of a large frame, a dark complexion, and a rustic air. No bust of the poet which can be regarded as genuine has been preserved, and the numerous portraits which appear in the editions of his works have little or no claim to authenticity, with the exception of some miniatures which are found in the earlier manuscripts, and two mosaics, one discovered at Trèves in 1884, the other at Susa, in Africa, in 1896. The latter, which seems to belong to the first century of our era, and probably gives us our best representation of the poet, shows him seated between the muses of tragedy and of history, holding in his hands a scroll, partly unrolled, on which are the words:

> *Musa, mihi causas memora, quo numine læso*
> *Quidve.* . . . (*Æn.* i, 8).

The face and figure, while less attractive than some of the spurious portraits, agree much more closely with the description of Donatus than they. Vergil's most marked characteristics seem to have been modesty and gentleness. The prominence which came to him early in life was a genuine cause of distress to him, and he is said to have taken refuge in the nearest shop or doorway to avoid what Horace glories in, being pointed out by the finger of the passer-by.

Like nearly all the poets of the Augustan Age except Horace, Vergil was strongly influenced by the Alexandrian school of Greek writers. His acquaintance with them doubtless began at the time of his studies at Naples under Parthenius. It was this influence which gave his works their cosmopolitan and modern tone, which with their pathos, that note of brooding pity, as Mackail happily expresses it, makes them mark a new era in the history of Roman literature. It is to these characteristics also that their general and lasting popularity is in a great measure due. But though a master in his treatment of the passion of love, he does not belong to the followers of Alexandria on whom Horace vents his scorn. As Cicero in oratory avoided the extremes of the Asianic and of the Attic schools, and developed a characteristic style of his own, so Vergil combined the best features of the Alexandrian poets with those of what we may term the national school of Roman writers. During his early life Vergil is said to have written some short poems, which he appears afterwards to have suppressed; these will be considered later. His first serious work was in a field as yet untried by Roman poets, that of pastoral poetry. He is said to have taken this up at the suggestion of Asinius Pollio, although his fondness for country life and his love of nature must have made the task a thoroughly congenial one. The ten poems which have come down to us, the *Eclogues* or *Bucolics* (*Eclogæ, Bucolica*), appear to have been written between the years 43 and 37 and to have been published at first separately and afterwards in a body. The arrangement, which does not seem to be a strictly chronological one, is doubtless that of the poet himself. They fall into two general classes, the purely pastoral poems, in which he sings of the life and the loves of shepherds, and those in which Vergil himself and his contemporaries appear in the guise of country folk. To the former class belong the second, third, fifth, seventh, and eighth. The second sings of the hopeless love of Corydon for Alexis, his master's favorite. The others all represent contests in song between shepherds: in the third and seventh the singers are rivals who contend before a judge for a prize; in the fifth two shepherds meet and sing in turn the praises of Daphnis, the ideal shepherd, with many compliments to each other; and in the eighth two friends sing of unrequited love. Of the other class the first and ninth have to do with Vergil's loss of his paternal estate, and present not a few difficulties of chronology and of interpretation. The ninth, which seems to be the earlier, refers to his expulsion from his property and is supposed to have been designed to secure the aid of Alfenus Varus in recovering it; the first represents the poet as restored to his home and sings the praises of his benefactor, Octavian. The famous fourth Eclogue celebrates the birth of a child, whom it seems impossible to identify, who is to bring back the Golden Age. The child is variously supposed to be the unborn child of Octavian and Scribonia, the offspring of Antony and Octavia, and Asinius Gallus, the son of C. Asinius Pollio. The first view seems on the whole the most probable, although the last is supported by such high authority as Ribbeck and Sellar. In Christian times this was regarded as a prophecy of the coming of the Messiah. In the sixth two shepherds capture Silenus by a clever stratagem, and compel him to sing to them. It is supposed to have the object of justifying a refusal to celebrate the exploits of his friend Alfenus Varo on the plea that Apollo bids him devote himself to the humble field of pastoral poetry. The tenth condoles with his friend Cornelius Gallus for the faithlessness of his mistress. It represents Gallus as dying of love and singing of his woes to the Arcadian shepherds.

The *Eclogues* are modeled closely on the *Idylls* of Theocritus. The names of the personages who figure in the poems are taken from the Greek poet, and the scenery is throughout Sicilian and not Italian. Yet Vergil succeeded in giving them a national character, and the pathos which is characteristic of all his work appears in the feeling descriptions of the miseries caused by the civil wars. The interpretation of the poems of the first of the two classes mentioned above, which follow Theocritus most closely, present no special difficulty. The allegorical poems, on the other hand, are full of puzzling contradictions and inconsistencies. A recent German writer regards the sixth and tenth, which are especially difficult, as 'catalogue poems,' made up in great part of passages from the works of Cornelius Gallus. In spite of their highly imitative character and of many obvious defects of versification and of composition, the *Eclogues* take a high rank in the history of Roman literature.

The seven years which followed the publication of the *Eclogues* were spent by Vergil in the composition of a poem on agriculture, the *Georgics* (*Georgica*). This was published in the year 29 and represents the perfection of Vergil's work from the point of view of finish. The subject is said to have been suggested by Mæcenas and Augustus, with the purpose of arousing a greater interest in rural life, in the hope that if agriculture were made more attractive to the Roman people, the farms which had been abandoned and laid waste during the civil wars might be restored to cultivation. Here again, however, the task was a congenial one, and the subject was one in which the poet was deeply interested and which he was thoroughly competent to handle. Although Vergil was the first Roman writer to compose a poem on agriculture, the topic was at all times a popular one, and he had an abundance of material at hand in his native language, the translation of the treatise of the Carthaginian Mago, the works of Cato and of Varo, and probably those of Hyginus, besides an abundance of Greek sources. Vergil styles himself the Roman Hesiod, but there is little in common between the *Works and Days* and the *Georgics;* he owes much more to the Alexandrian poets, especially Nicander and Aratus. Though strictly speaking a didactic poem, the *Georgics* are not a complete treatise on agriculture, but handle selected topics. The first book deals with the management of fields, the second with the culture of trees, the third with the rearing of horses and cattle, and the fourth with bee-keeping, concluding with the episode of Aristæus. It is said that the last book contained a panegyric of Cornelius Gallus, which was stricken out at the request of Augustus after the downfall of Gallus in B.C. 27. The poem was composed slowly and deliberately, and refined and polished to the highest degree. There is nothing in it of the dryness of a didactic work, but the most commonplace details are given an attractive form. There are numerous digressions, such as the praise of spring and of Italy, and each book closes with one of these. It has justly been called the most finished poem in the Latin language, and Addison termed it the most finished of all poems. As in the case of the *Eclogues*, Vergil undoubtedly followed his Greek and Roman sources closely, but he nevertheless stamped the work with his own individuality.

In spite of the literary perfection of the *Georgics* and the unfinished state in which he left the *Æneid*, the latter has always rightly been regarded as the greatest of Vergil's works. The idea of writing a great national epic is one which he seems to have formed early in life, but he had postponed the undertaking until he should feel himself competent for it. He was doubtless hastened somewhat in carrying out his plan by requests for such a work from authority which it was impossible to resist. In this field Vergil was not a pioneer, for the works of Nævius and Ennius had already connected the destiny of Rome with that of Troy and had outlined a plan for a national epic from which it would have been difficult to depart in any radical way. Vergil undoubtedly made much use of the work of his predecessors, but the *Æneid* bore to their productions much the same relation that history does to mere chronicle. It entirely supplanted them, and at once took a position as the national epic, from which it was never displaced. Besides the Roman writers, Vergil had at his command an abundance of Greek models, the *Iliad* and *Odyssey*, the Cyclic Poets, and Apollonius Rhodius, and on these and others he drew with a freedom which would to-day be called plagiarism. In order to form a fair estimate of the rank of the *Æneid* as an epic poem, it must be borne in mind that it is an epic of a different type from the Homeric poems and hence cannot fairly be compared with them. The *Iliad* and the *Odyssey* are the greatest of primitive epics, and as such defy imitation. But the *Æneid* is an historical epic, written with a definite purpose, the glorification of Rome and of the Julian line. In its own class it must hold a high rank, if not the highest. In the *Æneid* the stories of the gods and goddesses and many of the mythological details are of the nature of 'epic machinery,' though Vergil himself appears to have had a religious nature; and while his philosophical studies probably prevented him from accepting the ancient belief in its entirety, a desire to effect a revival of the old Roman reverence for the gods doubtless formed part of his plan, and was thoroughly in accord with the wishes and the policy of Augustus. The task which Vergil had undertaken was a great one, and he never completed it to his own satisfaction, although, as Mackail says, it is easy to see within what limits any changes or improvements must have been made, and the poem is substantially complete. Suetonius tells us that he first wrote a version in prose and then turned this into poetic form in no special order. Such a method of composition would account for various inconsistencies that are found in the poem, which would doubtless have been corrected in the final revision which Vergil had in mind; though strict consistency is not demanded of a poet. So dissatisfied was Vergil himself with his work, that on his death-bed he gave directions that the *Æneid* should be destroyed; but by the command of Augustus it was published, with only such revision as was absolutely necessary, by Varius and Tucca.

The fact that Vergil was engaged on a national epic soon became known, and the appearance of the *Æneid* was awaited with great expectancy, to which Propertius gives expression in the well-known lines:

> *Cedite Romani scriptores, cedite Graii:*
> *Nescio quid maius nascitur Iliade* (iii. 26,25).

In the year 26 Augustus, who was absent in Spain, wrote asking to see a first draft of the poem or some part of it; but Vergil was not yet ready and spoke of himself as having been mad to undertake such a task. A few years later, however, he read three books to Augustus, including the sixth, in which he inserted lines 860-886 in memory of the young Marcellus. When the poet, who is said to have been an effective reader, finished the beautiful lines, Octavia, who was present, is reported to have swooned, and on her recovery to have presented Vergil with 10,000 sesterces (about $500) for each line of the tribute.

The outline of the *Æneid* is in brief as follows. The poem begins with the voyage of Æneas from Sicily to Italy in the sixth year after the fall of Troy. Juno, the relentless foe of the Trojans, persuades Æolus, king of the winds, to raise a great storm, which destroys one ship of the fleet and scatters the rest far and wide over the sea. Æneas with seven ships takes refuge in a harbor on the African coast within the territory ruled by Dido, Queen of Carthage. His mother, Venus, who has appealed to Jupiter and received from him assurance of her son's great mission and its fulfillment, appears to Æneas in the guise of a huntress and advises him to seek the protection of Dido. He does so, and on reaching her palace finds messengers from the rest of his ships, which have all been saved but one. Venus meanwhile induces Cupid to inspire Dido with a passion for Æneas. Dido receives the Trojans kindly and entertains them at a magnificent banquet. Here Æneas tells the story of the capture of Troy by the stratagem of the wooden horse, of the sack of the city and his escape. He tells of his attempts to found a city in Thrace and in Crete, and of the oracles and portents which pointed to Italy as his destined goal, of his meeting with Helenus and Andromache in Epirus, of his adventure with the Cyclops, and of his final arrival in Drepanum, where he lost his father, Anchises, by death. Then the story goes on from the night of the banquet. Æneas lingers for some time in Carthage, forgetful of his mission, beguiled by Dido's love. At last by the command of Jupiter he sets sail for Italy without the knowledge of the Carthaginian Queen. Dido kills herself and as she dies prays that there may be everlasting hatred between the Carthaginians and the descendants of Æneas. He is driven by contrary winds to Sicily, where he is welcomed by his countryman Acestes, and celebrates funeral games on the anniversary of his father's death. During the games the Trojan women, weary of their apparently endless wanderings, set fire to the ships, but the flames are extinguished by rain sent in answer to the prayers of Æneas. After leaving with Acestes those of his companions who wish to remain behind, Æneas sails to Cumæ. By the aid of the Sibyl he gains access to the lower world, and consults Anchises, who tells him the glorious destiny of the race which he is to found. Æneas then proceeds to the mouth of the Tiber, where Latinus, King of that region, receives him hospitably, forms an alliance with the Trojans, and promises their leader his daughter Lavinia in marriage. Juno now makes a last attempt to prevent Æneas from carrying out his purpose. She involves the Trojans in a quarrel with the people of Latinus, while at the same time Turnus, King of the Rutuli, one of Lavinia's disappointed suitors, prepares to make war on them. The result is that Turnus forms a coalition against the Trojans, who are aided by Evander, an Arcadian king who has founded a city called Pallanteum on the site afterwards occupied by Rome. A long struggle follows with varying fortunes. The Trojans are finally victorious and Turnus is slain in single combat by Æneas.

The *Æneid* is unequal in its execution and in its interest for the general reader. Certain episodes stand out prominently from the rest of the work, and in particular the last six books, in which the numerous battle scenes demanded by literary tradition are somewhat tedious, are less generally known than the rest of the poem. They are, however, full of beautiful episodes, and the greatness of Vergil's achievement can only be fully appreciated when the *Æneid* is carefully studied as a complete work of art. Æneas, the hero of the poem, is throughout the man of destiny, with whom everything else is subordinated to his mission of founding a mighty empire. The episode of the unhappy Dido, which has most strongly appealed to the readers of all times, has many of the elements of a Greek tragedy. She, too, has her great task to perform, and love forms no part of her plans, but to save Æneas she is made the victim of the wiles of Venus. Although she knows from Æneas's story of his wanderings that the gods have willed that he should fulfill his destiny on Italian soil, she attempts to turn him aside from his purpose, not of her own will, but through the influence of a mighty power. His desertion of her is justified and even praiseworthy, since it is the result of submission to the command of the king of gods and men, and the episode furnishes a tragic motive for the Punic Wars, that titanic struggle for the mastery of the world which took so strong a hold on the imagination of the successors of the victors. Æneas typifies the old Roman virtues, which Horace celebrates in the first six odes of his third book, and his escape from the wiles of the enchantress must have recalled to the Romans of the Augustan Age the yielding of Antony to the charms of Cleopatra. The struggle for supremacy in Italy was that of the higher civilization against semi-barbarism. The anti-type of Æneas is the violent and godless Turnus, allied with Mezentius, the *contemptor divorum,* and other such men. So far as the outward form of the poem is concerned, it is generally agreed that in the *Æneid* Vergil brought the hexameter, "the stateliest measure ever molded by the lips of man," to the highest degree of perfection of which it was capable. Even in his earliest works he surpassed his predecessors, Ennius, Lucretius, and Catullus, and his progress in the mastery of his chosen verse was constant, reaching its culmination in the last six books of the *Æneid.* He is particularly successful in adapting sound to sense, the swing of the Cyclops' hammers, the trampling of horses and the like are imitated, not only in single lines, but in longer passages. A recent critic says: "He has been perhaps more successful than any other poet in fusing together the expressed and the suggested emotion; he has discovered the hidden music which can give to every shade of feeling its distinction, its permanence, and its charm."

The *Æneid* was hailed with acclamation immediately on its publication, and its author was regarded as the inspired bard of his native land, the Roman Homer. A few feeble voices were raised in opposition to the general chorus of praise, but without effect. The influence of the poem was widespread and lasting, not only on the later Roman poetry, but on prose as well, and strongly affected even such writers as Livy and Tacitus. No poet ventured to handle the same theme, but the later epic writers for the most part drew heavily on Vergil for inspiration and material, and fully acknowledged his preëminence. His works became text-books in the Roman schools at an early period, and lines from the *Æneid* have come to light which were scribbled on the walls of Pompeii by schoolboys. No works were more extensively quoted. They came to be regarded as canons of grammatical and stylistic usage; they are extensively cited and discussed by such writers as Gellius, Nonius Marcellus, and Macrobius, and numerous commentaries were written on them. That of Servius, which embodies much of the work of his predecessors, has come down to us. In the estimation of the Christians Vergil held a position unique among the pagan writers of Rome. Saint Augustine, for example, vividly describes the charm which the *Æneid* had for him. He was even thought to have received some measure of divine inspiration, and a meaning was read into his works which was entirely foreign to them. The writers of the decline, not content with imitating Vergil, busied themselves with the composition of *centos*, composed of lines and half-lines taken from his works and arranged in such a way as to give in many instances a sense very different from that which they had in their context. With diabolical ingenuity some grossly obscene poems were constructed in this way from lines which had no suggestion of impropriety, such as parts of the *Epithalamium* of Ausonius. The writing of Vergilian centos became a regular form of literary production, and there were even those who improvised them.

With the revival of learning Vergil's influence became very great in most of the countries of Europe, and from that time until the present day the greatest poets have nearly all shown traces of his inspiration. Dante, Ariosto, and Tasso, Chaucer, Spenser, Milton, Dryden, and Tennyson may be mentioned as striking examples. His works have been translated into most of the languages of Europe. It was not until early in the nineteenth century that Vergil's claims to greatness began to be questioned, especially in Germany. Since then he has been criticised and defended with equal lack of discrimination by many of his opponents and champions. The most common charges brought against him are lack of originality and the inferiority of the *Æneid* to the Homeric poems. The latter point has already been discussed. The former criticism is in a sense justified, but there can be no doubt that Vergil had in common with many other great poets the power of making what he borrowed his own, as is shown by the fact that he was able to inspire imitation as well as to imitate. A fair estimate must rank him among the greatest poets of ancient times, and among the great poets of the world's history.

At an early period a series of mythological legends began to be associated with the name of Vergil. The ancient biographies assert that his birth was attended with prodigies prophetic of his future greatness, and the reputation for vast learning, which he gradually acquired, and the belief in his prophetic powers, increased the veneration in which he was held and the mystic atmosphere which surrounded him. As early as the second century the custom of consulting the *sortes Vergilianæ* became current, that is, the *Æneid* was opened at random, and an omen was drawn from the words of the first passage on which the eye fell. This custom, which the *Æneid* shares only with the Bible and the Homeric poems, lasted for many centuries. Charles the First of England is said to have consulted the *sortes Vergilianæ* and to have opened the *Æneid* at iv. 615-621. Still earlier Silius Italicus, as the younger Pliny tells us, used to make an annual pilgrimage to Vergil's tomb, which he approached with as much reverence as if it were a temple, and this practice also became a current one. By the Middle Ages we find in legend and literature a mythical Vergil, a seer and a man profoundly acquainted with the secrets of nature. Among the common people of Naples he came to be regarded as a necromancer or wizard, and the most grotesque legends were associated with his name, in which chronology was entirely disregarded. He was said to have made a bronze fly which kept all other flies away from the city, a butcher's block on which meat kept fresh for six weeks, as well as other marvelous and curious things, and his name was associated with numerous adventures of a more or less disreputable character. These tales were carried by travelers to other countries and found their way into the romantic literature of the day and even into Latin works of a learned character.

Besides the works which are known to be Vergil's a number of minor poems have come down to us under his name, which are included in many editions. Three of these, the *Culex*, *Ciris*, and *Moretum*, belong to the class of the *epyllion*, or 'little epic.' In the first, which is a poem of about 400 hexameter lines, a gnat (*culex*) stings a sleeping shepherd and thus saves his life from a serpent. The shepherd as he awakens kills his preserver. The ghost of the gnat comes from the lower world, of which a full description is given, and reproaches his murderer with his untimely fate. The second, of about 500 hexameters, tells the story of Scylla and Nisus, and takes its name from the bird into which the former is changed. The third, a charming little poem of 124 hexameters, describes a farmer preparing his breakfast, which consists of bread, which he prepares and bakes, and a rustic salad (*moretum*). Besides these there is a poem of 38 lines in the elegiac distich, the *Copa*, 'Mine Hostess,' which represents a Syrian woman dancing in the doorway of her wayside inn and inviting the wayfarer to enter; and a collection of fourteen shorter pieces in various metres called *Catalepton* (ποιήματα κατὰ λεπτόν, 'minor poems'). The evidence for the Vergilian authorship of these works is not very strong. Donatus and Servius attribute a number of minor poems to Vergil. Both enumerate the *Culex*, *Diræ*, *Ætna*, *Ciris*, *Catalepton*, *Priapeia*, and *Epigrammata*, to which Servius adds the *Copa*. An *Ætna* and *Diræ* have also been preserved, but it is the general consensus of scholars that they cannot have been written by Vergil. The rest of the list corresponds exactly with the poems which have come down to us as youthful works of Vergil, for the *Priapeia* and *Epigrammata* are both represented among the *Catalepton;* but we have only to assume that the poems were collected and ascribed to Vergil in the time of Nero, a belief which is held by some scholars, to make the testimony of Donatus and Servius, and even that of Statius and Martial, who refer to a *Culex* by Vergil, of little weight. The testimony of Lucan to a Vergilian *Culex* is, however, more difficult to dispose of. On the other hand, the contrary evidence is not very convincing. Much has been made of certain metrical features of the poems, but these, which were really the only strong argument against a Vergilian authorship, have recently been shown by Skutsch to be of no great weight, at least in the case of the *Culex* and the *Ciris*. The latter has been generally regarded as the work of an unknown poet belonging to the circle of M. Valerius Messala, the patron of Tibullus, but Skutsch claims the poem for Cornelius Gallus, and regards the lines which the *Ciris* has in common with Vergil's works as original with the former. There is little to show that the *Culex* may not have been a youthful work of Vergil's. Chronologically it belongs to that period, and with reference to the triviality of the theme and the inferiority of the poem to Vergil's later productions, which are offered as arguments against its genuineness, one may recall the words of Lucan, when comparing his early efforts with those of Vergil, which are quoted by Suetonius:

> *et quantum mihi restat*
> *Ad Culicem ?*

There is still less ground for skepticism in the case of the *Moretum*, and the only reason for rejecting the *Copa* is its entire unlikeness to Vergil's manner, which, as Mackail says, might tempt one into the paradox of its authenticity. The question is a very difficult one and cannot be regarded as settled; nor is it likely, without more evidence than is at present available, that unanimity of opinion will ever be reached. The majority of scholars regard the whole collection as spurious, with the possible exception of some of the *Catalepton*, though most express this opinion more decidedly in the case of some of the poems than of others. The brilliant work of Skutsch, though not very convincing in its main thesis, rather increases the probability that the poems are the work of Vergil by disposing of the metrical arguments and some of the chronological difficulties. If the objection of unlikeness to the Vergilian manner is a valid one, it applies with more or less force to the entire collection. The whole question is comparatively unimportant, so far as Vergil's position in literature is concerned, but it is of great interest as regards the development of his genius. Vergil's popularity during the time of the Roman Empire and throughout the Middle Ages led to the preservation of his works in an unusual number of old and good manuscripts. Of these not less than four, together with three sets of fragments, are written in capitals or uncials and may be assigned to the fourth or fifth century. These are among the oldest manuscripts of Latin writers which have come down to us. The *editio princeps* was published at Rome about the year 1469. The standard critical edition is that of Ribbeck (Leipzig, 1859-68), containing his famous *Prolegomena*. There is a later edition, without the *Prolegomena* (ib., 1894-95). The best English edition is that of Conington and Nettleship (London, 1872-75). There are numerous good editions published in this country and abroad, of which the following may be mentioned: Forbiger (4th ed., Leipzig, 1872-75); Kappes (5th ed., ib., 1893); Benoist (2d ed., Paris, 1876); Papillon and Haigh (Oxford, 1892); Sidgwick (Cambridge, 1894-97); and Page (London, 1894-1900). There is also an edition of Servius's commentary by Thilo and Hagen (Leipzig, 1881-87). The translations of Vergil into English are very numerous. The earliest is that of Dryden. The *Æneid* has been translated by Conington into prose (London, 1872) and into verse (ib., 1873), as well as by William Morris, Cranch, Kennedy, and others. The *Georgics* have been translated by Rhodes and Blackmore, and the *Eclogues* by Calverley and Palmer. The following works may be consulted with profit: Sellar, *Roman Poets of the Augustan Age—Vergil* (3d ed., Oxford, 1897); Sainte-Beuve, *Etude sur Virgile* (2d ed., Paris, 1870); Meyers, *Essays Classical* (London, 1897); Mackail, *Latin Literature* (New York, 1895); Tyrrell, *Latin Poetry* (ib., 1895); Heinze, *Vergil's epische Technik* (Leipzig, 1903); Nettleship, *Lectures and Essays* (Oxford, 1885); id., *Ancient Lives of Vergil* (ib., 1879); Skutsch, *Aus Vergils Frühzeit* (Leipzig, 1891); Comparetti, *Virgilio nel medio evo* (2d ed., Florence, 1896; Eng. trans. of the first edition by Benecke, *Virgil in the Middle Ages*, London, 1895); Tunison, *Master Virgil* (Cincinnati, 1888); Boissier, *The Country of Horace and Vergil* (New York, 1896); Leland, *Legends of Virgil* (ib., 1900); Henry, *A Voyage of Discovery in the Æneid*, i.-vi. (Dresden, 1853); id., *Æneidea* (London, 1873-79); Miller and Nelson, *Dido, an Epic Tragedy* (Chicago, 1900).

VERGNIAUD, vâr'nyō', PIERRE VICTURNIEN (1753-93). An orator of the French Revolution, born at Limoges. He studied law and practiced his profession at Bordeaux. In 1789 he was a member of the general council of the Department of the Gironde, and in 1791 he was sent as a Deputy from Bordeaux to the Legislative Assembly. He was recognized as a leader of the Girondists. He voted for the condemnation of the King and it was his duty as president of the Convention to announce the verdict and the sentence. He, however, steadily opposed Robespierre and the Mountain, and when the latter became supreme and undertook to do away with opposition Vergniaud shared in the fall of the Girondists (June 2, 1793). After remaining in concealment for some days he was seized, brought to trial, condemned, and guillotined October 31, 1793, with 20 of his fellow Girondists. Consult: Vatel, *Vergniaud: Manuscrits, lettres et papiers* (2 vols., Paris, 1875); Touchard-Lafosse, *Histoire parlementaire et vie intime de Vergniaud* (Paris, 1848).

VERHAS, vĕr-häs', JAN (1834—). A Belgian genre painter, born at Termende and educated there and under Nicaise de Keyser at Antwerp. Some of his best known works are: "Seashore at Blankenberghe" (1876); "Inundation" (1877); "Procession of School Children" (1880, Brussels Museum); and "On the Landing Bridge at Blankenberghe" (1885).

VERIFICATION (from Lat. *verificare*, to verify, make true, from *verus*, true + *facere*, to do, make). Under the common-law system of pleading, an averment in an answering pleading containing new matter, to the effect that the pleader is ready to establish the truth of the facts pleaded therein. Where the new matter is merely negative a verification is not necessary. The common form of such a verification is: "*And this the said A. B. is ready to verify.*" In code pleading, the verification is an affidavit that the facts alleged in the pleading are true. See PLEADING.

VERLAINE, vâr'lân', PAUL (1844-96). A French poet, born at Metz. Little is known of his early life. Before the Franco-Prussian War he had published *Poèmes saturniens* (1865); *Les fêtes galantes* (1869); *La bonne chanson* (1870). After 1870 Verlaine, who had led the traditional Bohemian life in Paris, disappeared for eleven years. In 1881 he reappeared in the public eye as a quasi-Catholic with his *Sagesse*, perhaps his best known volume. It is a remarkable product of a devout religious mysticism.

From this time to his death in Paris in 1896, Verlaine remained, with the exception of sojourns in England, Belgium, and Holland, among the cafés of the Latin Quarter, drinking absinthe, carousing, and writing verse and journalistic articles. The disordered habits of this modern Villon often led to serious misdemeanors which occasioned his imprisonment, or to long illnesses which confined him in hospitals—experiences which he characteristically described in *Mes prisons* (1893) and *Mes hôpitaux* (1891). During this period he published several volumes of verse, all of them rather small and containing only short poems; *Jadis et naguère* (1885); *Romances sans paroles* (1887); *Amour* (1888); *Bonheur* (1891); *Parallèlment* (1889); *Chansons pour elle* (1891); *Chair: dernières poésies* (1896). In prose he put forth *Les poètes maudits* (1884)—interesting sketches of his literary companions of the new school, notably Mallarmé and Rimbaud; also *Confessions* and *Les hommes d'aujourd'hui*.

Verlaine is classed with the Symbolists. In his mystic worship of God and of the flesh he appeared by turns avowedly orthodox and hopelessly sensual. As for ideas and the gifts of a concrete imagination, he had none, but he was an exquisite master of verse. He found new nuances, and new variations, and his pages exhibit a suffusing mobility of which French poetry had scarcely been thought capable. He usually wrote impeccably according to the strictest forms; but, like a Symbolist, he indulged at times in lines of 11 and 13 feet, ignored the interlacement of rhymes, etc. Altogether Verlaine is by far the greatest French poet Symbolism has yet to claim.

Consult: Brunetière, *L'évolution de la poésie lyrique en France*, vol. ii. (Paris, 1894); Lemaitre, *Les contemporains*, vol. iv. (ib., 1889); Nordau, *Degeneracy* (New York, 1894); Delille, in *Fortnightly Review* (London, 1891); Wells, *Modern French Literature* (Boston, 1897). Verlaine's *Works* are collected in five volumes (Paris, 1900).

VERLAT, vâr′lȧ′, Michel Charles (1824-90). A Belgian painter, distinguished for his work in genre, animal, and historical painting. He was born in Antwerp and studied under De Keyser and Wappers, and then in Paris, where he became a follower of Courbet. He was called to Weimar by the Grand Duke to be director of the Academy of Fine Arts. There he painted, besides many portraits of the ducal family, one of Liszt. His canvases include: "Buffalo Surprised by a Tiger" (1852); "Godfrey de Bouillon at the Assault of Jerusalem" (ordered by the Belgian Government, 1855); "The Holy Family" (1868); and "Water Carrier" (1878). Many of his pictures are in the galleries of Brussels and Amsterdam.

VER MACAQUE, vâr mȧ′kȧk′ (Cayenne name). The larva of a bot-fly (*Dermatobia noxialis*), which attacks human beings in South America. The back and shoulders are especially subject to attack. The adult fly lays its egg or its larva on the skin, and the young grub penetrates and causes at first a swelling. It grows rapidly, and unless destroyed will cause a large lump with an apical orifice. On reaching full growth, as with the other bots, the larva issues and falls to the ground to transform. Painful ulcers frequently result from the work of the grub. See Bot; Bot-Fly.

VERMEER, fĕr-mâr′ (van Delft), Jan (1632-75). An eminent Dutch genre, portrait, and landscape painter, frequently, though erroneously called Van der Meer. He was born at Delft and a pupil of Karel Fabritius, by whom he was influenced only to a slight extent, pursuing on the whole a course of great independence. One of the great colorists of the Dutch school, his not very numerous pictures are noted for exquisite light effects. Single figures, mostly young women engaged in all kinds of domestic occupation, interiors, street scenes, and landscapes are among his favorite subjects, all marvelously pure in color, abounding in charming effects of perspective and full of life, entitling them to be ranked with the gems of Dutch art. Such are "Woman Reading Letter" (Amsterdam Museum), "'Street in Delft," "The Milkmaid" (both in the Six Gallery, Amsterdam), "View of Delft" (Hague Gallery), "Girl with Wine-Glass" (Brunswick Gallery), "Young Lady with Necklace" (Berlin Museum), "The Love Letter" (Dresden Gallery), "The Geographer" (1669, Städel Institute, Frankfort), and "Lady at the Piano" (National Gallery, London). Only occasionally he depicted groups, such as the "Drinking Scene" (1656, Dresden Gallery), with life-size half-figures of rare beauty of coloring, and the splendid "Painter's Studio" (Czernin Gallery, Vienna).

VERMEJO, bâr-mā′hō. See Bermejo.

VERMES, vĕr′mēz (Lat., worms). The name, now practically discarded, given by Linnæus to one of the classes in his zoölogical system, in which he included all the invertebrate animals except Insecta, whether of worm-like form or not. Since Linnæus's time the name has been more or less widely used, but in an ever-narrowing and more restrictive sense. At the present time it comprises all non-chordate (see Chordata) animals which are not unicellular (see Protozoa), are not provided with jointed appendages (see Arthropoda), are not radially symmetrical, and have a well-marked body cavity, and have no mantle, shell, or creeping foot. The Vermes, excluding the group Platodes, are by the latest authority (R. Hertwig) divided into two phyla, i.e. Rotifera and Cœlhelminthes, the latter embracing six classes: Chætognathi, Nematelminthes, Annulata, Polyzoa, Phorinda, Brachiopoda. See Worms.

VER′MICEL′LI. See Macaroni.

VERMIFORM APPENDIX (from Lat. *vermis*, worm + *forma*, shape). A long, narrow, worm-shaped portion of gut about the diameter of a quill, or larger, and varying in length from three to six inches. It springs from the posterior and inner aspect of the head of the colon, near its lower end. It is the rudiment of a lengthened cæcum found in all mammals excepting some of the higher apes and the wombat. In structure it resembles closely that of the large gut. It is hollow to its tip, and its cavity communicates with that of the large bowel. It is entirely covered by peritoneum, being frequently attached by a fold of this membrane to the back of the large intestine. Rarely it has its own mesentery. Its functions are probably unimportant.

Situated in the right side of the abdominal cavity, in the right iliac region, it hangs suspended from the large gut and after describing a few slight turns terminates in a blunt end. It normally projects in a direction upward and inward. Sometimes, however, it is greatly elongated and projects far out into the peritoneal cavity; sometimes it is found bound down by adhesions to comparatively distant points, and sometimes it hangs down into the cavity of the true pelvis in close relation to the bladder and other pelvic viscera. Its blood supply in the male is a twig from the mesenteric arterial system. In the female, besides the mesenteric supply a branch of the right ovarian artery is distributed to its distal extremity.

Appendicitis. The appendix is not uncommonly the seat of processes accompanied by inflammation, perforation, and abscess. Attacks of this kind are termed *appendicitis*. The exciting causes are mechanical or chemical irritation and bacteria.

The disease is most common in individuals between ten and thirty years of age, though it has been seen in an infant under one year and in patients over seventy. About 80 per cent. of the cases occur in males, because of their greater exposure to weather and injury, and because the female appendix has a greater arterial supply. The disease appears to be more common in the United States than in other countries. It is slightly more frequent in summer and autumn than during other seasons. The varieties of this ailment are generally classified as follows: *Acute appendicitis*, including catarrhal, intestinal, ulcerative, and gangrenous forms; and *chronic appendicitis*, including catarrhal, intestinal, and obliterating forms. In most varieties the appendix is larger, longer, and firmer than normal, œdematous and filled with fluid or semifluid secretion, the lumen opening into the cæcum being closed. In the interstitial form there is a dense cellular infiltration of the retiform tissue of the mucous membrane, pathologic alterations involving also the submucous, muscular, and subserous coats, and dilatation of the blood-vessels existing. Abscesses may develop in the submucous and subserous layers. The lymphoid follicles are the seat of serous infiltration, and new lymphoid cells develop in small collections, afterwards becoming necrotic. In the severer forms the final process is ulcerative, following extensive distention and necrosis, and the purulent contents of the appendix fall into the peritoneal cavity, together with fæcal material in many cases. In the chronic forms ulceration does not take place. Attacks may recur during life from time to time and be unrecognized. One-third of all adult bodies reveal diseased appendices at autopsy.

The three principal symptoms of appendicitis are pain, tenderness, and rigidity of the lower part of the abdominal wall on the right side. The pain resembles that of colic and is generally referred to the neighborhood of the umbilicus, yet it may be felt in any part of the abdomen. A special diagnostic corroborative sign for the physician is pain at McBurney's point, midway between the anterior superior spine of the ilium and the navel. There are also gastro-intestinal disturbances, elevation of temperature, increased rapidity of pulse and of respiration, vomiting, nausea, hiccup, and either diarrhœa or constipation. The last-named is usually present after the first. Difficulty in swallowing, chills, cyanosis, profuse perspiration, and distention of the abdomen may occur. The physician can sometimes find the appendix by palpation. Ulceration and perforation with peritonitis may occur in three or four days or may occur on the first day upon which any symptoms have been noticed by the patient. Or ten days to two weeks of mild symptoms may elapse, and the patient may nearly regain his health when a relapse occurs. The interval may be a half-year or a year and then a recurrence may take place. In the chronic forms the most constant symptom is pain in the right iliac fossa, moderate at times, frequently recurring, and at times of great severity. The danger in these cases lies in the possibility of a sudden acute exacerbation going on to ulceration, gangrene, and fatal peritonitis. Various other disorders present similar symptoms and conditions to those of appendicitis, and it is impossible for the layman to diagnose it.

The treatment of appendicitis is determined by the fact that it is a surgical affection from the start. Removal of the appendix as early as diagnosis is made is the only conservative, safe, and justifiable treatment. To await the probable formation of pus is generally to sacrifice the patient. The medical treatment of the case is confined to the periods before and after the operative procedure, and includes attention to diet, local applications, laxatives, rest, and stimulation. An early use of a searching laxative in suspected appendicitis is imperative, whether diarrhœa be present or not. Opium should never be given under any circumstances.

It is commonly thought that fruit seeds naturally gravitate into the intestine. Such is not the case. Foreign bodies of that sort are extremely rare in cases of appendicitis. Fæcal concretions or appendicular calculi are frequently met. Consult: McBurney, "Indications for Early Operation for Appendicitis," in *Annals of Surgery*, xiii. (1891); Kelly, "The Pathogenesis of Appendicitis," in *Philadelphia Medical Journal*, iv. (1899); Deaver, *A Treatise on Appendicitis* (Philadelphia, 1900).

VERMIFUGE. See Anthelmintic.

VERMIGLI, vĕr-mē'lyē, Pietro Martire (Peter Martyr) (1500-62). A Protestant Reformer. He was born in Florence; became an Augustinian monk at Fiesole in 1516); rose to be visitor-general of the Order (1541), but adopted the views of the reformers. Having avowed his conversion at Lucca, he was compelled to flee to Switzerland, whence he passed to Strassburg, and became professor of theology there (1542). Invited by Cranmer to England, he was, in 1547, appointed by Edward VI. regius professor of divinity at Oxford. Driven from England under Queen Mary, he resumed his chair at Strassburg

(1553), where he taught till 1556, when he became professor of Hebrew at Zurich. Many of his numerous publications, which are in Latin, were translated into English. To his *Commonplaces* (London, 1583) is prefixed the original *Life* by Josias Muler. For Latin biographies consult C. Schmidt (Elberfeld, 1858). He shared in the preparation of the English Book of Common Prayer, issued in 1552.

VERMILLION (OF., Fr., *vermillion*, from *vermeil*, bright-red, from Lat. *vermiculus*, little worm, kermes-insect, from which crimson or carmine was obtained, diminutive of *vermis*, worm). A name applied to cinnabar, or native mercuric sulphide, but more generally to the artificial sulphide used as a pigment, the mineral not being of sufficient purity to be used directly as a pigment. The vermillion of commerce was formerly prepared by heating together mercury and sulphur in an iron pan with constant stirring. A more modern process consists in bringing mercury, sulphur, and an aqueous solution of potassium hydroxide together in a revolving drum and heating to about 46° C. (115° F.), when the mixture gradually assumes a red color. It is said that about 85 pounds of mercury are required to produce 100 pounds of vermillion. Vermillion is a permanent pigment, and may be used with water or oil, but cannot be used in enamel, as it volatilizes at a red heat. It possesses great body, weight, and opacity. Numerous pigments consisting of aniline colors thrown on a lead body, such as the oxide or carbonate, have largely taken the place of the true vermillion as a pigment, especially as they have a permanent red color, stand exposure fairly well, and change to a lighter color with age instead of a darker, as is the case with vermillion.

VERMILLION FLYCATCHER. A very beautiful flycatcher (*Cardellina rubra*) of Northern Mexico, carmine red all over, except the silvery white ear-tufts. It places a nest of delicate materials in a low tree, and lays eggs marked as shown on the Plate of EGGS OF SONG BIRDS.

VERMONT′ (Fr., Green Mountain). A North Atlantic State of the United States, belonging to the New England group. It lies between latitudes 42° 44′ and 45° 3′ north, longitudes 71° 30′ and 73° 25′ west, and is bounded on the north by the Canadian Province of Quebec, on the east by the State of New Hampshire, on the south by Massachusetts, and on the west by New York. The entire eastern boundary is formed by the Connecticut River, and more than half of the western boundary by Lake Champlain, most of the islands in that lake, including Grand and La Motte islands and the peninsula projecting southward from Canada, belonging to Vermont. The State measures 158 miles from north to south, and 41 to 90 miles from east to west. Its area is 9565 square miles, including 430 square miles of water. It ranks thirty-ninth in size among the States.

TOPOGRAPHY. The Green Mountains cover practically the whole State, with an irregular mass of rounded hills, peaks, and ridges, so that no portion of any great extent is level. The range enters the State at its southwestern corner and extends northward as a single main range with outlying hills till it reaches the centre of the State, where it divides into several parallel ranges, taking a northeast direction. The general elevation of the surface of the State is between 500 and 1000 feet, though the northwestern portion, along Lake Champlain, sinks to a little over 100 feet above the sea. The crest of the mountain range has a height of over 3000 feet for a considerable distance in the centre of the State, and two peaks rise above 4000 feet, Mount Mansfield, the highest point in the State, having an altitude of 4364 feet.

The Green Mountains form a continuous waterparting between the tributaries of the Connecticut River on the east and those of the Hudson and Lake Champlain on the west. The chief branches of the Connecticut are the West and the White Rivers. Four streams of considerable size enter Lake Champlain, the Missisquoi, Lamoille, Winooski, and Otter, and a fifth, the Poultney, forms part of the State boundary. The Hudson receives two small streams from the southwestern corner of the State, while the Black River in the north flows into Lake Memphremagog, a portion of which extends south of the boundary line. There are no large lakes within the State, but a considerable number of smaller lakes and ponds are scattered among the mountains.

CLIMATE. The climate of Vermont is rigorous, but healthful and bracing. The summers are cool and generally pleasant. The winters are very severe and prolonged, with a heavy snowfall. Lake Champlain is generally frozen during February, though the climate on the lake shore is milder than in the rest of the State. At Burlington the normal mean temperature for January is 18°, and for July 70.4°. At Northfield, in the centre of the State, the mean is 15.5° for January and 66° for July. The maximum rarely exceeds 90°, and is generally about 80°, but has been as high as 98°; the minimum is generally —15°, but in the mountains may fall more than 30° below zero. The average rainfall ranges between 40 inches in the north and south to 33 inches in the west central portion.

SOIL AND VEGETATION. The soil is to a great extent stony and of a poor quality, though in the valleys, and especially in the western lowlands, there is much land that is suitable for cultivation. The hills and valley-slopes, as well as the summits of the mountains, are covered with rich herbage, and there are large forests of pine and hemlock, with spruce and fir on the higher slopes. On the lower lands there are also forests of deciduous trees, the sugar maple being one of the most common trees.

GEOLOGY AND MINERALS. The whole of Vermont is of ancient formation, ranging from the Devonian to the Pre-Cambrian age. The central axis of the Green Mountains is composed of gneiss, flanked for a short distance on the east by a narrow band of Devonian limestone, and on the west by large beds of Cambrian quartz and Old Red sandstone. The rest of the surface rock consists chiefly of Silurian limestone. The uplifting of the mountains occurred at the close of the Lower Silurian period, and the strata have been greatly folded, crushed, and metamorphosed. Evidences of glacial action, such as drift deposits and boulders, are everywhere abundant.

The principal mineral wealth of Vermont is in its rocks, and particularly in the crystalline and other more or less metamorphosed limestones which lie in immense beds along the western base of the mountains, and which furnish a great variety of marble, from white to almost pure black. Granite, slate, and soapstone are also abundant, and the quartz-mica-schists near Lamoille furnish excellent whetstones. Important veins of asbestos are bedded in the serpentine rocks in the north central part of the State. Among metallic ores iron and copper are the most abundant, but lead, manganese, gold, and silver are also found in small quantities.

Mining. Vast stone resources have long constituted an important source of wealth to the State. The marble quarries were the first to be extensively worked. The first quarry in the State was opened in 1785, and now Vermont produces two-thirds of the marble quarried in the United States. Proctor is noted for the largest marble quarry in the world. The marble of this section is said to be whiter and more durable than Carrara marble, which it is rapidly displacing for monumental purposes. More than half of the total product is now used for monuments. The production of marble in 1872 amounted to $2,275,000; the sales then fell until in 1896 they were only $1,101,000. However, they have since revived, and in 1901 amounted in value to $2,753,583. The quarrying of granite ranks next to that of marble in importance. The granite quarries have been developed chiefly since 1880 and the output doubled during the decade 1890-1900. All of the gray varieties of granite, but none of the red, are found, and much of it is of a very superior quality, almost half of the $1,245,828 worth quarried in 1901 being used for ornamental purposes. The largest granite quarries are at Barre. Large quantities of slate are mined in the western part of Rutland County. Some limestone is also mined. Altogether there were, in 1899, over 200 quarries in the State, giving employment to 8000 men and turning out a product valued at $4,600,000; in 1901 the output was valued at $4,700,000. Metal-mining has never been extensive, though small quantities of copper have for a long time been produced.

Agriculture. In 1900 4,724,440 acres, or 80.8 per cent. of the area, were included in farms. The decade 1890-1900 was characterized by a large decrease in the improved land, but a much larger increase in the area of unimproved farm land. The average size of farms in 1900, 142.7 acres, was greater than in any other census year in the last half of the nineteenth century, and greater than for any other State east of the Mississippi River. Over 85 per cent. of the farms are operated by their owners. With the exception of the river valleys and lower hill lands of the State, the land is generally stony and comparatively sterile. Nevertheless, agriculture has always been the leading industry in the State. With the adoption of intensive methods of cultivation the soil is made to produce abundantly, the production of corn per acre being greater than that of any other State. But this is accomplished at great expense, and between 1880 and 1890 a number of farmers were forced to abandon their farms, under the competition of the fertile lands of the West. Farming is more and more adjusting itself with reference to the development of the dairying industry. The State is naturally well adapted for this, and her dairy products are of a superior quality. The acreage of the hay crop is about four times that of all other crops combined. Oats, the most important cereal crop, is decreasing in acreage, while that of corn is increasing. Wheat and rye have declined steadily since 1850, and both have ceased to be important. Potatoes are an important crop, and some barley and buckwheat are raised. The production of maple sugar and syrup in Vermont still receives much attention, and the State annually produces more maple sugar than any other State in the Union, and two-fifths that of the entire country. The production of apples is another important industry, the apple trees in 1900 numbering 1,675,131.

The following table shows the acreage of the leading crops for the census years indicated:

CROP	1900	1890
Hay and forage	1,006,495	....
Oats	73,372	101,582
Corn	60,633	41,790
Barley	12,152	16,427
Buckwheat	9,910	13,429
Potatoes	28,353	... .

Stock-Raising. As above noted, cattle-raising has become the predominant industry in Vermont agriculture. The number of dairy cows has increased every decade since 1850. The production of milk in 1899—142,042,223 gallons—was 56.6 per cent. greater than in 1889. In 1899 dairy products were sold to the amount of $8,010,429, over half of which was received from sales of milk. In 1850 Vermont had over 1,000,000 head of sheep, but the number has steadily decreased. The horses of Vermont were among the first to win fame on the race-courses of the country, and include the Morgan, Messenger, and Black Hawk stocks. The following table shows the number of domestic animals on farms:

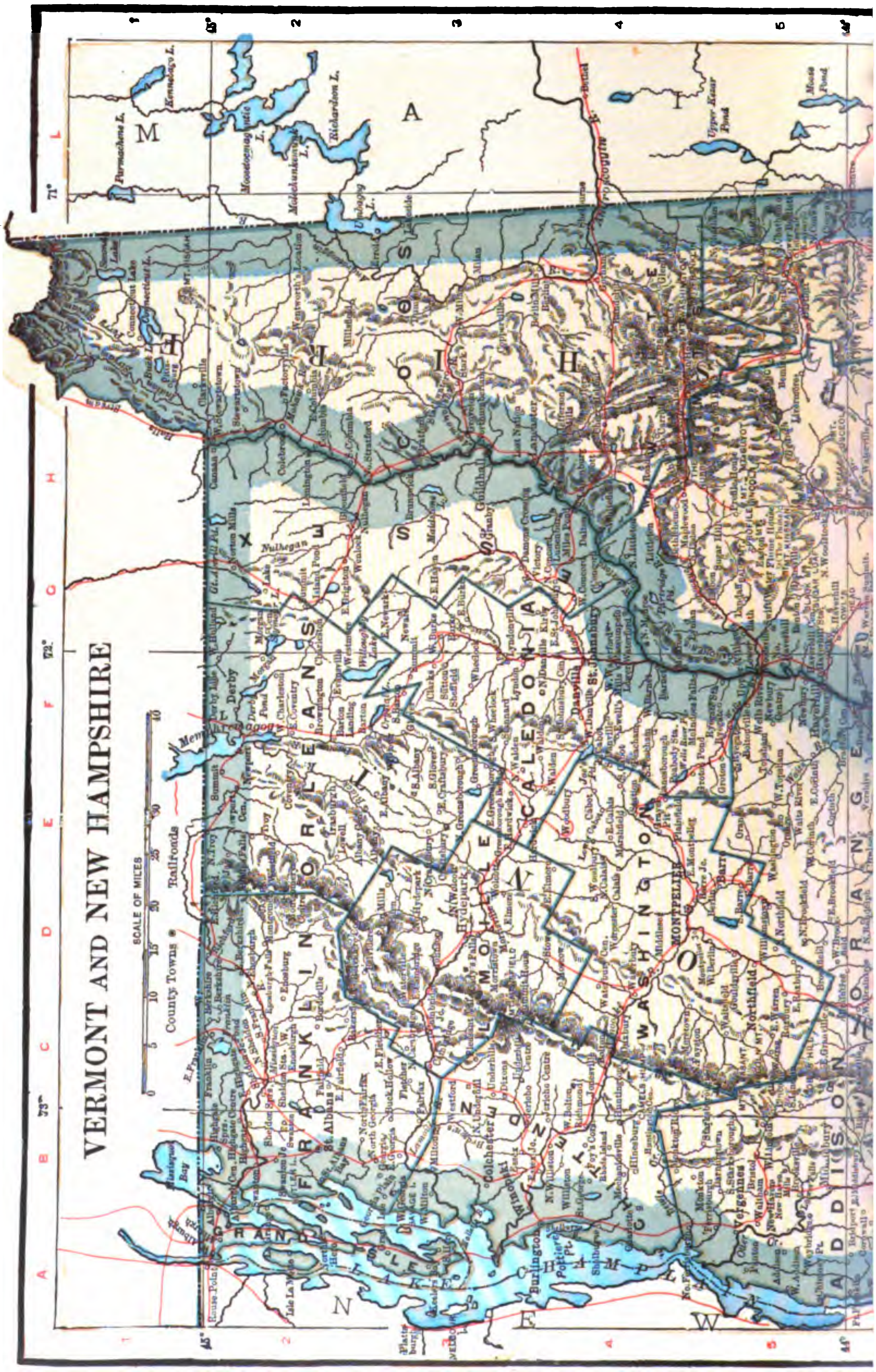
	1900	1890
Dairy cows	270,194	231,419
Other cattle	231,746	163,869
Horses	85,531	89,969
Mules and asses	356	330
Sheep	152,167	333,947
Swine	95,090	92,083

Forests and Forest Products. In 1900 it was estimated that the woodland area included 3,900 square miles, or 43 per cent. of the total area. A large part of this, however, was second growth, or cut-over land. For many years the lumber industry has been important, considering the small area of the State. Since 1890 there has been a decline (see table below), owing to the practical exhaustion of the white pine. At the same time there was an increase in the value of planing-mill products. Burlington was in 1882 the third largest lumber market in the United States. The marketable timber at present consists mainly of spruce and hemlock. There is a thriving wood-pulp industry, centring largely at Bellows Falls, on the Connecticut River, where it is favored by water power and adjacent forests.

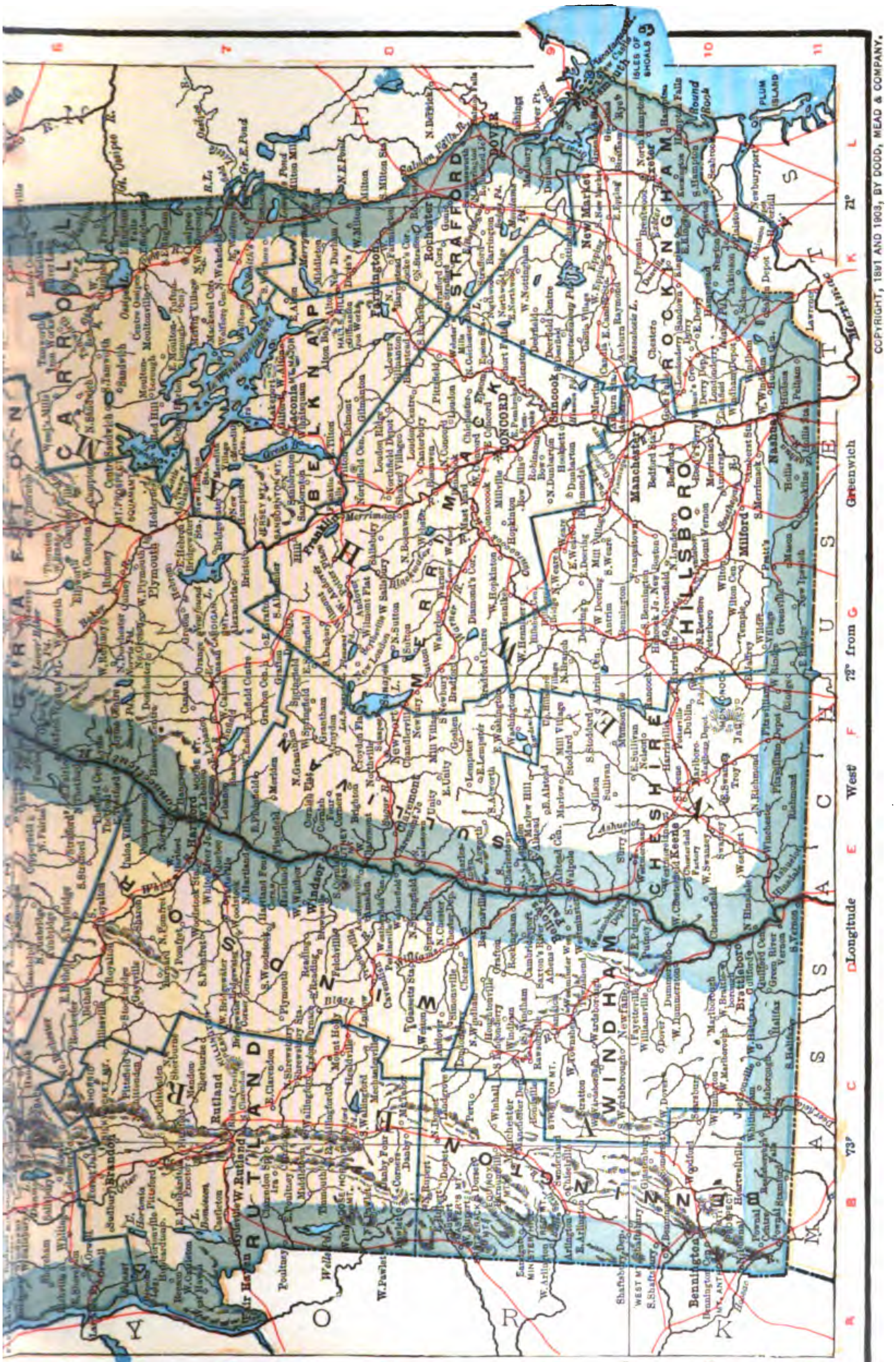
Manufactures. Vermont is the least industrial of the New England States. There has been,

AREA AND POPULATION OF VERMONT BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Addison	A 5	Middlebury	722	22,277	21,912
Bennington	B 10	Bennington	658	20,448	21,705
Caledonia	F 3	St. Johnsbury	652	23,436	24,381
Chittenden	B 4	Burlington	515	35,389	39,600
Essex	G 3	Guildhall	692	9,511	8,056
Franklin	B 2	Saint Albans	645	29,755	30.198
Grand Isle	A 2	North Hero	83	3,843	4,462
Lamoille	C 3	Hydepark	436	12,831	12,289
Orange	D 6	Chelsea	686	19.575	19,313
Orleans	E 2	Newport	729	22.101	22,024
Rutland	B 7	Rutland	911	45,397	44,209
Washington	D 4	Montpelier	688	29,606	36,607
Windham	D 9	Newfane	788	26,547	26.660
Windsor	E 8	Woodstock	930	31,706	32,225



VERMONT AND NEW HAMPSHIRE



COPYRIGHT, 1891 AND 1903, BY DODD, MEAD & COMPANY.

AREA AND POPULATION OF NEW HAMPSHIRE BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Belknap	H 7	Laconia	410	20,321	19,526
Carroll	J 6	Ossipee	939	18,124	16,895
Cheshire	F 10	Keene	734	29,579	31,321
Coos	J 3	Lancaster	1,812	23,211	29,468
Grafton	G 6	Woodsville	1,691	37,217	40,844
Hillsboro	G 10	Nashua	873	93,247	112,640
Merrimack	G 8	Concord	921	49,435	52,430
Rockingham	K 10	Exeter	693	49,650	51,118
Stafford	H 8	Dober	394	38,442	39,337
Sullivan	F 9	Newport	538	17,304	18.009

however, a significant development of manufactures in recent years. The value of products in 1900, $57,646,715, was 50.4 per cent. greater than in 1890, and the capital invested, $48,547,964, had increased 48.2 per cent. during the same period. In 1900 there were 29,455 persons engaged as wage-earners, or 8.6 per cent. of the total population. The most important group of industries are those which depend upon the forests for their raw materials. The great increase in dairying has been accompanied by a rapid development of the factory production of butter and condensed milk. The superiority of the stone resources of the State has afforded a basis for the manufacture of monuments and tombstones and for the allied marble and stonework industries. Of the other industries, the more important are the manufacture of flour and grist-mill products, foundry and machine-shop products, woolen goods and hosiery, and knit goods. Burlington is the largest manufacturing centre. The following table includes the most important industries for the census years indicated:

INDUSTRIES	Year	Number of establishments	Wage-earners average number	Value of products, including custom work and repairing
Total for selected industries for State....	1900	1,618	15,000	$34,366,777
	1890	1,413	13,688	23,947,027
Increase, 1890 to 1900..................	....	20.5	1,312	$10,419,750
Per cent. of increase..................	....	14.5	9.6	43.5
Per cent. of total of all industries in State......	1900	39.7	50.9	59.6
	1890	46.6	61.9	62.5
Cheese, butter, and condensed milk...............	1900	255	522	$5,656,265
	1890	123	263	1,602,641
Flouring and grist-mill products..................	1900	211	190	3,222,347
	1890	217	251	2,890,174
Foundry and machine-shop products...........	1900	61	1,288	2,185,510
	1890	61	733	1,199,067
Hosiery and knit goods	1900	14	1,041	1,834,685
	1890	10	705	1,105,958
Lumber and timber products.................	1900	658	3,625	6,131,808
	1890	779	6,054	6,958,674
Lumber, planing-mill products..................	1900	46	814	2,598,581
	1890	31	628	1,868,760
Marble and stonework	1900	54	1,773	2,484,551
	1890	46	1,353	1,656,637
Monuments and tombstones......................	1900	268	2,974	4,045,611
	1890	96	1,095	1,492,384
Paper and wood pulp...	1900	27	1,216	3,384,773
	1890	21	1,065	2,449,049
Wool manufactures......	1900	24	1,557	2,822,646
	1890	29	1,541	2,723,683

COMMERCE. Considerable foreign commerce is carried on with Canada through Burlington, which is the port of entry of the United States customs district of Vermont. The imports and exports of merchandise from this district in 1901 were $12,242,835. The district of Memphremagog, with Newport as its chief port, had an aggregate value of imports and exports for the same year of $5,004,556. This commerce is carried on with Montreal, principally by the way of Lake Champlain and the Richelieu River; and by means of canals navigation is also practicable to Albany and New York.

TRANSPORTATION. The railroads of the State are operated chiefly by the Central of Vermont, the Boston and Maine, and the Grand Trunk railroad companies. The total length of roads was nearly stationary during the decade 1890-1900, about 1000 miles, of which 870 are local. Improvement is being made in the public highways, the State having provided a system of State aid and supervision.

BANKS. The opposition to banks was so strong in Vermont at the end of the eighteenth and the beginning of the nineteenth centuries that there were no banks until 1806. In that year a State bank was established, which was owned and managed by the State. The conditions imposed upon it were so stringent that it had little success, and a law was passed to wind up its affairs in 1812, but the final settlement came only in 1845. In 1817 the first private State bank was chartered, and by 1827 there were ten of them. There was no general banking law, and each was governed by its charter. The act of 1831 introduced a safety fund system for the purpose of guaranteeing the circulation. The fund was made up of payments by the banks to the amount of 4½ per cent. of their capital stock. A 10 per cent. tax on profits was imposed at the same time. In 1842 another act was passed, relieving from this contribution all banks that should execute bonds guaranteeing all their obligations in specie. A free banking act was passed in 1851, allowing note issue only on deposits of reliable State securities. All these measures put the banks on a very sound foundation, and Vermont did not suffer any serious bank calamities. The introduction of the national banking system gradually reduced the number of State banks, and none were known to exist after 1890. There have been savings banks since 1850, and they are popular. Some of them combine the business of a trust company with that of a savings bank. In 1902 there were 48 national banks, with capital, $6,460,000; surplus, $1,515,000; cash, etc., $982,000; deposits, $12,620,000; and loans, $13,301,000. There were 41 mutual savings banks, with 128,529 depositors, and total deposits amounting to $41,987,497.

GOVERNMENT. The capital is Montpelier. The Constitution was adopted by convention July 9, 1793, and amended by conventions in 1823, 1836, 1850, and 1870, and by the people in 1883. Every tenth year after 1880 the Senate may propose amendments to the Constitution. If an amendment receives a two-thirds vote of the Senate, and a majority vote of the House of Representatives, and a majority vote of each House of the next following General Assembly, it shall be submitted to a vote of the people, when a majority vote determines its final acceptance or rejection. The State sends two members to the National House of Representatives.

Suffrage is granted to native or naturalized citizens of the United States who are twenty-one years of age, have resided one year within the State, and are of a 'quiet and peaceable behavior.' The registration of voters is required. New ballot laws based on the Australian system were adopted in 1890.

LEGISLATIVE. The Senate consists of thirty members, apportioned among the counties on the basis of population. The House of Representatives is composed of one delegate from each town (township). General elections are held biennially on the first Tuesday of September of even years, and the sessions of the Legislature convene on the first Wednesday in the following October, and have no time limit. Revenue bills must originate in the House of Representatives.

The Legislature may constitute towns, boroughs, cities, and counties.

JUDICIAL. The judiciary of the State consists of a Supreme Court of seven judges, each receiving $3000 salary; of a Chancery Court, which the Supreme Court judges also hold; of a county court in each county; of justices' courts in the several towns; and of probate courts in each probate district. The Supreme Court judges are elected by the Legislature and hold office two years. All others are elected by the people and hold office for one year.

EXECUTIVE. A Governor, Lieutenant-Governor, and Treasurer are elected by the people biennially. The Secretary of State and other State officers, whose election is not otherwise provided for, are elected by joint vote of the two Houses. The veto of the Governor may be overridden by a majority vote of each House.

FINANCES. The total expenditures of the State during 1791, the first year of its Statehood, were £3219, which were obtained mainly from a general tax on property and partly from sale of public lands. The budget grew slowly, and direct taxation upon property remained the main source of income. In 1841 it brought in $68,000, out of a total budget of $85,000. The Civil War and the expenses resulting from it forced an issue of bonds, amounting in all to $1,650,000. These were very rapidly redeemed, and by 1870 there were only $841,000 of bonds outstanding. By 1880 the total funded debt did not exceed $140,000, almost all of which the treasury owed to its own college fund. In 1881 and 1884 some laws were passed laying special taxes on banks, railroads, other transportation companies, express, telegraph, telephone, and insurance companies. As the income from these sources grew, the State tax became less important. In 1871-75 it amounted to 90 per cent., and at the end of the eighties about 27 per cent. There is a small direct tax laid annually for school purposes and another for highways. For the period 1900-02 direct taxation brought in only 32 per cent. Other sources of income are an inheritance tax, licenses, fees, etc. The satisfactory condition of the State finances was in no small degree due to the fact that there were never undertaken any considerable public improvements. The expenditures were therefore very limited, and in 1901-02 amounted (excluding loans repaid) to $886,679; of this sum $176,334 was the State school and highway taxes redistributed to the towns, leaving for State expenses proper $710,345. The balance in the treasury on June 30, 1902, was $324,969.

MILITIA. The men of militia age, in 1900, numbered 70,850. The organized militia, in 1901, numbered 776.

POPULATION. The population grew from 85,425 in 1790 to 280,652 in 1830. Since that year the growth has been very slow, the number being, in 1890, 332,422, and in 1900, 343,641. The State ranked twelfth in population in 1790, twenty-first in 1840, and fortieth in 1900. There has been a large influx of foreigners. The foreign-born, in 1900, numbered 44,747, of whom 25,540 were Canadians. Vermont has the smallest percentage of urban population of any of the North Atlantic States. Burlington, the largest city, had, in 1900, 18,640 inhabitants; Rutland, 11,499; and Montpelier, the capital, 6266.

RELIGION. The early inhabitants were largely of the English 'Non-Conformist' or 'Independent' type, who became known as Congregationalists, and they have continued the strongest religious sect in the State. Later the Methodists became important. Still later the influx of foreigners brought a strong Catholic element.

EDUCATION. Before the population and wealth began to concentrate in towns the old district system afforded uniformity in school conditions; but as a result of this movement there is a great disparity in school advantages. Many rural schools are very small and have short terms. In 1893 there was a change from the district to the town system, and through better transportation facilities some improvement has been made in the rural schools. Under the town system the high schools have improved, and there has been a 50 per cent. increase in the attendance. The average duration of schools has latterly been above 150 days. In 1900 there were 84,720 children between the ages of five and eighteen, of whom 65,964 were enrolled, and 47,020 in average attendance. There were in that year 256 male and 2714 female teachers. The schools derive their main support from local funds and taxes, though some assistance is secured from a State school tax and a State school fund. Of higher institutions the State supports normal schools at Randolph, Johnson, and Castleton, and a State university, including agricultural and medical departments, at Burlington. The Congregationalists maintain a college at Middlebury.

CHARITABLE AND PENAL INSTITUTIONS. There is a State insane asylum at Waterbury, and the insane asylum at Brattleboro is aided by the State. The two have more than 800 patients. The State has no institution for the deaf or blind, but cares for them by contract in institutions of other States. The State soldiers' home is located at Bennington. The State prison is at Windsor. Persons convicted of minor offenses are sent to the House of Correction at Rutland. Youthful offenders, both boys and girls, are sent to the industrial home at Vergennes.

HISTORY. The first explorer of this region was Champlain (q.v.), who sailed up the lake which bears his name in 1609. The country was said to be inhabited by the Iroquois, but this is doubtful. No settlements were made until 1665, when the French built Fort Saint Anne on Isle la Motte. Frequent French incursions were made through 'the Wilderness' against New England and New York, and in 1696 seigniories were granted. Massachusetts built Fort Dummer in 1724 on the site of Brattleboro, and in 1728 a trading house was opened here. French forts were built at Chimney Point and Crown Point in 1730-31, and much loss was inflicted on the English settlers by roving bands who used these posts as headquarters. English blockhouses were built and many battles were fought after 1744. The French abandoned all posts in 1757 except Isle aux Noix, and this was taken the next year. In 1732 Colonel John Henry Lydius bought of the Mohawks a tract of land corresponding nearly to the present counties of Addison and Rutland, and this purchase was confirmed by Governor Shirley, of Massachusetts, in 1744. New Hampshire claimed the territory to a line drawn 20 miles east of the Hudson River, i.e. as far as the border of the Massachusetts territory, and after

1749 Governor Wentworth, of New Hampshire, made lavish grants, and small settlements sprang up everywhere. New York, though she had acquiesced in the Massachusetts boundary, claimed this territory to the Connecticut River. Proclamations and counter-proclamations were issued, but in 1764 a royal order was issued declaring the Connecticut the boundary between New Hampshire and New York. The New York Government considered this to mean that the 'New Hampshire Grants' were annulled, and ordered the settlers to repurchase from New York. This was generally refused, and the settlers secured, in 1767, another royal order forbidding the granting of disputed lands until further instructions. New York continued, however, to grant the lands not previously sold. A convention of settlers was held at Bennington and they determined to resist by force any processes of the New York courts. The grand jury at Albany in 1770 indicted some of them as rioters, and several were arrested in 1771. Committees of safety were organized in the several towns, and it was decreed that no New York officer should take any one out of the district without consent of the committee. To enforce these rules the 'Green Mountain Boys' were organized under Ethan Allen (q.v.) and others, and they prepared to resist a reported expedition under Governor Tryon, who, however, ordered all prosecutions stopped until the matter might be submitted to the King. Nevertheless some grantees were dispossessed. The New York Assembly offered a reward of £100 for Ethan Allen or Remember Baker in 1774, but to no effect. At Westminster in the east a contest between a sheriff's posse and citizens resulted in the 'Westminster Massacre' on March 13, 1775. In April a convention met there and proclaimed the territory independent of New York, but declared itself willing to await the King's pleasure as to whether it should become a separate province or be annexed to some other province.

During the Revolution the colonists waged practically a separate war against the British and Indians. The capture of Ticonderoga, May 10, 1775, was almost entirely the work of the 'Green Mountain Boys.' In January, 1776, a convention at Dorset sent a commission to Congress, which, however, would not consider the proposition of making a new State. On January 15, 1777, another convention met at Westminster, and declared the territory an independent State with the name New Connecticut, and asked for admission. The present name was substituted in June, at the advice of Dr. Thomas Young, of Philadelphia, and a constitution similar to that of Pennsylvania was adopted, but with a clause prohibiting slavery. The government went into effect March 12, 1778, and sixteen towns east of the Connecticut River were united to the State in June, but the union was dissolved the next year, because of the resentment of New Hampshire, which now began to press its claim to the territory. New York also renewed its claims. No action was taken by Congress, and in retaliation Vermont extended its jurisdiction over the New Hampshire towns and over New York east of the Hudson, but, owing to the advice of Washington, the claim was given up February 22, 1781. After the close of the Revolution a gradual change in feeling took place in New York, and on July 15, 1789, a commission to treat with Vermont was appointed. In October, 1790, it was agreed that New York should cease opposition to the admission of Vermont to the Union on payment of $30,000 for disputed land claims. This was soon paid, and the State became a member of the Union March 4, 1791, the first State admitted under the Constitution.

The State was more democratic from the beginning than any other of the New England States. There were no rich and no aristocracy. The capital was laid out at Montpelier, the geographical centre of the State, in 1808. The University of Vermont was incorporated in 1791 and the first class graduated in 1804. There was considerable emigration after 1825, but there has been a gradual settlement of French Canadians to replace those departing. The State furnished more than its quota during the Civil War. Some Southern sympathizers from Canada invaded the town of Saint Albans in October, 1864, and this was made a point in the Geneva Arbitration. The Fenian operations against Canada, in 1866 and 1870, had their base in this town. The State adopted a prohibitory amendment to the Constitution in 1852, but abandoned the policy of prohibition in 1902, when the voters of the State declared for high license. This measure, amounting to local option regulation, became law in 1903.

In 1792, 1796, and 1800, the State was carried for Federalist electors, but was Democratic-Republican thereafter to 1824. In that year, and again in 1828, the Adams Republicans were successful. In 1832 the vote was cast for the Anti-Masonic candidate. After that time it was steadfastly Whig to 1852, and has been Republican, by large majorities, ever since.

GOVERNORS OF VERMONT

BEFORE ADMISSION TO THE UNION

Thomas Chittenden	1778-89
Moses Robinson	1789-90
Thomas Chittenden	1790-91

AFTER ADMISSION

Thomas Chittenden		1791-97
Isaac Tichenor	Federalist	1797-1807
Israel Smith	Democrat-Republican	1807-08
Isaac Tichenor	Federalist	1808-09
Jonas Galusha	Democrat-Republican	1809-13
Martin Chittenden	Federalist	1813-15
Jonas Galusha	Democrat-Republican	1815-20
Richard Skinner	" "	1820-23
Cornelius P. Van Ness	" "	1823-26
Ezra Butler	Adams Republican	1826-28
Samuel C. Crafts	" "	1828-31
William A. Palmer	Fusion	1831-35
Silas A. Jenison	Whig	1835-41
Charles Paine	"	1841-43
John Mattocks	"	1843-44
William Slade	"	1844-46
Horace Eaton	"	1846-49
Carlos Coolidge	"	1849-50
Charles K. Williams	"	1850-52
Erastus Fairbanks	"	1852-53
John S. Robinson	"	1853-54
Stephen Royce	Republican	1854-56
Ryland Fletcher	"	1856-58
Hiland Hall	"	1858-60
Erastus Fairbanks	"	1860-61
Frederick Holbrook	"	1861-63
John G. Smith	"	1863-65
Paul Dillingham	"	1865-67
John B. Page	"	1867-69
Peter T. Washburn	"	1869-70
John W. Stewart	"	1870-72
Julius Converse	"	1872-74
Asahel Peck	"	1874-76
Horace Fairbanks	"	1876-78
Redfield Proctor	"	1878-80
Roswell Farnham	"	1880-82
John L. Barstow	"	1882-84
Samuel E. Pingree	"	1884-86
E. J. Ormsbee	"	1886-88
W P. Dillingham	"	1888-90

Calvin S. Page	Republican	1890-92
Levi K. Fuller	"	1892-94
Urban A. Woodbury	"	1894-96
Josiah Grout	"	1896-98
Edward C. Smith	"	1898-1900
William W. Stickney	"	1900-02
J. G. McCulloch	"	1902—

BIBLIOGRAPHY. Gilman, *Bibliography of Vermont* (Burlington, 1891); Perkins, *Archæology of Vermont* (Philadelphia, 1881); Williams, *Natural and Civil History of Vermont* (2d ed., 2 vols., Burlington, 1809); Allen, *Natural and Political History of Vermont* (London, 1798); Robinson, *Vermont*, in American Commonwealth Series (Boston, 1892).

VERMONT, UNIVERSITY OF. A coeducational institution of learning at Burlington, Vermont, founded in 1791. The Vermont Agricultural College, chartered in 1862, was incorporated in 1865 with the university, under the title of the University of Vermont and State Agricultural College. The work of instruction is organized in (1) the Department of Arts, with a classical course leading to the B.A. degree, and a literary-scientific course, leading to the Ph.B. degree; (2) the Department of Sciences, including courses in civil and sanitary, mechanical and electrical engineering, chemistry, and agriculture, all leading to the degree of B.S.; (3) the Department of Commerce and Economics; and (4) the Department of Medicine, leading to the degree of M.D. The masters' degree in arts or science is conferred on graduates of two years' standing. Certificates from preparatory schools are accepted in place of the entrance examinations. The curriculum is partially elective. Military theory and drill are required of male students. The university offers a number of scholarships and prizes in different departments and maintains a loan fund for the benefit of needy students who are residents of the State. In 1903 the students numbered 570, and the faculty 64. The library conained 65,000 volumes. The endowment was $584,000, with an income of $97,000.

VERNAL GRASS (Lat. *vernalis*, relating to the spring, from *ver*, Gk. *ἔαρ*, *ear*, *ἦρ*, *ēr*, spring), (SWEET) (*Anthoxanthum odoratum*). A sweet-scented grass common in meadows, woods, and pastures throughout Europe and the Western Hemisphere. It is about a foot high, with a spiked oblong panicle. It has little value, as stock do not eat it readily, and in some countries it has become a pest. See Plate of GRASSES.

VERNATION. A fanciful name for the arrangement of leaves in the bud (q.v.).

VERNE, vârn, JULES (1828—). A French novelist. He was born at Nantes February 8, 1828, studied law, attempted the stage in 1850 with a comedy in verse, *Les pailles rompues*, and only after repeated dramatic failures struck, in 1863, with his *Cinq semaines en ballon*, a rich but not unexplored vein of scientific adventure. Of his very numerous works, most of which are available in fair translations, the more readable are *Twenty Thousand Leagues Under the Sea* (1870); *The Mysterious Island* (1870); *Around the World in Eighty Days* (1872); *Michael Strogoff* (1876); *The Green Ray* (1882); *Christopher Columbus* (1883); *The Southern Star* (1884); *The Carpathian Château* (1892). Several of his tales have been dramatized, and *Le docteur Ox* (1874) has been turned into an opera. The interest of his stories depends solely on incident; character drawing there is none.

VERNER, vĕr′nĕr, KARL ADOLPH (1846-96). A Danish philologist. He was born at Aarhus, and studied at the University of Copenhagen. He directed his attention mainly to the Slavic languages, visiting Russia in 1871-72. The succeeding years were spent at his old home, where he developed the law of Indo-Germanic accent that bears his name. In 1876 he was appointed an assistant in the university library at Halle, where he remained until 1883, when he became docent in Slavic languages at the University of Copenhagen, being made professor in 1888. He published little besides his famous article on his law.

VERNER'S LAW. A phonetic law of the Germanic group of Indo-Germanic languages, which was enunciated in 1875 by the Danish philologist Karl Verner (q.v.). It was the result of an investigation begun to explain certain apparent irregularities in the operation of Grimm's law, and was not only important in itself, but established the principle of phonetic laws on a scientific basis, thus marking an epoch in the development of philology. The law may be stated as follows. The surd Germanic spirants, *þ*, *f*, *h*, *hw*, and *s*, which represent Indo-Germanic *t*, *p*, *k*, or *q*, *g*, *ų* and *s* respectively, became the sonant spirants *đ*, *ƀ*, *g*, *gų*, and *s*, when the vowel immediately preceding them did not, according to the original Indo-Germanic accent-system, bear the primary accent of the word. The sonant spirants, excepting *z*, thus arising, are subject to the same changes in the various Germanic dialects as those which represent Indo-Germanic *dh*, *bh*, *gh*, *and gh*. The sonant *z*, however, is represented in German and Icelandic by *r*, while the sound-groups *sp*, *st*, *sk*, *ss*, *ft*, *fs*, *hs*, and *ht* throughout the Germanic group were exempt from the operation of the law. As examples of Verner's law the following examples from Gothic and Old High German may be cited, together with the corresponding changes according to Grimm's law: Sanskrit *pitár*, Greek *πατήρ*, Gothic *fadar*, Old High German *fatar*, 'father,' but Sanskrit *bhrātar*, Greek *φράτηρ*, Gothic *brōþar*, Old High German *bruoder*, 'brother;' Sanskrit *saptá*, Greek *ἑπτά*, Gothic and Old High German *sibun*, 'seven,' but Greek *κλέπτειν*, Gothic *hlifan*, 'to steal,' Sanskrit *nápāt*, Old High German *nefo*, 'grandson;' Sanskrit *daśát*, Greek *δεκάς*, Gothic *tigus*, Old High German *-zug*, 'decade,' but Sanskrit *dáśa*, Greek *δέκα*, Gothic *taíhun*, Old High German *zehan*, 'ten;' Pre-Germanic **se ųnis* (cf. Sanskrit *agní*, 'fire,' *vṛṣṇí*, 'ram'), Gothic *siuns*, 'appearance,' but Greek *λείπειν*, 'to leave,' Gothic *leihwan*, Old High German *līhan*, 'to lend;' Sanskrit *máhīyas*, Gothic *maiza*, Old High German *mēro*, 'more,' but Sanskrit *násati*, 'unite,' Gothic *ganisan*, Old High German *ginesan*, 'to be healed.' Verner's law seems to have been operative after the completion of the first Germanic sound-shifting, probably between B.C. 250 and A.D. 400. The uniformity of its action has been greatly disturbed by analogy (q.v.), but enough traces of it survive to justify the important deduction that as late as the beginning of the Christian Era the Germanic languages retained the Indo-Germanic system of free accent, according to which the primary accent might fall, as in Vedic Sanskrit, Greek, Lithuanian, and Russian, on any syllable of the word, in contrast to the Germanic accent-law established long before the earliest literary records, which confines the main accent to the root-syllable. A possible analogue has been sought in the change of Indo-Germanic *s* to *r* in Latin and Umbrian, but to *z* in Oscan (see Italic Languages), as Latin *dearum*, 'of goddesses,' Umbrian *urnasiaru*, 'of urn-feasts,' but Oscan *egmazum*, 'of things.' Consult: Verner, "Eine Ausnahme der ersten Lautverschiebung," in Kuhn, *Zeitschrift für vergleichende Sprachforschung*, vol. xxiii. (Berlin, 1875); Conway, *Verner's Law in Italy* (London, 1887). See Grimm's Law; Philology; Phonetic Law; Teutonic Languages.

VERNES, vârn, Maurice Louis (1845—). A French biblical scholar, born at Nauroy (Aisne). He studied theology at Montauban and Strassburg, and went to the Sorbonne in 1877 as lecturer on philosophy in the Protestant faculty of theology. In 1886 he became director of the department of religious sciences in the Ecole Pratique des Hautes Etudes. He devoted himself particularly to the subject of comparative religions, and published: *Le peuple d'Israël et ses espérances* (1872); *Histoire des idées messianiques depuis Alexandre jusqu'à l'empereur Adrien* (1874); *Histoire du peuple israélitique* (1881); *L'histoire des religions: son esprit, sa méthode et ses divisions* (1887); *Une nouvelle hypothèse sur la composition et l'origine du Deutéronome* (1887); and *Du prétendu polythéisme des Hébreux* (1891).

VERNET, vâr'nâ'. A celebrated family of French painters. The earliest member to attain prominence, Claude Joseph (1714-89), called Joseph Vernet, a marine and landscape painter, was a pupil of his father, Antoine Vernet (1689-1753), but was more influenced by Salvator Rosa during his course of study in Italy. His best known work is a series of fifteen paintings of the ports of France (1754-65) commissioned by Louis XV., now in the Musée de la Marine (Louvre). Though in the classic style of the school of Claude Lorraine, his works show a simpler and truer observation of nature than those of most contemporaries, and he is, in a certain sense, the precursor of the modern French landscape painters. His son and pupil, Antoine Charles Horace (1758-1836), usually called Carle Vernet, was best in genre works, usually comic in character, though he also painted Napoleonic battle-pieces, portraits, and hunting scenes, and made good designs for lithography; he is, indeed, one of the founders of French caricature. Though weak in color, his paintings are skillful in design.

His son, Horace Vernet (1789-1863), battle painter, the most celebrated member of the family, was born June 30, 1789. A pupil first of his father, then of Moreau and Vincent, he worked as a youth with facility with crayon, burin, or brush. In 1810 he showed his renunciation of classicism in his "Capture of a Redoubt," his first medal being won two years later with his "Taking of an Intrenched Camp." He was popular at Court, receiving commissions from the Empress Maria Louisa and the King of Westphalia. In 1814 he helped defend the Barrière de Clichy and received as a reward the Cross of the Legion of Honor from the Emperor. The incident of the siege was pictured in 1814, and refused by the Salon, Vernet having incurred the disfavor of the Bourbons. He subsequently won the favor of Charles X. and secured royal commissions. In 1826 he was elected to the Institute, and from 1828 to 1833 was director of the French Academy at Rome. He made several visits to Algiers and to Saint Petersburg, besides visiting and gathering notes for military subjects in Egypt, Syria, Palestine, and Turkey. At the opening of the Palace of Versailles in 1833 as an historical museum, Louis Philippe commissioned him to paint pictures of the battlefields of Friedland, Jena, and Wagram for the great gallery of battle pieces. Later he produced, from sketches made in Algiers, a series of pictures celebrating the conquest of that country, a work which occupied him from 1836 to 1842. Scenes of soldiery or battle appealed most strongly to him, though he executed many landscapes and portraits, among his sitters being Napoleon I., Louis Philippe, Emperor Nicholas, the Empress of Russia, Napoleon III., and many of the marshals of France. His immense productiveness resulted in over eight hundred canvases. His works display facility of invention, good arrangement, and fiery energy; but their execution is hasty, and they are deficient in color. Consult the works on *Les Vernets* by Charles Blanc (Paris, 1845), Lagrange (ib., 1864), Durande (ib., 1865), Clément (ib., 1876), and Dayot (ib., 1898); also Lagrange, *Joseph Vernet et la peinture au XVIIIème. siècle* (ib., 1861); Bertholon and L'hote, *Horace Vernet a Versailles, au Luxembourg et au Louvre* (ib., 1863); Rees, *Vernet and Delaroche* (London, 1880).

VERNIER, vĕr'nĭ-ĕr. A scale invented by the French geometrician Pierre Vernier (q.v.), by which linear or angular magnitude can be read with a much greater degree of accuracy than is possible by mere mechanical division and subdivision. The principle is essentially shown by the following examples: Fig. 1 is a portion of a graduated scale of equal parts with a vernier below, which is made to slide along the edge of the scale, and is so divided that ten of its subdivisions are equal to eleven of the smallest divisions of the scale; then each division of the vernier is equivalent to 1.1 of a scale division; and consequently if the zero-point of the vernier (Fig. 1) be opposite 11 on the scale, the 1 on the vernier is at 9.9 (1.1 to the left of 11), 2 on the vernier is at 8.8 (2.2 to the left of 11), etc. Also, if the vernier be moved along so that 1 on it coincides with a division on the scale, then 0 on the vernier is one-tenth to the left of the next division on the scale; if 4 on the vernier coincides with a division on the scale, the 0 is four-tenths to the left of a division as in Fig. 2. The vernier is applied to instruments by being carried at the extremity of the index limb, the zero on the vernier being taken as the index-point; and when the reading is to be performed, the position of the

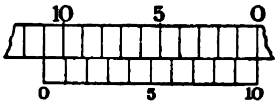


Fig. 1. RETROGRADE OR REVERSE VERNIER.

zero-point, with reference to the divisions of the scale, gives the result as correctly as the mechanical graduation permits, and the number of the division of the vernier which coincides with a division of the scale supplements this result by the addition of a fractional part of the smallest subdivision of the scale. Thus in Fig. 2 suppose the scale divisions to be degrees, then the reading by the graduation alone gives a result between 15° and 16°; but as the fourth division of the vernier coincides with a graduation on the scale, it follows that the zero-point of the vernier is 0.4 of a division to the left of 15°, and that the correct reading is 15.4°. It will be seen that by merely increasing the length of the vernier, as, for example, making 20 divisions of it coincide with 21 on the scale, the latter may be read to twentieths; and a still greater increase in the length of the vernier would secure further accuracy. Verniers like the above in which the number of its divisions is less than the corresponding number on the scale are called *retrograde* or *reverse* verniers. But some instruments are provided with *direct* verniers, that is, those in which the number of divisions exceeds the corresponding number on the scale. The principle of operation is the same as in the retrograde vernier, except that one must look *forward* along the vernier to find the coinciding line. Fig. 3 shows a direct vernier, and the principle of its construction is the same as for reverse verniers, only the vernier division is greater by a tenth of a scale division instead of being smaller. Fig. 4 shows a direct vernier where the coincidence comes at 3 giving a reading of 5.3. In general, if v is the length of a vernier division, s the length of a scale part, and n the number of divisions on the vernier, then $nv = (n - 1)s$ for the direct vernier and $nv = (n + 1)s$ for the reverse vernier. Therefore $s - v = \frac{1}{n} . s$, $v - s = \frac{1}{n} . s$ respectively, which shows the comparative size of the divisions of the two scales and to what fraction of a division any vernier will read. E.g. we wish a direct vernier, attached to a scale graduated to read half degrees, to read minutes, what must be the relation between a vernier and a scale division? Here $s = 30'$, and, since the vernier is to read minutes, $s - v = 1'$ and $v = 29'$. $s - v = \frac{1}{n} \cdot s = 1'$ and $n = 30$. Therefore, a space equal to 29 scale divisions is to be subdivided on the vernier into 30 equal parts.

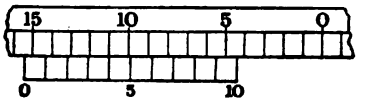


FIG. 2. RETROGRADE VERNIER SHOWING METHOD OF READING.

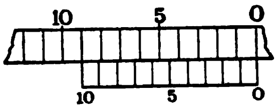


FIG. 3. DIRECT VERNIER.

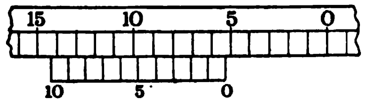


FIG. 4. DIRECT VERNIER SHOWING METHOD OF READING.

Of the various methods for subdivision which were in use before the introduction of the vernier, the most important were the *diagonal scale* (q.v.) and the *nonius*. The latter is so called from its inventor, *Petrus Nonius* (Pedro Nuñez), a Portuguese mathematician (1492-1577), who described it in a treatise *De Crepusculis Liber Unus* (Lisbon, 1542). It consists of 45 concentric circles described on the limb, and divided into quadrants by two diameters intersecting at right angles. The outermost of these quadrants was divided into 90, the next into 89, the third into 88, etc., and the last into 46 equal parts, giving, on the whole, a quadrantal division into 2532 separate and unequal parts (amounting on an average to about 2′ intervals). The edge of the bar which carried the sights passed, when produced, through the centre, and served as an index-limb; and whichever of the 45 circles it crossed at a graduation, on that circle was the angle read; for instance, if it cut the seventh circle from the outside as its forty-third graduation, the angle was read as $\frac{43}{84}$ of 90°, or 46° 4′ $17\frac{1}{7}''$. Consult Ludlow, "Subscales, Including Verniers," in Van Nostrand's *Engineering Magazine* (1882).

VERNIER, vâr′nyâ′, PIERRE (1580-1637). A French geometer, born at Ornans, in Burgundy. His father was a mathematician and director-general of currency to the Count de Bourgogne. Vernier was commandant of the castle in his native town and director of the mint. His chief work was *La construction, l'usage et les propriétés du quadrant nouveau de mathématiques* (1631), which contains the description of the instrument bearing his name. See VERNIER.

VER′NON, DIANA. A beautiful and talented girl in Scott's *Rob Roy*, whose peculiar education has trained her to vie with men in their sports. She is loved by all the Osbaldistones, including the villainous Rashleigh. The latter threatens to expose her father's plot if she will not marry him, but is killed by Rob Roy, and she is happily married to Frank Osbaldistone.

VERNON, EDWARD (1684-1757). An English admiral. He was born in Westminster; was educated at Westminster School, and in 1700 entered the navy, and saw much active service during the War of the Spanish Succession. In 1722 he was returned to Parliament. In 1739, as commander of six ships, and with the rank of vice-admiral, he captured Porto Bello, with a loss of only seven men. Owing to the inefficiency of the military support, he was repulsed from Cartagena in 1741, and lost heavily by sickness. This action has been described in *Roderick Random* by Smollett, who was serving in the expedition as assistant surgeon. Lawrence, the eldest brother of George Washington, was also a member of the expedition, and his estate Mount Vernon was named in honor of the admiral. Vernon returned to England in 1742; was several times reëlected to Parliament; in 1745 was promoted to be admiral, and during the expected invasion by the Pretender commanded on the Kent and Sussex coasts. For criticising the Admiralty in two pamphlets, he was removed from his command in 1746, but continued a member of Parliament until his death.

VERNON GALLERY. A collection of English paintings, formerly the property of Robert Vernon, now forming part of the National Gallery, London, to which it was given in 1847.

VER'NON-HAR'COURT, Sir William George Granville Venables. An English statesman. See Harcourt, Sir William.

VERONA, vā-rō'nȧ. A city of Italy, the capital of the Province of Verona, 71 miles by rail west of Venice (Map: Italy, F 2). The swift Adige traverses the city in a zigzag. It is crossed by seven bridges. Verona is a fortress of the first class and holds the key to the Tyrol. It is, with the exception of Venice, the most famous and attractive city of Venetia, and is both prosperous and progressive.

Its numerous weather-stained white marble palaces, richly sculptured, with evidences of having been painted, and often standing below the grade of the modern streets, give it an air of sumptuous decay, which effect is offset, however, by the abundant signs of its modern thrift. Its walls are pierced by several handsome gates. By far the larger part of the town is on the right bank of the Adige, where, in the centre, on the large and impressive Piazza Vittorio Emanuele, rises the celebrated Roman amphitheatre. This splendid, well-preserved ruin, dating from the reign of Diocletian, is 168 yards long and 106 feet high, and could accommodate over 20,000 persons. It is still used. On the Piazza and in the immediate vicinity are to be seen the Municipio; fragments of the old Roman wall; an ancient Franciscan monastery, now closed, but containing the mediocre sarcophagus known to disillusioned sight-seers as the tomb of Juliet; and the Museo Lapidario, with classic inscriptions and antique marbles. From the Piazza extends southward the spacious and splendid Corso of the same name, and to the southeast stretches the likewise spacious Via Pallone—the latter reaching the river where, on the opposite side, lies the cemetery.

The Piazza is connected with the important Piazza del Erbe, on the northeast, by the busy Via Nuova Lastricata and Via Nuova, which together form the busiest thoroughfare of the city, especially at night. In the vicinity is the marble tablet marking the portal of an old and uninspiring house locally said to have been Juliet's home. A high tower affording a fine view of city and country, a very ancient fountain bearing the statue of Verona, a marble column surmounted by the Venetian Lion of Saint Mark, and proud palaces with frescoed façades, here add interest to the bustling scene. Adjacent on the northeast is the Piazza dei Signori, beautified by archways (with portraits) which span the entrances. It is surrounded by palaces dating from the time of the Scaligers, and contains the famous statue of Dante by Zannoni. Of these palaces the Loggia, or Palazzo del Consiglio, is the most conspicuous. The superb structure in early Renaissance was a creation of Fra Giocondo (1500), and is adorned with statues of the ancient Romans who were born in Verona—among them Catullus, Cornelius Nepos, Pliny the Younger, and Vitruvius. Near by is the famed tomb of the Scaligers, rising in a small paved square. The grave Gothic outlines of the monument appear behind lofty railings in which are to be seen recurring ladders—the family emblem. Farther north, and in the extreme bend of the Adige, stands the uninteresting Gothic cathedral. It contains, however, a fine "Assumption" by Titian.

Northwest of the Roman Amphitheatre, and on the river bank, stands the battlemented Castel Vecchio (1355), from which a venerable pinnacled bridge stretches to the northern shore. Hence, to the northeast, extends the spacious and imposing Corso Cavour, bordered by fine palaces. It is a prominent thoroughfare. It leads northeast toward the Porta de' Borsari—a triumphal arch constructed A.D. 265. On the southwest it connects, near the Castel Vecchio, with the broad fine street leading southwest to the attractive Porta del Palio. In the extreme western corner of the city, and near the river, rises the Church of San Zeno Maggiore, dating from 1139. It ranks among the finest Romanesque churches in Italy, and is notable for its symmetries. It contains a valued painting by Mantegna, and the fine bronze tomb of the saint.

By the Ponte Navi, on the opposite side of the city, stands the mediæval Church of San Fermo Maggiore, with a striking façade. The narrow, curving, and extended section of the city on the left bank, with the cemetery on the south, is called Veronetta. The municipal museum and the picture gallery are situated here by the Ponte Navi, in the majestic Palazzo Pompei, overlooking the river. The edifice was constructed by Sammicheli and now belongs to the city. The paintings are nearly all of the Veronese school. Farther north looms the commanding Castel San Pietro, where a fortress of Theodoric the Great stood. It is now used as barracks. the ancient Church of Santo Stefano, restored by Theodoric, and the San Giorgio in Braida are near.

Verona has a royal seminary, an industrial school, and a deaf and dumb institution. The Biblioteca Capitolare contains valuable palimpsests, among them the *Institutes* of Gaius. The municipal library was established in 1860. The city is provided with numerous hospitals, including a military hospital, an asylum for the aged, and one for paupers and beggars, public dormitories, and three associations for taking care of poor children. There are cotton, paper, and flour mills, an immense nail factory, and piano and organ factories. Silks, soap, sugar, and candles are also manufactured. There are besides the new arsenal and extensive artillery establishments. Verona is important in the Italian traffic with Switzerland, Austria, and Germany. It deals in wines, fruits, rice, and marble. At the head of the municipal government is a syndic. The population in 1901 was 74,271.

Verona was conspicuous in its architecture already in mediæval times, and with the Renaissance came Fra Giocondo and its military architect Sammicheli. Verona had an early and distinct school of painting, which, like that of Venice, excelled in coloring. The great master Paul Veronese came from here. Verona also contributed worthily to sculpture.

History. Verona was anciently a Rhætian

town. From the Celts it passed under Roman rule as a colony in B.C. 89, and was wealthy and important. Theodoric the Great made it a royal seat. It fell to the Lombards, whose King, Alboin, met his death at Verona. From the rule of the Lombards Verona passed under that of the Frankish King Pepin. It was at the head of the Italian cities that resisted the sway of Frederick Barbarossa. It shared in the terrible struggles between Guelph and Ghibelline. It came under the power of the great Ghibelline Scala or Scaliger family in the middle of the thirteenth century, its rulers being called podestàs. This celebrated family made of it a sumptuous and famous city, and their name is inseparably linked with it. Dante found a refuge with Can Grande della Scala after being driven from Florence. Early in the fourteenth century Verona extended its sway and brought Padua and Vicenza under its control, and also Brescia, Parma, and even the distant Lucca. The city's ambitions were, however, checked by the alliance of Milan, Florence, and Venice. It became subject to Venice in 1405. It was powerfully fortified by Sammicheli in 1527. It passed to Austria on the extinction of the Venetian Republic in 1797. The Austrians strongly fortified it after 1814, and made it a pivot of their famous Quadrilateral. In the winter of 1822 it was the meeting place of a congress of European monarchs and diplomats which under the guidance of Metternich (q.v.) determined upon the intervention of the Holy Alliance (q.v.) for the suppression of the Spanish Revolution. Verona became a part of the Kingdom of Italy in 1866. Consult: Da Perini, *Storia di Verona del 1790 al 1822* (Verona, 1873-85); Wiel, *The Story of Verona* (London, 1902).

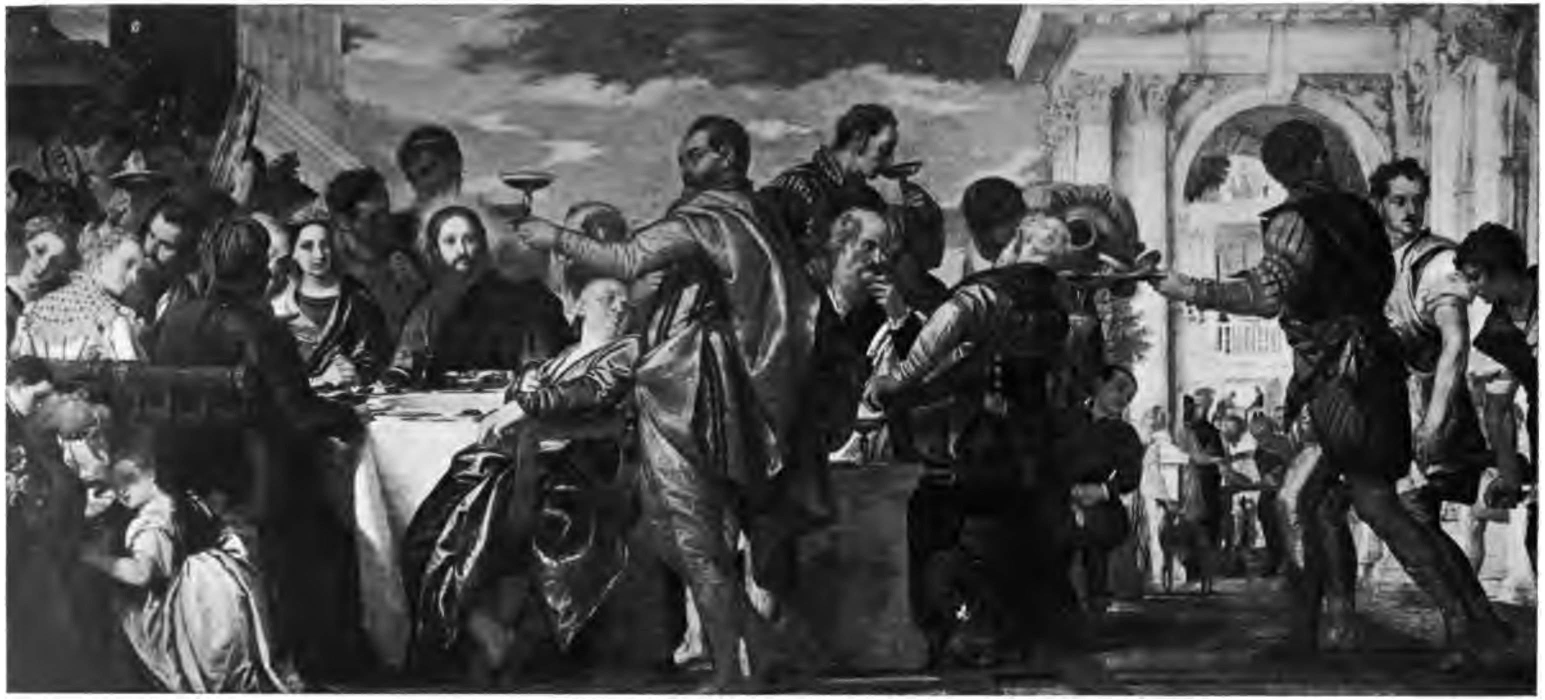
VERONESE, vā'rô-nā'zâ PAUL (properly PAOLO CALIARI or CAGLIARI) (1528-88). A painter of the Veronese school, who became one of the chief masters of the Venetian Renaissance. He was born at Verona, the son of Gabriele Caliari, a sculptor, from whom he learned modeling before taking up painting with Antonio Badile. He was, perhaps, even more influenced by painters of the previous generation, especially by Domenico Bruxacorsi. In 1548 he was summoned, with other Veronese artists, to decorate the Cathedral of Mantua. None of these decorations survive. On his return to Verona he was employed to fresco a room in the Contarini Palace with antique historical subjects, which have recently been uncovered. In 1551 he was charged by the architect Sammichele with the decoration of Villa Soranza, near Castelfranco, and soon afterwards he decorated Villa Emo (now Fanzolo) in the same vicinity. Fragments of the former frescoes are preserved in Castelfranco and in England, but the latter remain *in situ*, though in a damaged condition. They represent scenes from ancient history, classic myths, and contemporary life. In both of these tasks he was assisted by Battista Zelotti.

Veronese's early works are in the silver-gray tone peculiar to Veronese art, and the decoration just mentioned already contained the characteristic qualities of his fully developed style. He was summoned to Venice in 1555 by his countryman, the prior of San Sebastiano, from whom he received the commissions which have made this little church a museum of his works. He began (1555) the decoration of the ceiling of the sacristy with the "Coronation of the Virgin" and in the pendentives the "Four Evangelists:" in 1556 he finished the three panels of the ceiling of the nave with subjects from the "Life of Esther;" and in 1558 the altar-piece, a "Madonna in Glory, with Four Saints," and the walls of the church with scenes from the "Life of Saint Sebastian," etc. In 1560 he completed the paintings on the doors of the organ, the "Pool of Bethesda," the "Purification of Mary," and a "Nativity;" he also modeled the ornament of the organ. For several years following he was engaged in other work, and not until 1565 did he complete the splendid paintings of the choir walls, "The Martyrdom of Saint Sebastian" and "Saints Mark and Macellinus Going to Their Execution." Besides these decorations there are some fine altar-pieces by Paolo in the church. In competition with the great Venetian masters he greatly improved his work, both as to color, which became richer and more harmonious, and as to form, which became nobler.

In 1556 Veronese visited his native city, where he portrayed Pace Guarienti in full armor (Pinacoteca, Verona), and painted the "Deposition from the Cross" in Santo Maria della Victoria. A second visit in 1566 was the occasion of his marriage to the daughter of his former master, Badile. In 1560 he decorated the villa at Tiene, near Vicenza, with a series of historical frescoes, which are among the most remarkable of his works. Among the best subjects represented are "Cleopatra's Banquet" and "Sophronisba meeting Masĭnissa."

Veronese's frescoes in San Sebastiano had met with the hearty approval of Titian, who assigned to him an important part of the decoration of the Library (now the Royal Palace), which Sansovino had just completed. His subjects, the allegories of "Music," "Mathematics," and "Fame," treated in the form of episodes, were by general consent pronounced the best in the library. To this period (1561-62) also belong his earlier paintings in the Sala de' Dieci (Ducal Palace); of these "Jupiter Destroying the Giants" is in the Louvre, and "Juno Showering Treasures upon Venice" at Brussels; only an "Old Man with a Young Woman" remains. His principal decoration in the Sala della Bussola, "Saint Mark with the Lion," is also in the Louvre; but his grand painting of the "Homage of Frederick I." in the Hall of the Great Council was destroyed in the fire of 1577.

About the same time Veronese began his celebrated series of banquet scenes for the refectories of Venetian monasteries, in which the Scriptural subject is a mere pretext for the rendition of a luxurious Venetian feast, in all the splendor of contemporary costume. In the "Marriage of Cana" (1563, Louvre), a colossal picture containing 130 figures, he represented the chief notables of Europe and Venice as the participants. The bridal couple are Francis I. of France and Eleanor of Austria; and as a group of musicians in the foreground he portrayed the principal painters of Venice, Titian, Tintoretto, and himself among them; while on a balustrade in the background curious Venetians watch the spectacle. Another celebrated "Mar-



PAUL VERONESE

"THE MARRIAGE AT CANA," FROM THE PAINTING IN THE DRESDEN MUSEUM

riage of Cana" is at Dresden (see illustration); a third is at Madrid. The "Feast at the House of Simon" (or Levi) may be seen at the Venice Academy, Paris, Turin, and Milan, the "Supper at Emmaus" at Paris and Dresden. A similar subject, the "Feast of Gregory the Great" (1572), at Vicenza, caused Veronese to be cited before the tribunal of the Inquisition.

Among his patrons and friends were the brothers Barbari: Daniele, Patriarch of Aquileja, and Marcantonio, procurator of San Marco. His portrait of the former is in the Pitti Palace; and for both he decorated the beautiful villa (now Villa Giacomelli) at Maser (1566). The paintings cover three chambers, a gallery, and a salon, and rank with the best and most characteristic productions of the Renaissance. The subjects represented are mostly mythological and symbolical in character—the "Gods of Olympus" as the Planets, the "Muses" and "Virtues;" which, with the portraits of his hosts, himself and his beloved, and even religious subjects, form a strange medley. The architectural and landscape backgrounds are very remarkable.

Veronese was occupied with many decorative tasks which time has not spared; a better fate befell those at Magnadola, near Treviso, which are similar in subject to the Tiene frescoes, but in a freer, grander style. The grandest works of his last period are those executed in the Ducal Palace after the fire of 1577. His only fresco there, "Venice Enthroned," in the Anticollegio, has lost its color, but the "Rape of Europa" is undimmed. In the Sala del Collegio is a splendid "Thanksgiving for Lepanto," in which the Doge kneels before the Lord in Glory, to whom he is recommended by Saints Mark and Justina. The figure of "Faith" is one of the most beautiful in Venetian painting. On the ceiling of this hall, the finest in the Ducal Palace, Venice, attended by "Justice" and "Peace," sits enthroned; the remaining panels contain various allegorical figures. In his battle-pieces in the Hall of the Great Council, the "Defense of Scutari" and the "Capture of Smyrna," he portrayed characteristic episodes of the battles. His most ambitious effort is the splended "Apotheosis of Venice," surrounded by the gods and her heroes, and crowned by the goddess of fame. The pillars supporting her power are upheld by stalwart sailors; and her rule is acclaimed by noble lords and ladies on a balcony, and by the people and soldiers below.

Veronese's work in the Ducal Palace was interrupted by his death, April 19, 1588. The monks of Saint Sebastian gave him a resting place in their church, which his work had rendered famous. His two sons and his brother, Benedetto (1538-98), continued his commissions under the signature "Herodes Paoli." The most gifted of his sons, Carlo (1570-96), died young.

Veronese was essentially a decorative painter, and even in his easel paintings the decorative character predominates. Of these he executed an almost incredible number, considering the extent of his frescoes. The subjects are mostly religious, but in all of them the 'painter of pageants' is evident. Of his numerous madonnas the most remarkable is the "Madonna of the Cuccina Family," a curious, oblong picture, representing the Virgin and saints adored by a family of a dozen members; there is a very beautiful "Holy Family" in the Louvre. Among his most celebrated religious subjects are "Jesus and the Captain of Capernaum" (Dresden), the "Burning of Sodom," and "Esther Before Ahasuerus" (Louvre); an "Annunciation" and the "Raising of Lazarus" (Florence, Uffizi); "Christ bearing the Cross" (Dresden and Louvre); "Susanna in the Bath" (Dresden and Madrid); "Adoration of the Kings" (Dresden, Vienna, Munich, Venice, and Milan); and a fine series of "Prophets" and "Evangelists" in the Venetian Academy. The National Gallery (London) possesses two very fine examples, the "Vision of Saint Helena" and "The Family of Darius" (1563), in which the varied feelings of the monarch's captive daughters are marvelously expressed. Celebrated among his mythological pictures are "Venus and Adonis" (Madrid), "Minerva and Mars" (Berlin), and "Mars and Venus" (Saint Petersburg). His portraits include those of "Unknown Women" at Florence (Pitti), Paris (Louvre), and Munich, and his own portrait in the Uffizi.

Veronese was the true heir of Giorgione and Titian in Venetian art. Although gifted with narrative talent of a high order, he never appealed to the intellect, but to the eye and the imagination. From Verona he brought a sound naturalism, the silvery tone and mild harmony of color. He was a decorative painter of the highest rank. The example of Titian enriched his color and ennobled his forms, but without depriving them of their individual quality. His color is transparent and brilliant in its lightness; he is probably the best all round draughtsman of the Venetian school, and in the sweeping sureness of his brush work he stands almost, if not quite, the peer of Velazquez.

In subject Veronese was characteristically Venetian. He painted the Venetian aristocracy—the men preferably in the ease of middle life, the women fair and in richest costume. Especially did he delight in their fêtes, then the most pompous and luxurious in the world, and it is as the great 'painter of pageants' that he is chiefly known.

Bibliography. The most important biography is that of Yriarte (Paris, 1888). Others are by Janitscheck, in Dohme, *Kunst und Künstler Italiens* (Leipzig, 1877); Pietro Caliari (Rome, 1888), and Meissner (Bielefeld, 1897). Consult also Yriarte, *Vie d'un patricien de Vénise* (Paris, n. d.); Müntz, *Histoire de l'art pendant la Renaissance* (Paris, 1889-95).

VERON'ICA. The name applied, demonstrably in the thirteenth century (from a mediæval corruption of the Latin *vera icon,* true image), to a supposed authentic likeness of the features of Christ, said to have been miraculously impressed upon a linen cloth which one of the women of Jerusalem (see Luke xxiii. 27) offered him to wipe his face, as he was carrying his cross toward Calvary, and later transferred to the woman herself as a proper name. The miraculous picture is reported to have been preserved in Rome since the year 700, and its possession has been claimed also by Milan and Jaén. The face has been frequently reproduced, especially by the Spanish painter Morales. Consult: Pearson, *Die Fronica* (Strassburg, 1887); Von Dobschütz, *Christusbilder* (Leipzig, 1899).

VERPLANCK′, Gulian Crommelin (1786-1870). An American scholar and essayist, born in New York City. He graduated at Columbia in 1801, studied law, practiced in New York, spent several years in European travel, was active in State politics, and from 1821 to 1825 was professor of the evidences of revealed religion in the General Theological Seminary, New York. He was then a member of Congress (1825-33), State Senator (1838-41), and vice-chancellor of the State University (1855-70). He was also president of the Board of Emigration (1846-61). His chief books are: *Evidences of Revealed Religion* (1824); *Essay on the Doctrine of Contracts* (1825); *Discourses and Addresses on American History, Arts, and Literature* (1833); and an edition of *Shakespeare's Plays*, (3 vols., 1844-46). With Bryant and R. C. Sands, he edited the *Talisman* (1828-30), an annual. As a critic and a Shakespearean scholar he filled in his day a deservedly high place.

VER′RALL, Arthur Woolgar (1851—). An English classical philologist, born at Brighton, England. He received his education at Wellington School and at Trinity College, Cambridge, of which latter he was appointed fellow in 1874. He was the author of many papers in English philological journals; also of *Euripides the Rationalist* (1895). He also edited Euripides's *Medea* (1881), Æschylus's *Seven Against Thebes* (1887), *Agamemnon* (1889), and *Choephori* (1893).

VERRAZANO, vĕr′å-tsä′nô, Giovanni da (1480?-1527?). A Florentine navigator. Little is known with certainty of his career. The year of his birth is doubtful. He journeyed widely in the East, and in 1521 is reputed to have been sailing as a French corsair under the name of Juan Florentin or Florin, Spanish commerce being his prey. His first voyage of discovery, under commission from Francis I., was apparently in 1523, though it is much confused with the doings of Juan Florin in that year against the Spaniards. His notable voyage to America was made in 1524 and he seems to have touched the coast of North Carolina near Cape Fear. He apparently coasted south and then north, probably as far as Cape Breton. The chief evidence of this interesting voyage is a letter of Verrazano to Francis I., the authenticity of which is questioned. After his return he fought in the battle of Pavia, February 24, 1525, and was temporarily a prisoner of the Spaniards. If Verrazano was Juan Florin he was captured again at sea in 1527 and hanged, but some later documents indicate that he was at a later time in the year in Paris, preparing another expedition for America. Consult: H. C. Murphy, *The Voyage of Verrazano* (Albany, 1875), the most complete presentation of the argument against the authenticity of the account of the voyage; also, on the other side, B. F. De Costa, *Verrazano the Explorer* (New York, 1880), with a full bibliography; Winsor, *Narrative and Critical History of America*, vol. iv. (Boston), for a critical discussion of authorities.

VERRES, vĕr′rēz. A Roman politician. He was elected prætor in B.C. 74, and by lot became *prætor urbanus*. At the expiration of his term of office he went as Governor (*proprætor*) to Sicily, the richest province of the Republic. Here he was guilty of oppression and extortion, and was accused by the Sicilians. Cicero managed the prosecution, and Hortensius the defense. Cicero had prepared six orations, but at the close of the first so clear was the guilt of Verres that, without awaiting his sentence, he fled to Massilia (Marseilles), remaining in exile 27 years.

VER′RILL, Addison Emory (1839—). An American zoölogist, born at Greenwood, Maine; graduated at Harvard College in 1862 and was appointed to the chair of zoölogy at Yale College in 1864; from 1867 to 1870 he was a professor in the University of Wisconsin. From 1860 Verrill, investigated the invertebrate fauna of the Atlantic Coast, with especial reference to the polyps, echinoderms, worms, and mollusks, and became the chief authority on the living cephalopods, especially the colossal squids of the North Atlantic. His *Report upon the Invertebrate Animals of Vineyard Sound* (with S. I. Smith, 1874) is a standard manual of the marine zoölogy of Southern New England. His collections were deposited in the Peabody Museum of Yale University. In later life he explored with his students the geology and marine animals of the Bermuda Islands, and published *The Bermuda Islands* (1903). Besides many memoirs and articles he wrote: *Revision of the Polypi of the Eastern Coast of the United States* (1866); *The Cephalopods of the Northeastern Coast of America* (1879-82).

VERROCCHIO, vĕr-rŏ′kê-ô, Andrea del (1435-88). A celebrated Florentine sculptor, painter and goldsmith. His father, Michele di Cione, having died while the lad was young, Andrea assumed the name of the goldsmith Giuliano de' Verrocchio, to whom he was apprenticed. From this training he acquired his mastery of the technique of bronze casting and the high finish of his plastic productions. The only surviving example of his goldsmith work is a relief in silver, of the "Beheading of John the Baptist," in the Cathedral Museum at Florence. In sculpture his real master was Donatello, if indeed he did not actually study under him. One of his earliest works was the completion of that master's charming marble fountain in the Sacristy of San Lorenzo.

The most important of Verrocchio's commissions in Florence were for the Medici. In San Lorenzo he designed the bronze sepulchral slab of Cosimo de' Medici (d. 1464), and carved the beautiful marble tomb of Giovanni and Piero, a decorative masterpiece of most original conception, finished in 1472. For Lorenzo the Magnificent he also designed a bronze statue of the "Youthful David" (1476, Museo Nazionale), an admirable rendering of the transition of the human figure from youth to manhood, as naturalistic as it is graceful in position and form. His "Boy with a Fish," a charming fountain-piece, still adorns the court of the Palazzo Vecchio. The marble group of the "Incredulity of Thomas," in Orsanmichele, Florence, survives as one of the finest of the Renaissance, both in technical execution and in the beauty and majesty of the figures. His last work, the equestrian statue of "Bartolomeo Colleoni," at Venice, is his most celebrated. In this the martial bearing of the rider is as admirable as the anatomical perfection of the striding steed. Upon his death in 1488, he had completed the model of horse and rider, which were cast somewhat later by Alessandro Leopardi, who also designed the pedestal.

In painting he is more famous through his pupils Leonardo da Vinci and Lorenzo di Credi, than for his own achievements. There is much dispute over the pictures to be assigned to him. The "Baptism of Christ" (Florentine Academy), in which Leonardo assisted, is one of the few certain attributions. His figures are well modeled, but somewhat stiff in action and hard in color. He was, however, an innovator in that he was the first Florentine to render atmospheric perspective. Of the numerous drawings attributed to him the "Angel's Head," in the Uffizi, and a "Female Head," in the British Museum, are the most celebrated.

Consult: Mackowsky, *Verrochio* (Bielefeld, 1901); and Bode, *Italienische Bildhauer der Renaissance* (Berlin, 1887); also Perkins, *Tuscan Sculptors* (London, 1864).

VERSAILLES, vĕr'sä'y'. The capital of the Department of Seine-et-Oise, France, situated about 12 miles by rail and by tram southwest of Paris (Map: France, J 3). The flat town, with its quiet avenues, has little of interest or charm save what is offered by the famous palace and park, whose magnificence under the Bourbons made this unequaled in fame among all the royal residences of the world. In the town are a library of over 112,000 volumes, a hippodrome, and a shooting school. The population in 1901 numbered 54,982; it was formerly 100,000.

The palace, dating from 1661, and restored and converted into an historical museum under Louis Philippe, is on the western side of the town, with the park beyond. The park is laid out on regular lines running obliquely to the meridian. Three spacious avenues—the middle one the historic Avenue de Paris—pass through Versailles and converge in the great Place des Armes, which separates the palace from the town and through which the former is entered. South of this place is the room of the Jeu de Paume, where the famous Third Estate met in June, 1789. The room contains a Musée de la Révolution. The palace is composed of a central square, two wings at the right and left of it, and a third wing backing on the square and extending into the park. The imposing façade is one-fourth of a mile long. The Cour d'Honneur is entered from the Place, large pillars marking the entrance and symbolizing national victories under Louis XIV. Most of the great French painters, notably David, Delacroix, and Horace Vernet, are represented here, and all the history of France, with its great battles and ceremonies, is spread on canvas before the visitor. There are also countless portraits and statues.

The royal chapel is sumptuously adorned, and has good ceiling pictures by Coypel. At the north end of this wing is the theatre, built by Louis XV. and used by the National Assembly after the Franco-Prussian War and later by the Senate. The Rooms of the Crusades are resplendent and covered with large modern paintings. The impressive Galerie de Constantine holds some of the finest battle pictures of Vernet. The Grands Apartments of Louis XIV. overlook the park, and contain noteworthy paintings. Adjoining is the famous Galerie des Glaces—an immense and sumptuous room facing the centre of the gardens. Its paintings are by Charles Lebrun. William I. was crowned Emperor of Germany in this room in 1871. The bedchamber of Louis XIV. is imposing and contains the magnificent bed on which he breathed his last. His Petits Apartments are contiguous, and include the bedchamber of Louis XV., where he died. The famous antechamber—the Œil de Bœuf, so termed from its oval window—was where the gentlemen of the Court awaited the royal 'lever.' The Grands Apartments of the Queen are beautifully decorated. In the immense and gorgeous Galerie des Batailles—over 130 yards long—are many grand battle pictures by modern French artists. The Galerie de l'Empire contains paintings representing the career of Napoleon.

The park with its decorative ponds and vast fountains was first laid out by the celebrated Le Nôtre. It is imposing, but thoroughly stiff and artificial, and has served as a famous type of Renaissance garden. Terraces, large ornamental basins, huge vases overflowing with flowers, countless marble groups and busts, statues—especially reflecting the appropriate art of Coyzevox—quincunxes, bosquets, and geometrically trimmed trees, here mock nature and the natural. An immense pond stretches away in the shape of a cross in front of the palace. The playing of the grand fountains, enlivened by colored lights, is one of the great sights in and about Paris. The water is supplied by the famous machine of Marly. The largest fountain, the Bassin de Neptune, is a wonderful piece of hydraulic mechanism. Two immense flights of marble step descend on the opposite side of the palace to the famous orangery, beyond which extends a vast pond which was dug by the Swiss guard of Louis XIV. A school of horticulture is near. The gardens proper have a salle de Bal or des Rocailles, and contain the Bosquet de la Reine, where the notorious transaction of the diamond necklace took place. In the northern section of the park are the charming Grand and Petit Trianon. (See TRIANON.) Near by are the carriage houses, with many vehicles of state, including some of the magnificent equipages used by Napoleon.

HISTORY. When Louis XIV. chose Versailles as the site of his new palace and park, it had little to commend it, being a low, swampy area, and distant from an adequate water supply. A château (1627) of Louis XIII., however, was situated here. The 'grand monarch' lavished vast sums in laying out, completing, and maintaining this magnificent royal seat. The Court came here permanently about 1682, and from this date for over a hundred years Versailles figured prominently in history. Louis XV. dwelt here and Madame de Pompadour and Madame Du Barry reigned over this vast pleasure establishment. Here, too, Louis XVI. and Marie Antoinette resided. In the palace was signed the treaty of 1783 between England, France, and Spain, on the same day (September 3d) on which the definite treaty of peace in which England recognized the independence of the United States was signed in Paris. On October 6th the palace was ravaged in the presence of Louis by the market women and fish-wives, with the result that the King and Queen were forced to go to Paris. The meeting of the States-General, the opening act of the French Revolution, took place here on May 4, 1789. Since then it has has never been a residence. During the siege of Paris in

1870-71 King William I. made his headquarters here, and here he was crowned German Emperor, January 18, 1871. When the Germans departed, the French Government established itself at Versailles, whence it carried on war against the Paris Commune. It remained here until 1879, when Paris was once more made the political capital.

Consult: Laurent-Hanin, *Histoire municipale de Versailles* (Paris, 1885-89); Bosq, *Versailles et les Trianons* (ib., 1887); Molinier, *Versailles, ses arts decoratifs, ses musées et ses collections* (ib., 1888); Bouché, *Versailles* (Versailles, 1895).

VERSCHAFFELT, vĕr-skäf′fĕlt, Pieter Antonie (known also as Pietro Fiammingo) (1710-93). A Flemish sculptor and architect, one of the best known exponents of the rococo style. He was born in Ghent and studied under his uncle, Pieter de Sutter, and Bouchardon in Paris. He executed in Rome a monument to Pope Benedict XIV., the bronze figure of the archangel Michael (1740) which surmounts the Castle of Sant' Angelo, and numerous busts. By the Elector Palatine, Charles Theodore of Bavaria, he was appointed director of the academy at Mannheim. There he spent the remainder of his life. He built the arsenal and set up the high altar of the Hofkirche.

VERSECZ, vĕr′shĕts. A town in the County of Temes, Hungary, at the foot of the Versecz Mountain, 45 miles south of Temesvár (Map: Hungary, G 4). Steam sawmills, breweries, and machine shops are the chief industrial establishments. The town is famous for its brandy and red wine. Population, in 1900, 25,199, mainly Germans and Magyars.

VERSIFICATION (Lat. *versificatio*, from *versificare*, to versify, from *versus*, verse, line, furrow, turning, from *vertere*, to turn; connected with Skt. *vart*, to turn, Goth. *wairþan*, AS. *weorþan*, OHG. *werdan*, Ger. *werden*, to become + *facere*, to make, do). A term used to designate both the art of making verses and the principles on which that art is based. In the latter sense it includes rhythm and metre. By *rhythm* is meant the measured movement of language which is caused by the regular recurrence of metrical units known as feet. These units may be formed by a combination either of long and short syllables, i.e. be based on *quantity*, or of stressed and unstressed syllables, i.e. be based on *accent*. *Metre* deals with the measurement of poetry by means of the rhythmical feet.

GREEK AND LATIN.

The unit of measure for the foot is the short syllable, ⏑, technically called *mora*. having the musical value of an eighth note ♪; a long syllable is equivalent to two *moræ*, —, ♩. In certain measures a long syllable may be protracted to the length of three or four moræ, ⌞, ♩.; ⌴, 𝅗𝅥; or a syllable may be shortened so as to occupy less than its normal time. These phenomena, however, are confined for the most part to logaœdic verse (q.v.), and therefore have been dealt with under that head. Each foot has an accented and an unaccented part. The portion on which the metrical accent, *ictus*, falls is called the *thesis*, the unaccented the *arsis*.

The principal feet are the following:

Feet of three moræ ($\frac{3}{8}$ *time*).

Trochee — ⏑ *εἶπε*, prīmus ♩♪
Iambus ⏑ — *λέγω*, amō ♪♩
Tribrach ⏑⏑⏑ *λέγετε*, hominis ♪♪♪

Feet of four moræ ($\frac{2}{4}$ *time*).

Dactyl — ⏑⏑ *εἴπομεν*, dūcimus ♩♪♪
Anapæst ⏑⏑ — *σέβομαι*, facerent ♪♪♩
Spondee — — *εἴπω*, dūcō ♩♩
Proceleusmatic ⏑⏑⏑⏑ *λεγόμεθα*, mulieris ♪♪♪♪

Feet of five moræ ($\frac{5}{8}$ *time*).

Cretic — ⏑ — *εἰπέτω*, dūcerent ♩♪♩
First Pæon — ⏑⏑⏑ *λειπόμεθα*, duxerimus ♩♪♪♪
Fourth Pæon ⏑⏑⏑ — *λεγομένη*, celeritās ♪♪♪♩
Bacchius ⏑ — — *λεγοίμην*, amābant ♪♩♩
Antibacchius — — ⏑ *φαίνητε*, dūcēbat ♩♩♪

Feet of six moræ ($\frac{6}{8}$ *or* $\frac{3}{4}$ *time*).

Choriambus — ⏑⏑ — *ἐρχομένη*, difficilēs ♩♪♪♩
Ionic *a maiore* — — ⏑⏑ *ἐκλείπομεν*, dēdūcerem ♩♩♪♪
Ionic *a minore* ⏑⏑ — — *ἐλελοίπη*, relegēbant ♪♪♩♩

These feet are variously combined into the larger units of *dipody* (two feet), metrical sentence or *colon*, and *verse*, which are bound together by the fact that the chief ictus falls on one foot in each unit; the colon and verse may be identical, as in some lyric measures, or the verse may contain two or more cola. Verses are named *trochaic*, *iambic*, *dactylic*, etc., according to the nature of the fundamental foot. The last syllable of most verses may be either long or short indifferently, *syllaba anceps;* if the last foot lacks a syllable, the verse is called *catalectic*, but if it be complete, *acatalectic*. Whenever a word ends within a foot, the resulting break is known as *cæsura* and is marked thus, ||; if the end of a word coincide with the end of a foot, the break is named *diæresis*, noted thus ‡.

Trochaic Rhythms. Trochaic verses are usually measured by dipodies (—́ ⏑ —̇ ⏑). In the place of the second trochee, rarely of the first, a spondee pronounced in the time of a trochee (hence called an irrational spondee, —>) may be admitted. The apparent anapæst (⏑⏑>) and the cyclic dactyl (—͝ ⏑) are sometimes used; and the tribrach (⏑⏑⏑) is freely substituted in any foot but the last. The most frequent trochaic line is the *tetrameter catalectic*, measuring seven feet and one syllable, divided into two cola by a diæresis after the second dipody. The movement is rapid and well suited to express excitement. It was employed by Archilochus and Solon; it was the favorite measure of Epicharmus, and is frequently employed in the old Attic comedy. In early tragedy it was also used, but in the later only after about B.C. 415. Example:

—́ ⏑ —̇ ⏑ | —́ ⏑ —̇ > —́ ⏑ —̇ > | —́ ⏑ ⏑̇ ∧
ὦ σοφώτα | *τοι θεαταί* ‡ *δεῦρο τὸν νοῦν* | *πρόσχετε*
Aristoph. N., 575.

VERSAILLES

The same form of verse, under the name *septenarius*, was common in Latin comedy and was employed by Varro, Seneca, and many later Latin poets. In the early period, however, the Romans admitted substitutions in any foot but the last; in later Latin verse the Greek models were adhered to more strictly.

Hipponax (q.v.) introduced a modification of the trochaic tetrameter catalectic in which the last syllable but one is always long; the substitutions allowed are few. This form is called *Hipponactean* or *Scazon*, the 'lame tetrameter,' from its peculiar movement. This may be illustrated by the following:

ἀμφιδέξι | ος γάρ εἰμι # κοὐχ ἁμαρτά | νω κόπτων
Hippon. frg. 83.

nec coruscus | imber alto # nubilo
ca | dens multus
Varro, *Sat.* frg. 557.

The rare trochaic *tetrameter acatalectic* is mostly confined in both Greek and Latin to lyric systems. Great freedom of substitution is allowed especially in Latin comedy.

κλῦθί μευ γέ | ροντος, εὐέ#θειρα χρυσό | πεπλε κούρα
Anac. frg. 76.

adeon homin(em) es | s(e) invenust(um) aut#
infelicem | quemqu(am) ut ego sum
Ter. *And.* 245.

Of the other trochaic rhythms too great variety, ranging from the dipody to the hexapody, is employed in lyric passages to admit of illustration here.

IAMBIC RHYTHMS. Iambic, like trochaic rhythms, are usually measured by dipodies (⏑⏑́⏑⏑). The tribrach is here allowed in any foot but the last, and the irrational spondee (>–́), the irrational dactyl (>⏑́⏑), or the cyclic anapæst (⏑⏑́) may be substituted in the first foot of any dipody. The most common iambic verse is the *trimeter acatalectic*, in which the dialogue of the drama is composed. In Greek tragedy resolutions are not frequent and substitutions are usually confined to the first foot of the dipody, e.g.

ὦ τέκνα Κάδ | μου ‖ τοῦ πάλαι | νέα τροφή
τίνας ποθ' ἕ | δρας ‖ τάσδε μοι | θοάζετε
Soph. *O. T.* 1-2.

In comedy, however, the greatest freedom is allowed except in the sixth foot, which is always an iambus, e.g.

ὅσα δὴ δέδηγ | μαι ‖ τὴν ἐμαυ | τοῦ καρδίαν,
ἥσθην δὲ βαι | ά, ‖ πάνυ δὲ βαι | ά, τέτταρα
Arist. *Achar.* 1-2.

With the early Latin poets this verse, called by the Roman grammarians the *senarius*, was even less restrained, the proceleusmatic (⏑⏑⏑⏑) being a possible substitution in any foot but the last, e.g.

ubi vent(um) ad æ | dis ‖ est Dromo
pultat fores;
anus quædam prod | it; ‖ hæc ub(i) ape-
rit ostium
continu(o) hic se | coniecit ‖ in-
tr(o), ego consequor.
Ter. *Haut.* 275-7.

The later Roman writers, like Horace, conformed more closely to their Greek models, but the degree of strictness varied with each writer.

The *Choliambus* or *limping iambus* is an iambic trimeter in which a trochee has been substituted for the last iambus of the normal line. As this verse, like the corresponding trochaic measure, was introduced by Hipponax for satiric and ludicrous effects, it is also known as the *Hipponactean*. In the Alexandrine period it became a favorite measure for narrative and didactic poetry, especially for fables; the mimes of Herondas, discovered in 1890, are in this verse. In Latin it was used by Catullus, Martial, and others.

miser Catul | le, ‖ desinas | ineptire
Catul. 8, 1.

The *iambic tetrameter catalectic* (in Latin called the *septenarius*) is frequent in comedy. Resolutions and substitutions are numerous in the first six feet, and in Latin are allowed even in the seventh.

καὶ μὴν πάλαι | γ' ἐπνιγόμην # τὰ σπλάγχνα
κά | πεθύμουν
Arist. *Nub.* 1036.

verb(um) unum cave | de nuptiis, #n(e) ad
morb(um) hoc eti | am teneo
Ter. *And.* 300.

The *iambic tetrameter acatalectic* (Latin *octonarius*) is much less frequently used, but is found in the Greek lyric poets and in the cantica of Latin comedy.

Κάστωρ τε πώ | λων ὠκέων #δματῆρες, ἱπ | πότ αι σοφοί,
Alc. frg. 2.

enim vero, Da | ve, nil locist ‖ segnitiæ
neque | socordiæ
Ter. *And.* 206.

DACTYLIC RHYTHMS. In all dactylic rhythms the regular substitute for the dactyl (— ⏑⏑) is the spondee (— —). In Greek and Latin alike the *dactylic* or *heroic hexameter* is the most common form of verse, and is regularly employed in epic, didactic, and bucolic poetry. It contains six feet, of which the first four may be either dactyls or spondees, the fifth is usually a dactyl (when a spondee is here used, the verse is called *spondaic*), and the sixth is either a spondee or a trochee. The chief cæsura is usually after the thesis—occasionally in the arsis—of the third foot, less often after the thesis of the fourth. A diæresis after the fourth foot is called *bucolic* from its frequency in bucolic poetry.

ἄνδρα μοι | ἔννεπε, | Μοῦσα, ‖ πο | λύτροπον, | ὃς μάλα |
πολλά

–́ ⏑ ⏑ | –́ – | –́ || ⏑ ⏑ | –́ ⏑ ⏑ | –́ ⏑
πλάγχθη ἐ | πεὶ Τροί | ης || ἱε | ρὸν πτολί | εθρον
⏑ | – ⏑
ἔ | περσεν

Odys. 1, 1-2.

–́ ⏑ ⏑ | –́ – | –́ || – | –́ – | –́ ⏑
conticu | er(e) om | nes, || in | tenti | qu(e) ora
⏑ | –́ –
te | nebant.
–́ ⏑ ⏑ | –́ ⏑ ⏑ | –́ – | –́ || – | –́ ⏑ ⏑ | –́ –
inde to | ro pater | Æne | as || sic | orsus ab | alto.

Vergil *Æn.* 2, 1-2.

The *dactylic pentameter* consists of two catalectic dactylic tripodies, separated by diæresis. Spondees as substitutes for the dactyls are permitted only in the first half of the verse, and syllaba anceps is allowed only at the end of the second tripody. This verse is never used by itself, but always follows a dactylic hexameter, the two making an *elegiac distich.* This couplet is found in elegiac poetry (hence the name), and was frequently employed for amatory verse and epigrams.

– – | – – | – || ⏑ ⏑ | – ⏑ ⏑ | – ⏑ ⏑ | – ⏑
ὦ ξεῖν', | ἀγγέλ | λειν || Λακε | δαιμονί | οις ὅτι | τῇδε
– ⏑ ⏑ | – – | –∧ – ⏑ ⏑ | – ⏑ ⏑ | –∧
κείμεθα | τοῖς κεί | νων # ῥήμασι | πειθόμε | νοι
– ⏑ ⏑ | – ⏑ ⏑ | – || – | – ⏑ ⏑ | – ⏑
Tityrus | et sege | tes || Æ | neïa | qu(e) arma
⏑ | – ⏑
le | gentur
– ⏑ ⏑ | – – | –∧ – ⏑ ⏑ | – ⏑ ⏑ | ⏑∧
Roma tri | umpha | ti # dum caput | orbis e | rit

Ovid *Am.* 1, 15, 25-26.

The *tetrameter acatalectic* was used by Alcman and other Greek lyricists in dactylic strophes.

A tetrameter catalectic with an hexameter forms the *Archilochian strophe*, and the trimeter catalectic is known as the *lesser Archilochian* verse; both are employed by Horace.

Anapæstic Rhythms. Anapæstic verses are much more numerous in Greek than in Latin, as the latter language does not lend itself readily to this measure. The most common metrical equivalents for the anapæst (⏑ ⏑ —) are the spondee (— –́), dactyl (— ⏑́ ⏑), and rarely the proceleusmatic (⏑ ⏑ ⏑́ ⏑). The verses are measured in dipodies. The common forms in Greek are: (a) the *monometer;* (b) the *dimeter acatalectic;* (c) the *dimeter catalectic* or *parœmiac*, e.g.:

– –́ | ⏑ ⏑ –́
(*a*) σύμφω | νος ὁμοῦ

Arist. *Av.* 221.

⏑ ⏑ –́ ⏑ ⏑ –́ | ⏑ || ⏑ –́ ⏑ ⏑ –́
(*b*) πτερύγων ἐρετμοῖ | σιν || ἐρεσσόμενοι

Æsch. *Ag.* 52.

⏑ ⏑ –́ – –́ | ⏑ ⏑ –́ –∧
(*c*) σὲ μὲν εὖ πράσσοντ' | ἐπιχαίρω

Soph. *Aj.* 136.

Both tragedy and comedy frequently employ a series of anapæstic dimeters, acatalectic, with an occasional monometer, closing always with a parœmiac, the whole forming an *anapæstic system.* Such systems are very common as march movements, e.g.

⏑ ⏑ –́ ⏑ ⏑ –́ | ⏑ ⏑ –́ ⏑ ⏑ –́
(*d*) δέκατον μὲν ἔτος | τόδ' ἐπεὶ Πριάμου
⏑ ⏑ –́ ⏑ ⏑ –́
μέγας ἀντίδικος
⏑ ⏑ –́ ⏑ ⏑ –́ | – ⏑́ ⏑ – –́
Μενέλαος ἄναξ | ἠδ' Ἀγαμέμνων,
⏑ ⏑ –́ ⏑ ⏑ –́ | – –́ – –́
διθρόνου Διόθεν | καὶ δισκήπτρου
– –́ ⏑ ⏑ –́ | – ⏑́ ⏑ – –́
τιμῆς ὀχυρὸν | ζεῦγος Ἀτρειδᾶν
⏑ ⏑ –́ – –́ | – ⏑́ ⏑ – –́
στόλον Ἀργείων | χιλιοναύταν
– ⏑́ ⏑ – –́
τῆσδ' ἀπὸ χώρας
– –́ ⏑ ⏑ –́ | ⏑ ⏑ –́ –
ἦραν, στρατιῶ | τιν ἀρωγήν.

Æsch. *Ag.* 40-47.

By the union of an acatelectic with a catalectic dimeter the *anapæstic tetrameter catalectic* is formed, which was employed by Tyrtæus and Epicharmus, and which in Attic comedy is the regular measure for the entrance and departure of a chorus or an actor, for the parabasis, and for the chief part of the agon.

⏑ ⏑ –́ – –́ | ⏑ ⏑ –́ – –́ ⏑ ⏑
(*e*) ἄγετ', ὦ Σπάρτας | ἔνοπλοι κοῦροι, # ποτὶ
–́ ⏑ ⏑ –́ | – –́ ⏑∧
τὰν Ἄρεος | κίνασιν

Tytr. frg. 16.

– –́ – –́ | – ⏑́ ⏑ – –́ – –́ –
ὑμεῖς δ' ἡμῖν | πρόσχετε τὸν νοῦν # χαίροντες
–́ | ⏑ ⏑ –́ –∧
τοῖς | ἀναπαίστοις

Arist. *Eq.* 69.

In Latin, anapæstic measures are found in Plautus, where their measurement is often doubtful; Terence avoided them; but Varro, Seneca, Prudentius, and other late writers employed them, conforming, however, more strictly to their Greek models than Plautus did. Of the forms enumerated above *b*, *c*, *d*, and *e* are found.

⏑ ⏑ –́ – ⏑́ ⏑ | – –́ ⏑ ⏑ –́
(*b*) hic homost omni(um) homi | num præcipuos
⏑ ⏑ –́ ⏑ ⏑ –́ | – –́ ⏑ ⏑ –́
voluptatibus gau | diisqu(e) antepotens.

Plaut. *Trin.* 1115-16.

⏑ ⏑ –́ ⏑ ⏑ –́ | – –́ – ∧
(*c*) nimis tand(em) eg(o) abs te | contemnor

Plaut. *Ps.* 916.

– ⏑́ ⏑ – –́ | ⏑ ⏑ –́ ⏑ ⏑ –́
(*d*) sed quis hic est qu(i) in | plate(am) ingreditur
– ⏑́ ⏑ – –́ | ⏑ ⏑ –́ ⏑ ⏑ –́
cum nov(o) ornatu | specieque simul?
– –́ ⏑ ⏑ –́ | ⏑ ⏑ –́ | ⏑ ⏑ –́
pol quamquam domi | cupi(o) op | periar:
– –́ ⏑ ⏑ ⏑́ ⏑ | – –́ – ∧
qu(am) hic rem gerat, anim(um) | advortam

Plaut. *Trin.* 840-842.

– ⏑́ ⏑ – ⏑́ ⏑ | – –́ – –́
(*e*) hunc hominem decet | aur(o) expend(i): huic #
⏑ ⏑ ⏑́ ⏑ – ⏑́ ⏑ | – –́ – ∧
decet statuam statu(i) | ex auro

Plaut. *Bac.* 640.

Further in Latin two anapæstic dimeters acatalectic are combined to form a *tetrameter acatalectic* or *octonarius.* Diæresis regularly occurs after the second dipody and both *hiatus* and *syllaba anceps* are allowed before the diæresis.

– ⏑́ ⏑ ⏑ ⏑ –́ | – ⏑́ ⏑ – –́ –
quid mihi meliust | quid magis in remst # qu(am) a
–́ ⏑ ⏑ –́ | – –́ – –́
corpore vi | tam secludam

Plaut. *Rud.* 220.

Cretic and Bacchiac Rhythms. Rhythms of this class are all employed to express great emotion. For the cretic (–́ ⏑ –́) may be substituted the following forms:

–́ ⏑ ⏑́ ⏑, ⏑́ ⏑ ⏑ –́, –́ > –́, ⏑́ ⏑ > –́, –́ > ⏑́ ⏑.

The bacchius (⏑ –́ –́) may have the forms

⏑ –̇ ⏑ –̇, ⏑ –́ –̇ ⏑, > –́ –̇ (or for the antibacchius these reversed). The *tetrameter acatalectic* is the most common measure.

⏑ –́ — | ⏑ –́ — | ⏑ –́ — | ⏑ –́ —
τίς ἀχὼ, | τίς ὀδμὰ | προσέπτα | μ' ἀφεγγής;
Æsch. *Prom.* 115.

–́ ⏑ — | –́ ⏑ — –́ > — | –́ ⏑ —
ut malis | gaudeant ♯ atqu(e) ex in | commodis
Ter. *And.* 627.

In the lyric portions of Greek tragedy, where great excitement is expressed, a peculiar foot, called *dochmiac*, is found, made up of an iambus and a cretic (⏑—, —⏑—), or of a bacchius and an iambus (⏑——, ⏑—). Since all possible substitutes for the constituent parts are allowed, the foot appears in a great variety of forms.

CHORIAMBIC AND IONIC RHYTHMS. Many verses once called choriambic are now regarded as logaœdic; genuine choriambics are exceedingly rare, there being not over six cases in Latin.

–́ ⏑ ⏑ –̇ | –́ ⏑ ⏑ –̇ | –́ ⏑ ⏑ –̇ | –́ ⏑ ⏑ –̇
δεινὰ μὲν οὖν, | δεινὰ ταράσ | σει σοφὸς οἰ | ωνοθέτας
Soph. *O. T.* 484.

–́ ⏑ ⏑ –̇ | –́ ⏑ ⏑ –̇ | –́ ⏑ ⏑ –̇
ut neque quid | me faciam | nec quid agam ||
> –́ ⏑ ∧
certum sit.
Ter. *Adel.* 611.

The close of the second example is apparently an iambic dipody catalectic.

Ionic rhythms appear chiefly in tripodies and tetrapodies.

⏑ ⏑ –́ –̇ | ⏑ ⏑ –́ –̇ | ⏑ ⏑ –́ –̇
πεπέρακεν | μὲν ὁ περσέ | πτολις ἤδη
⏑ ⏑ — — | ⏑ ⏑ — — | ⏑ ⏑ — — | ⏑ ⏑ — —
βασίλειος | στρατὸς εἰς ἀν | τίπορον γεί | τονα χώραν
Æsch. *Pers.* 65-66.

–́ –̇ ⏑ ⏑ | –́ –̇ ⏑ ⏑ | –́ ⏑ –̇ ⏑ | –́ — ∧
molles, vete | res Delia | ci manu re | cisi.
Petron. 23.

The *ionic a minore tetrameter catalectic* or *Galliambic* verse admits of the greatest variety of resolutions and substitutions, which can only be seen by a study of Catullus, 63.

DACTYLO-EPITRITIC RHYTHMS. About one-half the extant poems of Pindar are written in the dactylo-epitritic measure, which consists of dactyls, spondees, prolonged syllables ⊔, and epitrites. The epitrite is a dipody of the form ⊔́ ⏑ –̇ —, which may also be catalectic, ⊔ ⏑ — ∧. An unaccented syllable at the beginning of the verse (anacrusis) is also permitted.

–́ ⏑ ⏑ | — ⏑ ⏑ | –́ — | ⊔́ ⏑ –̇ — || –́ ⏑ ⏑ | –́
Τυνδαρί | δαις τε φι | λοξεί | νοις ἁδεῖν καλ || λιπλοκά | μῳ
⏑ ⏑ | — ∧
θ' Ἑλέ | νᾳ
— ¦ –́ ⏑ ⏑ | –́ ⏑ ⏑ | –́ — | ⊔́ ⏑ –̇ ∧
κλει ¦ νὰν Ἀκρά | γαντα γε | ραίων | εὔχομαι.
Pind. *Ol.* 3, 1-2.

DACTYLO-TROCHAIC RHYTHMS. These verses consist of two separate cola, one dactylic, the other trochaic. The following combinations are distinguished: (1) the *greater Archilochian*, consisting of a dactylic tetrameter acatalectic, and a trochaic tripody.

–́ ⏑ ⏑ | –́ ⏑ ⏑ | –́ — | –́ ⏑ ⏑ –́ ⏑ | —
solvitur | acris hi | ems || gra | ta vice ♯ veris | et
⏑ –́ >
Favoni
Hor. C. 1, 4, 1.

(2) The *iambelegus*, a trochaic dimeter catalectic with anacrusis followed by a dactylic tripody catalectic. No resolutions are allowed in the first colon, or substitutions in the second.

> | –́ ⏑ | –́ > | –́ ⏑ | –́ ∧ –́ ⏑ ⏑ |
tu | vina | Torqua | to mo | ve ♯ consule |
–́ ⏑ ⏑ | –́ ∧
pressa me | o
Hor. *Ep.* 13, 6.

(3) The *elegiambus*, which is the same as the iambelegus with the cola reversed.

–́ ⏑ ⏑ | –́ ⏑ ⏑ | –́ ∧ ⏑ ¦ –́ ⏑ | –́ > | –́
scribere | versicu | los ♯ a ¦ more | percus | sum
⏑ | –́ ∧
gra | vi
Hor. *Ep.* 11, 2.

Consult: Rossbach and Westphal, *Metrik der griechischen Dramatiker und Lyriker* (3d ed., Leipzig, 1886); Müller, *De Re Metrica* (ib., 1861); Schmidt, *Die Kunstformen der griechischen Poesie* (ib., 1868-69); Christ, *Metrik der Griechen und Römer* (2d ed., ib., 1879); Gleditsch, *Metrik der Griechen und Römer*, in Von Müller's *Handbuch* (3d ed., Munich, 1901).

ROMANCE VERSIFICATION.

Like the Romance languages, versification in the various Romance countries can be treated under one head, for they all have a common foundation and undergo various influences.

The influence of classic Latin, Oriental, and German versifications is very slight as compared with the influence in the Middle Ages of Provençal, and in the Renaissance of Italian versification on those of other countries.

The long or short quantity of vowels plays no part in Romance versification, except in some scattered and fruitless attempts at imitations of antique verse, as in the *vers mesurés* of Baïf in the sixteenth century and even more recently. There are, also, mere accented remodelings of the old measured verse which show an inclination to replace syllable length by word accent. Examples of this are to be found all the way from the 'Eulalia-sequence' down to the 'Odi barbare' of the Italian Carducci in our own day.

The principle of fixed syllable count is fundamental in all Romance verse. The rhythm is marked by one or more fixed accented syllables. These are the final syllables of the verse and of the syllabic series when there is more than one accented syllable in the verse. The counting of syllables in each syllabic series or verse includes this last accented syllable; the one or two optional additional syllables at the end of the syllabic series or verse cannot alter the rhythm, for these syllables are unaccented. In the earlier Romance verse we find verses with three or even four fixed accents, as in the trochaic eleven-syllable and fourteen-syllable verse; also the twelve-syllable verse with accented fourth, eighth, and twelfth, long used in the French folk-songs.

A second principle of Romance versification is the vocalic or consonant-vocalic likeness in sound of the last accented syllable at the end of two or more verses. Assonance (likeness of vowels) and rhyme (likeness of vowels and consonants) emphasize the verse-ending and make the rhythm of the verse fall more sharply on the ear, thus compensating in some measure for the decrease, as time went on, in the number of fixed accented syllables.

Very few Romance verses are found entirely without rhyme or assonance; yet even more seldom is rhyme found confined to the same sound of the consonant, or on an unaccented syllable, or binding accented with unaccented syllables. However, from the beginning of the sixteenth century in Italian, under the influence of classic Latin, rhymeless verses (*versi sciolti*) are found, which were used in various genres and were well liked, as is shown by their use in Trissino's *Sofonisba*, Ariosto's comedies, Rucellai's *Api*, and Allemanni's *Coltivazione*. The Spanish *versos sueltos*, the French *vers blancs*, and also English blank verse are learned productions and largely imitations of Italian models. Verses without assonance or rhyme are not present in the older French and Provençal poetry; unbound single lines like those at the ends of the *tirades* in *Aucassin et Nicolette* are very rare.

The fundamental principles of Romance versification lie, then, in a fixed number of syllables before the last accented syllable of each syllabic series and verse, and in the like sound of the last accented vowels respectively of the last accented syllables of at least two verse lines. It is probable that the roots of Romance versification go back even to the time of archaic Latin. By the first century A.D. there is a perfected system of fixed syllable count. In vulgar Latin verse, the coincidence of verse and word accent is frequently met, and especially at the end of the verse. Alliteration is very popular here, and alliteration from principle is proper only in accented verse. It is necessary to presuppose an accented old Latin poetry from which Romance versification is descended.

The gradual development of Romance assonance and rhyme out of analogous bindings of the syllabic series and verses in older popular Latin poetry is as probable as the similar development of popular Romance verse. Such bindings are found only sporadically in Latin learned poetry, and the examples found in Commodianus and Saint Augustine are doubtless mere borrowings from popular use. Assonance or rhyme was obligatory to Romance authors from the very beginning, and its origin lies as far back as the principle of the fixed number of syllables. The strophes of popular Romance verse were of two kinds: those which came from very primitive vulgar Latin forms, and those in the poetry of trained artists, who borrowed their models partly from popular poetry, but also from the perfected forms of middle Latin and other artistic literatures.

Romance versifications, by their accent, fall into two great groups, iambic or trochaic verse, verse with rising or falling rhythm. Under the first group, the ten-syllable verse is the most Romance of all Romance verses. The oldest form of this is that which has an extra syllable at the end of the hemistich or verse. These extra syllables could fall in the development of Romance tongues without changing the rhythm. The twelve-syllable verse with accented sixth (or fourth) and eleventh syllables must be considered as the oldest historical ancestor of the ten-syllable verse, and this twelve-syllable verse probably goes back to a fourteen-syllable form with accented sixth and twelfth, and considerations from the history of language strengthen this view. This ten-syllable verse with accented sixth or fourth syllable was the verse of the *Chanson de Roland* and of most of the assonated *chansons de geste*, and is generally common in French lyrics. From the end of the twelfth century it lost ground, but in the fourteenth and fifteenth centuries it reached popularity again as 'vers commun,' and then gradually died out. The Provençal ten-syllable verse is not necessarily borrowed from France, but is early found and much used in Provençal lyrics. In Italian the *endecasillabo*, as the ten-syllable verse is called, because of its regular feminine verse-ending, has held almost undisputed sway in all literary genres from the thirteenth century to the present day. It is probably a native growth, strongly influenced by the Provençal ten-syllable verse. The ten-syllable verse entered Spain with Provençal poetry, and was sparingly and closely imitated. In the fifteenth century came a new introduction from Italy, and it was very popular for a time, yet it was built entirely on Italian models.

The eight-syllable verse is partly of popular origin, and can be followed nearly as far back as the ten-syllable. At first it shows two fixed accented syllables, and was among the most popular versifications of French and Provençal literature. All narrative poetry of the Middle Ages in North and South France use the eight-syllable verse, and the courtly epos and older drama are nearly exclusively eight-syllable. It is generally rhymed in pairs in this period. Since the middle of the sixteenth century it has lost ground and is now used only in lyrics. It is a stranger to Spain, Portugal, and Italy.

In France the twelve-syllable verse with accented sixth succeeded to the place of the ten and eight-syllable verses. First called Alexandrine in the fifteenth century, it was much used in *chansons de geste*, and in drama and didactic poetry of the Middle Ages. Out of style in the fourteenth and fifteenth centuries, it became the verse of classicism in the sixteenth century, and has been important ever since. The rhyming in pairs, so common in Renaissance poetry, is very seldom found in earlier times. In Provençal the twelve-syllable verse is used far less than in France, and is probably an imitation. In Italian are found some early examples, and also in folksong, so that perhaps it is native and ancestor of the ten-syllable verse with accented sixth. The earliest twelve-syllable verses in Spain are in the thirteenth century. They are distinctly imitations of French Alexandrines and are bound in four-line strophes of one rhyme, exactly as in France. Moreover, they are always called *versos franceses*.

The twelve-syllable verse with accented fourth, eighth, and twelfth syllables, is of popular origin, and is found somewhat in French and Provençal poetry.

The six-syllable verse is a free creation of the Romance people and is considerably found in Italian as the *settenario*, though seldom used as the exclusive verse of a complete poem. It is less used in Provençal, modern French, and old Portuguese lyrics.

The four-syllable and two-syllable verses are found in lyrics, and are due to dissection of longer verses.

The trochaic verses are native to Spain and Portugal, and are generally little used in France, Provence, and Italy.

The fourteen-syllable verse with accented seventh was very popular in Spain as verse of the *romances*, and later of the drama, and goes back to the catalectic trochaic tetrameter, which is very popular in older rhythmic Latin poetry. Also the lines of the *Poema del Cid*, a poem of the twelfth century, but preserved in a garbled manuscript of the fourteenth century, are mutilated fourteen-syllable lines, and not, as some have tried to prove, imitations of the French Alexandrine.

The ten-syllable verse with accented fifth is closely allied to the fourteen-syllable, and is called *verso de arte mayor*. It falls into two lines of five syllables each and is met in purely lyrical *romances*. The fourteen-syllable verse is again shortened into the eleven-syllable with accented seventh, the *verso de redondilla mayor con pie quebrado*. This is also found in Provençal, and sometimes bound in strophes with fourteen-syllable verses. The nine-syllable verse is a further shortening of the fourteen-syllable. Examples are found in Italian, Galician, Provençal, old and modern French.

Much more abundant is the seven-syllable verse, *verso de arte real*, or *de redondilla mayor*, which is the independent half of the fourteen-syllable, and is also related to the similarly cut trochaic tetrameter. As a result of this breaking up of the fourteen-syllable came the four-line strophes with cross rhyme—such as the later ballads offer. This seven-syllable verse is also seen in the lyric poetry of North and South France. *Aucassin et Nicolette* is written in this verse in single assonance *tirades*.

The five-syllable, or *redondilla de arte menor*, is often met in Spanish and Portuguese, and comes through division of the ten-syllable trochaic verse with accented fifth. Three-syllable and one-syllable verses, from the breaking up of longer verses, are little more than tests of metrical skill.

As time went on the number of syllabic series was generally reduced to two at most, and feeling for independent nature of the syllabic series was gradually lost. In the binding together of verses, assonance was replaced by rhyme; in some countries earlier, in some later. A great number of rhyme schemes grew up, many of them being later abandoned.

BIBLIOGRAPHY. Stengel, "Romanische Verslehre," in Gröber's *Grundriss der Romanischen Philologie*, vol. ii. (Strassburg, 1892-98); Becker, *Ueber den Ursprung der romanischen Versmasse* (ib., 1890); Ronca, *Metrica e ritmica latina nel medio evo* (Rome, 1890); Schuchardt, "Reim und Rythmus im Deutschen und Romanischen," in *Keltisches und Romanisches* (Berlin, 1886); Tobler, *Vom französischen Versbau alter und neuer Zeit* (3d ed., Leipzig, 1894); De Gramont, *Les vers français et leur prosodie* (Paris, 1876); Jeanroy, *Les origines de la poésie lyrique en France au moyen âge* (ib., 1889); Schuchardt, *Ritornell und Terzine* (Halle, 1875); Wolf, *Lais, Sequenzen und Leiche* (Vienna, 1841); id., *Studien zur Geschichte der spanischen und portugiesischen National-litteratur* (Berlin, 1859); Diez, *Ueber die erste portugiesische Kunst- und Hofpoesie* (Bonn, 1863); Casini, *Notizia sulle forme metriche italiane* (Florence, 1884).

GERMANIC AND ENGLISH.

There has been of late a tendency, conspicuously represented by Sidney Lanier, to break away from tradition and to found an independent science of English verse. This undertaking may ultimately lead to a new system, which shall be at once simpler and more accurate than the old one, but no such scheme has yet received general adoption.

In this article, therefore, which is concerned rather with an historical account of the principal English verse-forms than with a fundamental theory of poetics, the old terms will be retained. A measure like the following, for example, will be called *anapæstic*:

Where he stands, the Arch-Fear in a visible form,
Yet the strong man must go;

and the reverse movement *dactylic*:

Take her up tenderly,
Lift her with care.

The term *foot* will be employed for the metrical unit, and lines of the following type may be termed either *iambic pentameters* (to denote the measure or the number of feet) or *decasyllabic couplets* (to denote the normal number of syllables and the rhyme-scheme):

In friendship false, implacable in hate,
Resolved to ruin or to rule the State.

A fundamental distinction between English and classical versification becomes at once apparent from these first illustrations. In Greek verse, and the classical Latin verse which arose from its influence, the rhythm was primarily quantitative and was determined by the regular recurrence of long and short syllables. The metrical stress, which accompanied this rhythm, did not coincide necessarily, or even usually, with the regular accent of the separate words. In English verse, on the contrary, as in certain popular and mediæval Latin verse, the rhythm is accentual, and quantity, though by no means negligible, is not the determining principle. The metrical stress coincides in general with the normal word-stress, and in order to preserve this word-accent considerable freedom is allowed in the transposition of metrical feet.

Accentual rhythm, accompanied by alliteration, is characteristic of the earliest known Germanic verse. In fact, the type may be still older, and may have been common (as a recent theory maintains) to the Germanic, Celtic, and Italian peoples. A great body of this alliterative verse is preserved in Anglo-Saxon, Old Saxon, and Old Norse, and a few lines from Anglo-Saxon will illustrate its structure:

Hwæt! we Gār-Dena in gēardagum
ēodcyninga þrym gefrūnon
hūþā ā æþelingas ellen fremedon.

The long line consists regularly of two half-lines bound together by carefully regulated alliteration. The number of accents in the half-line is a matter of discussion. According to one theory there are four; and the whole line, with its eight stresses, is made to correspond to a primitive long line assumed for Indo-Germanic. According to another theory, which has been most fully worked out by Sievers, each half-line (disregarding certain hypermetrical forms) has only two accents, and in the distribution of them it conforms to one of the following, in which the grave accent (∸) represents secondary stress: general types:

A. –́x | –́x stíðum wórdum.
B. x–́ | x–́ ne wirterscúr.
C. x–́ | ⏑́x and fórd gángan.
D. –́x | –́xx̀ (or –́xx̀) fórd fóldwège.
E. –́xx̀ (or –́xx) | –́ ándlàngue dæg.

Each of the five types admits of several modifications, and except in a few situations there is great freedom as to the number of unaccented syllables. End-rhyme is almost unknown; and stanza structure is very rare in Anglo-Saxon, though regular in Old Norse. The "five-type" verse was employed with marked regularity throughout the Anglo-Saxon period for poetry of all kinds. Indeed, alliterative verse, somewhat freer in structure, continued to be written, alongside of other metrical forms, for several centuries later; and it was handled with masterly skill by two of the ablest poets of the age of Chaucer, Langland and the unknown author of the romance of "Gawayne and the Green Knight." The "Pearl," an elegy by the latter poet, exhibits a very difficult combination of alliteration with a complicated rhyme-scheme.

The Middle English period, however, is marked in general by the adoption and gradual perfection of the more regular measures of which mediæval Latin and Old French verse afforded models. Three new characteristics, all due to foreign influence, made their appearance in this later verse: (1) end rhyme (see RHYME) took the place of the earlier alliteration; (2) stanza structure, a development closely associated with rhyme, became common; (3) the number of unaccented syllables in a line was more strictly regulated. The change to the new type of versification was gradual, and English poetry long showed traces of the older usages. Yet the *Poema Morale*, a poem of the twelfth century, in rhymed septenaries, attained a pretty strict regularity in syllable-counting; and the *Ormulum* (about 1200, in unrhymed septenaries) is mechanically monotonous. Layamon's *Brut*, on the other hand, a long poem of about the same time, is more various in structure. It employs both rhyme and alliteration, and retains the old freedom of accentual rhythm. The accentual system persisted in many poems throughout the Middle English period, and later still in popular ballads and in the so-called 'tumbling verse' of early modern English writers. In fact, the 'new principle' of Coleridge's *Christabel* was really a revival of the old, native English method of counting accents.

In addition to the metres already mentioned, wide use was made in Middle English of the Alexandrine (often combined with the septenary, but employed in comparative purity in Robert Mannyng's *Chronicle*), the octosyllabic couplet (extremely frequent), and a number of lyric forms. There was considerable imitation of French poetry in its more complicated, as well as its simpler stanza arrangements; and the so-called 'tail-rhyme stanza' (used with humorous effect in Chaucer's *Sir Thopas*) was fairly common in narrative verse. To Chaucer, the first great master of the newer versification, is due the introduction of two important metres: the 'rhyme royal' (seven-line pentameter stanzas rhyming ababbcc), and the decasyllabic couplet. Of the former he has some 14,000 lines, and of the latter some 16,000; and both measures became in his hands admirable instruments for continuous narration. The rhyme royal was popular with Chaucer's immediate followers, Lydgate, Occleve, Dunbar, and James I. of Scotland, and was used later by Skelton, Barclay, and Sackville. Shakespeare employed it in *The Rape of Lucrece*, but since then it has been rare. The pentameter couplet always remained a favorite English metre.

The beginning of the modern English period is marked by no such change in the fundamental principles of versification as that which took place between Anglo-Saxon and Middle English. Chaucer's system has been in all essentials the system of English poets ever since, though the modifications of the language through loss of inflections, and the like, have considerably altered the technical problems of English poetry. The nature of these changes can best be made to appear by comparing a few lines of Chaucer's *Knight's Tale* with Dryden's modernization of the same.

"The Firstĕ Moevere of the cause abovĕ,
When he first made the fairĕ cheyne of lovĕ
Greet was theffect and heigh was his ententĕ;
Wel wiste he why and what ther of he mentĕ,
For with that fairĕ cheyne of love he bond
The fyr, the eyr, the water and the lond,
In certeyn boundĕs that they may nat flee."

Dryden renders the passage:

"The Cause and Spring of motion from above
Hung down on earth the golden chain of Love;
Great was the effect, and high was his entent,
When peace among the jarring seeds he sent;
Fire, flood, and earth and air by this were bound,
And love, the common link, the new creation crowned."

A complete survey of modern English verse-forms lies far beyond the range of this article. It is not possible here to do more than name the commoner metres and give some brief indications of their history.

The long septenary, or seven-stress line, of which Chapman's *Iliad* is a famous example, is unusual in modern English. But in its resolved form, printed as quatrains of alternating four-stress and three-stress verse, it constitutes the 'common metre' of the hymn-books; and one of the most frequent ballad stanzas has the same movement, though perhaps different in origin. The combination of septenaries with Alexandrines made the so-called 'poulter's measure,' which was rather popular with Elizabethan writers. Pure Alexandrine measure, like that of Drayton's *Polyolbion*, has not been common.

The octosyllabic couplet has been relatively less important in modern than in early English, particularly for narration. It was a good deal used for descriptive and reflective poetry by writers of the seventeenth and eighteenth centuries, partly because of the influence of Milton's *L'Allegro* and *Il Penseroso*. Butler's *Hudibras* gave it a new character as a typical metre of satire or burlesque, also well exemplified by Swift. In the nineteenth century it was again adopted for serious narration by Wordsworth, Byron, and Scott.

The various combinations of pentameter verse have undoubtedly been the favorite forms of

English metre. The eight-line stanza, imitated from the Italian 'ottava rima' (rhyming abababcc), was introduced by Wyatt and Surrey, and used by Spenser, Daniel, Drayton, Harrington, and Fairfax, chiefly in romantic poetry. In the nineteenth century Keats, Shelley, and other poets wrote it in the romantic spirit, while Byron and Hookham Frere turned it to satirical uses. The 'Spenserian' stanza (whatever the exact process of its formation) consists of eight pentameter lines (rhyming ababbcbc) with an added Alexandrine. It was invented by Spenser and used in the greater part of his poetry; and it has been imitated by a number of later poets, among them Thomson, Shenstone, Beattie, and Keats. The pentameter couplet, Chaucer's favorite metre, was used by the Elizabethans for various purposes. But its greatest vogue was in the 'classic' period of the seventeenth and eighteenth centuries, when it was steadily developed and perfected by Jonson, Sandys, Waller, Denham, Dryden, and Pope. Throughout the eighteenth century it was the prevailing measure and was written by many poets with strictness and technical skill. In the nineteenth century a freer form, approaching the effect of 'blank verse,' was developed by Leigh Hunt, Keats, Shelley, and Browning. Alongside of the 'heroic couplet' should be mentioned the less widely used 'heroic stanza' (a pentameter quatrain rhyming abab), best known through Gray's *Elegy*. Blank verse, or iambic pentameter measure without rhyme, is probably the most distinctive of English metres, and has served the highest uses. Introduced in the sixteenth century, during the classical reaction against rhyme, it became in the hands of Marlowe and Shakespeare the accepted form for English dramatic poetry; and after Milton's use of it in *Paradise Lost* it was widely adopted for epic and reflective poetry as well. Among the non-dramatic writers who used it in the eighteenth century were Blair, Akenside, Thomson, Young, and Cowper. In the nineteenth century it was very generally written —in highest perfection, perhaps, by Keats and Tennyson, and with great freedom and individuality by Browning. (For fuller treatment of the more important lyric forms, see Ode; Sonnet.) It is impossible to take account here of the numerous minor metrical forms, chiefly lyric, of different periods. Some of them have arisen from the imitation of French metres which began in the Middle English period. There was a distinct revival of this in the nineteenth century, represented by the lighter verse of Henley, Dobson, and Andrew Lang. A number of metrical experiments have been made in the effort to reproduce in English the ancient classical verse-forms, sometimes preserving even their quantitative scansion. One important metre which has been often tried, but never completely naturalized, is the dactylic hexameter. This was first taken up in the time of the classical Renaissance, and among the poets who attempted it were Stanyhurst and Gabriel Harvey, and even Sidney and Spenser. The early hexameters were quantitative. In the eighteenth century the measure was revived, largely under German influence, by Coleridge and William Taylor. The modern hexameters have been for the most part accentual in rhythm, and in the hands of Southey, Clough, Longfellow, and Kingsley have attained some real popularity.

Bibliography. General theory: J. B. Mayor, *Chapters on English Metre* (2d ed., Cambridge, 1901), a valuable exposition of the usual system of metrics; for recent attempts to develop a new system, compare Sidney Lanier, *Science of English Verse* (New York, 1881); Dabney, *The Musical Basis of English Verse* (ib., 1901); Liddell, *An Introduction to the Study of Poetry* (ib., 1902). For general historical surveys, see Edwin Guest, *A History of English Rhythms*, edited by W. W. Skeat (London, 1882); J. Schipper, *Englische Metrik* (Bonn, 1881-88). On the old Germanic verse-forms, see Sievers, *Altgermanische Metrik* (Halle, 1892); also Ten Brink in Paul's *Grundriss der germanischen Philologie* (Strassburg, 1901 et seq.), and Kaluza, *Der altenglische Vers* (1894), both holding the four-accent theory. On German versification, which it has not been possible to include in this article, see for the earlier periods Paul in the *Grundriss der germanischen Philologie*, and for the modern periods Westphal, *Theorie der neuhochdeutschen Metrik* (2d ed., Jena, 1877); Minor, *Neuhochdeutsche Metrik* (2d ed., Strassburg, 1902).

VERSTEGAN, fĕr-stā'g*a*n, Richard (c.1545-c.1630). An Anglo-Dutch antiquarian author, born in London. In 1565 he was entered at Christ Church, Oxford, as Richard Rowlands. After 1576 he removed to Antwerp and resumed the Dutch name of his family. There he established a printing press, and was actively concerned in the printing and dissemination of Catholic literature. His zeal in this respect later caused his imprisonment in Paris (1587) at the instance of the English ambassador. He is known to have gone about 1595 to Spain, where he was received by Philip II. and had some connection with the Catholic college at Seville. He wrote: *The Post of the World, wherein is contayned the antiquities and originall of the most famous cities in Europe* (1576); *Theatrum Crudelitatum Hæreticorum nostri Temporio* (1587, 1588, and 1592; French trans., 1588); *A Dialogue on Dying Well* (1603; translated from the Italian of Pietro di Lucca), and *Restitution of Decayed Intelligence in Antiquities concerning the English Nation* (1605).

VERSUNKENE GLOCKE, fĕr-zụn'k*e*-ne glō'k*e*, Die. See Sunken Bell, The.

VERT, vâr (Fr., green). The name for green in heraldry (q.v.).

VERTEBRA. See Skeleton; Spinal Column.

VERTEBRATA (Neo-Lat. nom. pl. of Lat. *vertebratus*, jointed, articulated, from *vertebra*, joint, vertebra, from *vertere*, to turn). A subdivision of the phylum Chordata, which includes the largest and most differentiated or highly developed of animals. The group, called vertebrates, or back-boned animals, may be defined as follows: Segmented Metazoa provided at some stage of development with a gelatinous supporting rod or 'chorda' running through the long axis of the body, and with throat-clefts or gill-slits. They have a main nerve-tube lying near the dorsal surface of the body which enlarges anteriorly to a brain. There is an internal, metameric, cartilaginous or bony skeleton, consisting typically of an axial series of parts replacing the chorda; of a box (cranium), inclosing the brain; of a series of arches (neural arches) protecting the nerve-tube; and of supports to the body-wall (ribs). The heart is ventral to the alimentary tract, which begins in a ventrally placed mouth and ends in a ventral anus, placed near the base of the tail. Vertebrates are the only group of animals in which the body may be divided into head, trunk, and tail, the tail being postanal. They alone are characterized by having typically, except as lost by degeneration, four limbs. They have an outer skin that consists of more than a single layer of cells. They have an internal skeleton that is essentially living, containing active cells within it. Each pair of limbs, when present, is supported by a bony girdle, which may in extreme cases be rudimentary. The skull, except in Cyclostomi, consists of cranium and lower jaw. The jaws are typically provided with teeth, but these are lost in turtles and birds. The central nervous system consists of a nerve-tube (spinal cord) and brain, with which latter the main sense-organs are connected. The brain is the special seat of sense-perception, of voluntary motor-impulses, and of the higher intellectual faculties. From brain and spinal cord a metamerically repeated series of nerves runs off to the skin, viscera, and muscles. The sense-organs consist of an olfactory pit usually paired; paired camera eyes, with lens; a pair of auditory organs (pits or closed cavities) usually comprising three semicircular canals. In addition to the cerebro-spinal system is a visceral system (the sympathetic). The digestive tract is a tube separated from the body-wall by the peritoneum-lined body-cavity. The digestive tube is divided into œsophagus and stomach, the small intestine with liver and pancreas, and the large intestine. (See ALIMENTARY SYSTEM.) Respiratory organs are typically present, either as gills in the aquatic vertebrates or as lungs. In some salamanders, however, respiration is by the throat and entire skin. The gills (q.v.) are thin plates typically placed in two rows on the gill-arches between the slits. The lungs, which arise, apparently, as swimming bladders in fishes, come to lie ventral and to have a purely respiratory function in land vertebrates. The circulatory system (q.v.) consists of a set of vessels almost wholly cut off from the body-cavity, and carry red blood, due to the red blood-corpuscles. This fluid is propelled by a heart that consists essentially of two parts, a thin-walled auricle that receives blood entering from the trunk behind, and a thick-walled muscular ventricle that forces the blood out forward, to the respiratory organs, head, and trunk. In addition to the blood-vessels are the lymph-vessels, spaces incompletely cut off from the body-cavity, and carrying chiefly white blood-corpuscles and special nutriment to the blood. Special excretory organs (q.v.) are present, essentially consisting of paired, metamerically repeated tubules into which blood-vessels pour their waste material. The tubules empty into a common paired duct, which also may serve, in the male, to convey the sexual products to the exterior. Reproduction is always sexual and the sexes are usually separate. See REPRODUCTIVE SYSTEM: MUSCULAR SYSTEM.

Development usually starts with a yolk-laden egg that cleaves incompletely. The embryo first appears as a disk or blastoderm lying on the yolk. At the hinder edge of the growing disk some cells are pushed in to form the alimentary tract. A pair of parallel folds rise up along the back to form the neural cerebral tube. From the upper right and left angles of the cavity of the alimentary tract metamerically repeated pairs of pouches are cut off to form the mesodermal pouches from whose walls the muscles and lining of the body-cavity arise. The notochord develops first as a continuous groove, and finally as a rod, between the mesodermal masses. By the time the germ-disk has surrounded the yolk the body-wall is completely formed. The yolk lies at the bottom of the gut and forms a huge lump there, which gradually becomes absorbed and the animal assumes the typical cylindrical form. See EMBRYOLOGY.

The vertebrates form the section Craniata of the phylum Chordata, and embrace six classes, namely: the cyclostomes, fishes, amphibians, reptiles, birds, and mammals. See CLASSIFICATION OF ANIMALS; and the names of these various classes, and of their subordinate groups.

MODE OF EVOLUTION OF THE VERTEBRATA.

At a very early period in the history of vertebrates, the internal rod or backbone, at first cartilaginous, became ossified and segmented into vertebræ, and four appendages developed which became fins, legs, or wings, for progression in water, on land, or in the air, respectively. Along the upper side of the backbone lay the spinal cord, holding the cells and nerves which coordinated the action of the different parts of the organism, and the anterior end of this cord early specialized into a brain. The sense-organs and the mouth were grouped around the brain, and the bony structures which developed to protect them and facilitate their action constituted the skull, which became the most characteristic and highly differentiated part of the animal. Many vertebrates developed various protective bony structures over the surface of the body as well as the head.

The higher specialization of an animal, its more exact adaptation to a particular mode of existence, are an advantage to it so long as the conditions of its environment remain the same. But if the conditions change, the highly specialized type is at a disadvantage, as it cannot so well adapt itself to a new environment as its more generalized rivals. It is, therefore, likely to become extinct and be replaced by the less specialized forms, which in turn become highly specialized in adaptation to the new conditions. The many and great geological changes which have taken place involve many and complex changes in the conditions of life, both of marine and land animals, and changes in each group of organisms involve a widening circle of change in all the other groups dependent on it. But in the more complex modes of life a higher intelligence and a better mechanical adaptation to the more general conditions of the environment have been at all times of advantage. We observe, therefore, in the history of vertebrates through geological time, a general continuous progress in intelligence and in the broader lines of adaptation, together with a series of successive specializations in the details of their construction.

The greater size of an animal is of advantage to it in the struggle for life as against its rivals or enemies, but the larger animals require more food in proportion to their size in order to maintain the same relative activity. As long, therefore, as food is sufficiently abundant, a race of animals will tend to increase in size. But if changed conditions bring about a scarcity of food, the larger animals will become extinct and the smaller alone survive, and in their turn increase in size when a season of plenty recurs.

Accordingly we find that as a race of animals specializes in structure it likewise frequently increases in size during stable conditions, and that with changed environment the larger and more specialized animals become extinct. But the improvement in the general mechanical adaptation of its parts enables an animal to attain a greater size without corresponding loss in activity, and through geological time there has been a continual increase in the largest size attained by successive races of similar habits.

Besides structures which serve to protect the animal or aid it in obtaining food or attacking its enemies, the higher vertebrates develop many which are partly or wholly ornamental. The evolution of these is due to sexual selection and goes hand-in-hand with the development of extreme specializations and the increase in size which mark constant conditions of environment.

EARLY HISTORY OF THE VERTEBRATA.

The vertebrates probably originated as aquatic or marine animals partly amphibious. From this point they split into two great sections, one, the fishes, becoming entirely marine, the other becoming amphibious and giving rise to the land vertebrates. These amphibious animals are most nearly represented among modern groups by the newts and salamanders, which with the frogs and toads constitute the order Amphibia. From the primitive Amphibia budded off three great groups or classes, the reptiles, predominantly amphibious, the mammals, predominantly terrestrial, and the birds, predominantly aërial. Each of those classes has since branched out into every available mode of life in its own province, and each has invaded more or less the especial province of the others, and also that of the fishes. The greater diversity and complexity of the conditions of life on the land have favored the evolution there of the highest types of vertebrates. The strictly terrestrial and the aërial life have brought out the highest degree of mechanical specialization of parts; the arboreal life has been among the conditions favoring the highest development of intelligence, and the races standing highest in this respect are arboreal or exhibit indications of descent from arboreal ancestors.

During the geological age of invertebrates, the vertebrates were probably being first evolved from lower animals, as soft eel-like creatures, not unlike the amphioxus which is still found living on the Brazilian coast, without limbs and without bony skeleton, and leaving no traces of their existence in the sediments. During the Silurian period, however, and perhaps as low down as the Ordovician, appeared certain marine vertebrates, somewhat allied to the fishes, but inferior to them in important points of organization, called Ostracodermi (q.v.). These had no internal bony skeleton, but were covered by bony plates over the head and sometimes over the body. Some had curious flipper-like appendages corresponding to the pectoral fins of fishes; there was no separate lower jaw. They are so unlike any living animal that it is difficult to get any complete knowledge of their anatomy from the external hard parts, which are all that is preserved, for the internal skeleton was not calcified.

In the succeeding or Devonian period the ostracoderms continue to exist, and true fishes appear and become the dominant forms of life. They are far more primitive than most modern fishes, less completely adapted for marine life, and in most of them the internal skeleton is not calcified and the fins are very imperfectly developed. The most remarkable among them is the Dinichthys, remotely allied to the modern lungfish, but of huge size and its head covered by massive bony plates. The ostracoderms die out at the end of this period. Fishes appear in all the succeeding marine formations and become more and more like those of the present day.

The next two periods, the Carboniferous and Permian, constitute the age of amphibians, when large and small Amphibia, mostly covered completely with bony plates, were the dominant forms of life. These animals were amphibious, some probably terrestrial, and had developed limbs and feet for progression on land. They show various stages in the calcifying of the backbone, and in some it is complete. In the Permian the first reptiles appear, primitive types not easily distinguished from the Amphibia from which they had originated, but superior to them in their capacity for higher evolution.

Evolution of the Reptilia. During the Triassic, Jurassic, and Cretaceous periods the reptiles were the dominant types, and branched out into terrestrial, aërial, amphibious, and marine groups in great variety, and many of them, such as the dinosaurs (q.v.), were of gigantic size. With them lived ancestors of the modern crocodiles and turtles. The marine reptiles, ichthyosaurs, mosasaurs, and plesiosaurs, were dominant on the ocean, while the pterosaurs or flying reptiles ruled the air. At the end of the Cretaceous most of the reptile orders became extinct.

The first birds appear in the Jurassic, retaining many characters of their reptilian ancestors, especially reptile-like teeth and a long vertebrated tail, from which the tail feathers branch out on each side down to the tip. In the Cretaceous period the birds have lost the reptilian tail, but still retain the teeth. All later birds have horny beaks instead of teeth.

Evolution of the Mammalia. During the age of reptiles the mammals had been slowly evolving, but very little is known of them. The remains that have been found are exceedingly rare and very fragmentary, and indicate very primitive types, of minute size and apparently arboreal habit. But at the beginning of the Tertiary period they appear in force, and rapidly increase in size and variety, taking the place of the reptiles as the dominant type, and like them branching out into terrestrial, arboreal, aërial, marine, and some amphibious races. The ancestry of many modern animals has been traced back through successive stages nearly to the beginning of the Tertiary period, always converging toward a common ancestor. The most complete and instructive of these lines of descent is that of the horse (q.v.); that of the camel stands next in completeness; and less complete series represent the ancestry of many of the higher ruminants, of the elephants, rhinoceroses, tapirs, dogs, and many other animals. Indeed, it may be said that there are comparatively few land mammals of which some ancestral types are not known; and these ancestral forms invariably present primitive characters linking the modern representative to the common ancestor of the mammals, although they often combine these primitive characters with peculiar specializations which show that they are not in the direct line of descent. And these primitive characters are more pronounced in the more ancient forms.

We have, however, very little positive knowledge of the ancestry of the marine mammals, the seals, cetaceans (whales, dolphins, and porpoises, etc.), and sirenians (dugongs and manatees). Setting aside these, with a few rare and peculiar land mammals whose history is unknown, and the Australian mammals (marsupials and multituberculates) which probably diverged from the common stock at an earlier date, we can infer with a high degree of probability from these known lines of descent a common ancestor to the modern mammals, which lived during the Cretaceous period and whose descendants at the beginning of the Tertiary period had diverged comparatively little in characters. This common ancestor was of small size, of a low order of intelligence for a mammal, the legs short, five toes on each foot and claws on the toes, and a long heavy tail. Its teeth were 44 in number, 11 on each side of each jaw, consisting of three incisors, a canine, four premolars, and three molars. The molars had each three sharp cusps arranged in the form of a triangle; the remaining teeth had but one cusp, but the canine was larger than the rest. The animal walked on the sole of the foot, and there are some reasons for thinking that it was at least partly arboreal. Its food was probably chiefly insects or other small animals. Only a few fragments of jaws and teeth of Cretaceous mammals have been found; but some of them correspond, as far as they go, to the characters of the hypothetical type, while others represent more ancient offshoots from the central stock.

The oldest Tertiary mammals preserve nearly all the above characters of their supposed ancestor, but show the early steps of the divergence which led into the various types of the present day. Some were becoming herbivorous, developing hoofs instead of claws, lengthening the limbs and losing one or more of the side toes on each foot to increase the speed, and changing the character of the teeth to fit them better for a vegetarian diet. Others were becoming more strictly carnivorous, adapting the teeth to cut and tear flesh; while others again were arboreal and frugivorous as judged from the characters of their limbs and teeth. In the succeeding stages of the Tertiary the characters of each line become more marked, some lines leading up into modern animals, others into side-branches which have died out. Several of these side-branches ended in clumsy monstrous races of huge size and peculiar form, occupying the same place in the various Tertiary faunas that the elephants, rhinoceroses, and hippopotami do in that of to-day. Such were the Coryphodon and Uintatherium of the Eocene, the Titanotherium and Elotherium of the Oligocene, the Chalicotherium of the Miocene, and various peculiar extinct rhinoceroses in America and Europe.

EVOLUTION OF MAN. Of animals which can be considered as in or near the line of ancestry of man, the remains are very few and very fragmentary in the Tertiary, and are found only in the Old World. It must be supposed that the evolution of man during this period took place in a region which has not been thoroughly explored, or in which the Tertiary strata are not well exposed. But early in the Quaternary period remains and indications of man are found fossil in all parts of the world, along with animals identical or closely allied with those of modern time as well as others which have become extinct, such as the mammoth and the mastodon in the northern world, the megatherium in South America, and the diprotodon in Australia. For the extinction of these and for the rarity of most other large animals at the present time, man is, no doubt, largely responsible, directly as a hunter, or indirectly by depriving them of their food and range. He has become cosmopolitan and dominant in a sense that no animal ever was in previous ages, and it may almost be said that all other animals exist only by his sufferance or to be exploited for his benefit.

MUSEUMS AND COLLECTING GROUNDS. The collections of fossil vertebrates are practically confined to the large museums of Europe and the United States, the best being in New York, London, and Paris. With the Paris Museum is especially connected the name of Cuvier (q.v.). In the middle of the last century Owen and Huxley in England were the most prominent investigators, while in its latter years American students, especially Leidy, Cope, and Marsh, were in the front rank. In recent years American museums and collectors have been in the lead, the arid Western States containing the richest fossil-fields yet known. While in Europe the best collecting grounds have been quarries worked primarily for building-stone, slate, or phosphate rock, or bone-beds of limited area. The Western fossil-fields are the extensive areas of Mesozoic or Tertiary rocks laid bare in the 'bad lands,' and while the fossils are widely scattered, they are remarkably well preserved.

The appended table shows the characteristic vertebrate animals found in the different geological periods as understood at the present time.

BIBLIOGRAPHY. Lucas, *Animals of the Past* (New York, 1901), is a popular book on vertebrate fossils, entertainingly written, but very incomplete. A later book, *Animals Before Man in North America*, by the same author, partly fills the gaps of the earlier work. Hutchinson, *Extinct Monsters* (London and New York, 1892), contains very good accounts of the more remarkable extinct types known up to the date of their publications, but does not include more recent American advances in the subject. A. Smith Woodward, *Outlines of Vertebrate Paleontology for Students of Zoölogy* (Cambridge, 1898), is the best English textbook on the subject, and it contains a well-selected bibliographic list. Zittel, *Handbuch der Paläontologie*, vols. iii. and iv. (Munich, 1887-93), is the most complete reference book for advanced students, and his

Chart Showing Distribution of Vertebrates, and the Characteristic Forms of the Different Periods

Periods		Characteristic Forms		Dominant type
Cenozoic	Quaternary	Recent		
		Pleistocene	Man (flint implements, skeletons of Spy and Neanderthal caverns). Mammoth, mastodon, woolly rhinoceros, Elasmotherium, Irish elk, Megatherium, Glyptodon, Diprotodon, one-toed horses, Platygonus, cave-bear, sabre-tooth tiger.	Man estimated 50,000 years
	Tertiary	Pliocene	Pithecanthropus, Sivatherium, Samotherium, three-toed and one-toed horses, mastodon, horned rhinoceroses, Chalicotherium, camels, deer, oxen, Dinocyon, Hyænarctos.	Mammals estimated 3,000,000 years.
		Miocene	Apes and baboons, three-toed horses, small-horned or hornless rhinoceroses, four-tusked mastodons, Dinotherium, Merycochærus, Procamelus, deer, Amphicyon.	
		Oligocene	Three-toed horses, Titanotherium, primitive rhinoceroses (Cænopus, Hyracodon, Metamynodon); primitive ruminants (Oreodon, Poebrotherium, Anoplotherium, Anthracotherium); primitive dogs, and sabre-tooth tigers.	
		Eocene	Four-toed horses; primitive types of hoofed and clawed mammals (Uintatherium, Coryphodon, Phenacodus, Hyrachyus, Palæotherium, Patriofelis, Oxyæna); monkeys; rodents; serpents.	
Mesozoic		Cretaceous	Great land reptiles (dinosaurs), Triceratops, Claosaurus; marine reptiles (mosasaurs and plesiosaurs); flying reptiles (pterosaurs). toothed birds; crocodiles; turtles; sharks; rays. Small insectivorous mammals.	Reptiles estimated 7,000,000 years.
		Jurassic	Dinosaurs (Brontosaurus, Diplodocus, Stegosaurus, Iguanodon, Megalosaurus); plesiosaurs and ichthyosaurs; pterosaurs; reptile-birds (Archæopteryx); crocodiles; turtles; true sharks and rays; true bony fishes.	
		Triassic	Carnivorous dinosaurs (Anchisaurus, Zanclodon); primitive reptiles (Pariasaurus, Cynognathus, Belodon); large armored amphibians (Labyrinthodon, Mastodonsaurus); lungfish (Ceratodus).	
Paleozoic		Permian	Primitive reptiles (Naosaurus, Diadectes, Pariotichus); armored amphibians (Eryops, Diplocaulus, Cricotus, Archegosaurus); primitive sharks (Pleuracanthus).	Amphibians estimated 5,000,000 years.
		Carboniferous	Small amphibians (Microsauria); primitive bony fishes (Palaeoniscus, Platysomus); primitive sharks (Pleuracanthus).	
		Devonian	Lungfish (Dinichthys, Coccosteus, Dipterus); primitive sharks; primitive bony fishes; ostracoderms (Pteraspis, Cephalaspis; Pterichthys, Bothriolepis); lampreys.	Fishes estimated 2,000,000 years.
		Silurian Ordovician Cambrian	First vertebrates (Ostracoderms); Cyathaspis; Palæaspis.	Invertebrates estimated 10,000,000 years.
Eozoic		Algonkian Archæan	No fossils.	

Grundzüge der Paläontologie (Munich, 1895), translated by Eastman under the title *Textbook of Paleontology*, vols. ii. and iii. (New York and London, 1900-03), gives a more condensed treatment. See also Lydekker, *Geographical History of Mammals* (Cambridge, 1896), and Gaudry, *Enchainements du monde animal* (4 vols., Paris, 1878-96).

VER'TIGO (Lat., a turning or whirling round, giddiness, dizziness), DIZZINESS. A condition characterized by an inability to maintain a due equilibrium. Vertigo may be caused by unusual and powerful visual sensations, such as those produced by water falling rapidly from a great height, or by objects moving swiftly across the field of vision. In some cases the subject feels as though all the visible objects were passing rapidly before him; in other cases he feels as though he were falling in a certain direction. Vertigo may arise from changes taking place in the brain, and, while in no sense a disease, is a common symptom of many diseases and is a result of several poisons. An especially severe form of dizziness is produced by rapidly rotating the body. A rapid and distressing form is produced by sending a galvanic current through the head from ear to ear. Vertigo caused by rotation of the body is probably due to false sensation in the semicircular canals of the internal ear. It is known that variations in the pressure of the endolymph within the canals give rise to two kinds of impulses: the auditory impulses and a series of afferent impulses which, although conducted to the brain through the auditory nerve, have nothing to do with hearing, but form the basis of our sense of equilibrium. Ménière's disease, an affection of the semicircular canals, presents as its principal symptom a constantly recurring vertigo. Disease of the middle ear, and also rarely of the external ear, is accompanied by the same symptom. Vertigo may be caused by an alteration of the intra-cranial blood-pressure. It occurs, therefore, in anæmia, in hyperæmia, in syncope, in epilepsy, in seasickness, in hypertrophy of the left ventricle of the heart, in hæmorrhage, in injuries of the brain, after the use of alcoholics, etc. Sometimes merely a sudden change of position causes it; as bending forward, stooping, rising, raising a weight above the head, or any sudden strain on the faculty of equilibration. Vertigo accompanying indigestion is due either to reflex circulatory disturbances in the brain, or to toxic influences, such as also accompany the use of alcohol, tobacco, belladonna, hyoscyamus, the inhalation of carbonic acid gas, etc.

VERTOT, vâr'tō', René Aubert de (1655-1735). A French historian, born in Normandy, and educated at Rouen by the Jesuits. In 1675 he joined the Premonstratensian Order, but later became a secular priest. He wrote *Histoire des révolutions de Portugal* (1689), *Histoire des révolutions de Suède* (1696), and *Histoire des chevaliers de Saint Jean de Jerusalem* (1726).

VER'TUE, George (1684-1756). An English engraver and antiquary, born in London. He was a pupil of Michael van der Gucht, and was employed by Sir Godfrey Kneller to engrave some of his portraits. His plates of portraits, numbering over five hundred, are faithful transcripts of the originals. Vertue had always cherished antiquarian tastes, and during the latter part of his life, under the patronage of the Earl of Oxford and others, he traveled about England engraving objects of antiquarian interest. He became a member of the Society of Antiquaries in 1717, and until his death was its official engraver. Nearly all the plates of the *Vetusta Monumenta* till 1756 are by him, as are the headings of the Oxford Almanacs, 1723-51. He also collected materials for a proposed *History of the Arts in England*, which were purchased, after his death, by Horace Walpole, who compiled from them his *Anecdotes of English Painting.*

VERTUM'NUS. In Roman mythology, the husband of the goddess Pomona (q.v.).

VERVET. One of the two South African representatives of that section of the cercopithecine monkeys called 'guenons.' It is small, and its general color is a greenish grizzle; but the narrow face, the hands, feet, and end of the tail are black, while the cheeks, throat, and under parts are white, and the root of the tail is red—this last feature, with the black tail-end, forming a distinctive specific mark. It inhabits the forests of Cape Colony and Natal, especially near the coast, and feeds mainly on the gum of the camel-thorn mimosa and similar trees. Its scientific name is *Cercopithecus lalaudi*, and its nearest relative is the grivet (q.v.).

VERVIERS, vâr'vyâ'. The capital of an arrondissement in the Province of Liège, Belgium, on the Vesdre, 16 miles by rail east-southeast of Liège (Map: Belgium, D 4). It is an attractive modern industrial town separated into a lower and an upper quarter connected by handsome boulevards. The Church of Saint Remacle possesses fine stained-glass windows. There are several handsome modern Gothic churches. The manufacture of mechanical tools and of cloth, the preparation of wool, and the dyeing of yarn are large industries. Population, in 1900, 52,203.

VERVINS, vâr'văN, Treaty of. A treaty of peace concluded between Henry IV. of France and Philip II. of Spain, May 2, 1598. The Spanish restored all their conquests with the exception of the citadel of Cambria, and, in general, the treaty marked a return to the conditions of the Treaty of Catlau-Cambrésis (q.v.), in 1559. The Peace of Vervins is noted as definitely closing the period of civil war in France, and was preceded by a few days only by the celebrated Edict of Nantes. See France; Henry IV.; Nantes, Edict of.

VER'Y, Jones (1813-80). An American poet, born in Salem, Mass. He graduated from Harvard College in 1836, and taught Greek there during the next two years. His first published work was *Essays and Poems* (1839), edited by Ralph Waldo Emerson, with whose Transcendental views Very was in sympathy. He was ordained in 1843 as a preacher by the Unitarian Association at Cambridge, but never held a pastoral charge. The greater part of his life he lived at Salem in retirement, whence he contributed occasionally to the Salem *Gazette* and to the *Christian Register* and other Unitarian journals. He was a friend of Emerson, Channing, and Clarke, the last of whom contributed a preface to the complete (posthumous) edition of his *Poems and Essays* (1886). Though few in number, his poems, chiefly in Shakespearean sonnet form, are full of deep religious feeling, are subtly introspective, and give evidence of a stronger, saner imagination than might be expected in a poet of extraordinary mysticism.

VERY HARD CASH. A story by Charles Reade which originally appeared serially in *All the Year Round*, as a sequel to *Love Me Little, Love Me Long*, and was published in book form in 1863 under the abbreviated title *Hard Cash.* It is a stirring tale of adventure on land and sea.

VERY WOMAN, A. A comedy, possibly a final version of the lost plays *The Woman's Plot* (1621) and *The Spanish Viceroy* (1624), written by Fletcher and revised by Massinger in 1634. It was printed as the latter's in 1655.

VESA'LIUS, Andreas (1514-64). A distinguished anatomist, born at Brussels. He studied classics at Louvain, and medicine at Cologne, Montpellier, and Paris. He lectured on anatomy in Pavia, Padua, Bologna, and Pisa. Finally he was made physician-in-chief to Charles V. at Madrid, where he continued mainly to reside. In 1564 he was charged with dissecting a body willed to him, before life was extinct; and he narrowly escaped death at the hand of the Inquisition. Through the interposition of Philip II. he escaped with an injunction to make a pilgrimage to the Holy Land. While there he was invited to occupy the chair of anatomy just vacated in Padua by Fallopius. He embarked for Europe; but the ship in which he sailed was wrecked on the shore of Zante, where he died.

His first publication was a series of anatomical tables entitled *Suorum Librorum de Corporis Humani Anatome Epitome* (Basel, 1542, fol.). The plates were nearly all reincorporated in his work *De Corporis Humani Fabrica Libri Septem* (Basel, 1543). He published in 1546 his attack on the errors of Galen's anatomy, the well-known *De Radicis Chinæ usu Epistola.* The cause of Galen was then espoused by Fallopius, to whom Vesalius replied in his *Anatomicarum Gabrielis Fallopii Observationum Examen* (1561). The great edition of Vesalius's works appeared with fine plates at Leyden in 1725, under the superintendence of Boerhaave and Albinus. Consult the lives by Burggraeve (1841), Mersman (1845), Meynants (1846), and Roth (1892). See Anatomy.

VESEY, vĕ′zĭ, DENMARK (1767?-1822). An American negro insurrectionist, born probably in Saint Thomas, West Indies. He accompanied his master, a Charleston (S. C.) sea captain, on his voyages for twenty years, but purchased his freedom in 1800 and worked as a carpenter in Charleston. Through his intelligence he gained great influence over the slaves, and with another negro, Peter Poyas, preached insurrection. The plot, as disclosed May 25, 1822, by a negro who had been approached, was for the thousands of the slaves in the city and the neighboring islands to come together and seize the city and harbor. When the leaders were arrested they were discharged through lack of evidence. An attempt to carry out the plot on June 16th was easily suppressed, and the leaders were tried before a special court, in which sat William Drayton, Joel R. Poinsett, R. Y. Hayne, and other distinguished citizens. Vesey conducted his case with much skill, but he and thirty-five other negroes were condemned and hanged.

VESICANT. See BLISTERS.

VESPA′SIAN (TITUS FLAVIUS VESPASIANUS) (9-79). A Roman Emperor. He was born A.D. 9, at Reate, in the Sabine country, his father being a man of humble origin, and his mother, Vespasia Polla, daughter of a camp-prefect and sister of a senator. Entering public life, Vespasian served as military tribune in Thrace, as quæstor in Crete and Cyrene, and as ædile and prætor at Rome. In the reign of Claudius he was made commander of a legion stationed in Germany, whence he was soon sent into Britain (43), where he conquered the Isle of Wight. He became *consul suffectus* in 51, and afterwards passed a number of years in command of Roman legions. In 66 he was chosen to conduct the war against the Jews, and this proved the turning-point of his life, for he was a fine disciplinarian, and endeared himself to his troops, who, on the news of the death of the Emperor Galba, proclaimed their general Emperor in Alexandria, July 1, 69. The Roman senate had meanwhile named Otho Emperor, and the troops in Germany had likewise declared in favor of their general Vitellius. A civil war was thus precipitated. (See OTHO; VITELLIUS.) The legions of all the eastern provinces soon declared in favor of Vespasian, and he had the advantage also of the control of Egypt, from which he could cut off the grain supply of Rome. Leaving his elder son, Titus, to conduct the Jewish campaign, he intrusted his interests at Rome to the care of his loyal supporter, Mucianus, Governor of Syria, remaining himself in the East to strengthen and organize his support. Otho soon met a violent death, and the army of Vitellius in Italy was routed by Vespasian's supporters at Cremona. The murder of Vitellius in December, 69, left Vespasian in control of the Roman world. The chief events of his successful reign of ten years were the suppression of a formidable revolt of the Batavians under Civilis (69-70), the capture and destruction of Jerusalem by Titus (70), the grand triumph of Vespasian and Titus, the construction of the Colosseum, and the conquests in Britain by Agricola (78-79). Vespasian died June 23, 79, and was succeeded by his son Titus, to whom he had already given a share in the government.

VESPASIAN, FORUM OF. See FORUM PACIS.

VESPERS. See BREVIARY.

VESPER SPARROW, or GRASS FINCH. A common resident sparrow (*Poœcetes gramineus*) of the Eastern United States and Canada, distinguished by the bright chestnut color of the bend of the wings, whence it was named 'bay-winged bunting' by the earlier ornithologists; and especially by the display in flight of a white feather at each side of the tail. It nests on the ground, and has a simple but pretty song which it is fond of singing at dusk, whence Wilson Flagg called it the vesper sparrow—a name which has superseded its earlier and more casual designations.

VESPUCIUS, vĕs-pū′shĭ-ŭs, AMERICUS (It. *Amerigo Vespucci*) (1451-1512). A Florentine navigator, from whom the Western continents received their name of America. He was born March 9, 1451; entered the offices of the commercial establishment of the Medici in Florence, and between 1483 and 1492 occupied a position of responsibility with that house. In 1493 he went to Spain and established himself as a merchant in Seville. In 1491 he took over the business of another Florentine merchant of Seville, who had been in the habit of furnishing supplies for the vessels engaged in the voyages to the West Indies. This brought Vespucius into direct touch with the affairs of the New World. In 1497 he placed his business in other hands, and set out to see something of the New World for himself. Sailing in May, 1497, he was absent eighteen months, probably exploring the South American coast, on the lookout for opportunities for commercial profit. Instead of returning to Spain with the vessel on which he had sailed, Vespucius seems to have left it at some port at which he met a fleet commanded by Alonso de Ojeda, with whom he made his second voyage, lasting fourteen months. He returned to Spain by July, 1500. Shortly after this, he must have gone to Portugal, for on May 10, 1501, he sailed on a Portuguese expedition which reached the South American mainland on June 6th, and returned in September, 1502. In May, 1503, he sailed again with the Portuguese, returning June 18, 1504. In February, 1505, he was back in Seville, where he met Columbus, who described him, in a letter to his son, Diego Columbus, as "a very worthy man who has always endeavored to be agreeable to me. . . . He is determined to do for me all he can." This letter is sufficient commentary on the assertion that the two explorers were rivals, or that Vespucius tried to secure the renown properly belonging to Columbus. After a visit to the Court of Ferdinand, Vespucius became a citizen of Seville again and naturalized himself as a Spanish subject, in April, 1505. He spent the next eighteen months in preparing an expedition for the Moluccas, in coöperation with Pinzon (q.v.), which was eventually prevented from sailing by Portuguese intrigues. In November, 1507, Vespucius was summoned to the Court at Burgos, where he was appointed Pilot-Major on March 22, 1508. He then repaired to Seville, where he occupied himself with the duties of his office, examining pilots, collecting geographical and cartographical data, and supervising the dispatch of expeditions to the New World. He died on February 22, 1512.

During his Portuguese sojourn at Lisbon, in

September, 1504, Vespucius completed and dispatched to his old patrons, the Medici, an account of his four voyages. The original has unfortunately disappeared, and the abridged translations which were printed at the time are so confused, and in places so incoherent, that it is impossible to decide from them, the only source of information regarding those voyages, exactly where Vespucius went, or what he discovered. It is quite certain that he explored a large section of the coast of South America, and it is probable that on his first voyage he landed on the American mainland a few days before Cabot reached the shores of North America. A literal reading of his narrative would give an exploration from somewhere on the Guiana coast northwestward for a thousand miles or more, reaching into the Pacific Ocean off the California coast. As there are physical difficulties against this, Vespucius's supposed own statement, the champions of Vespucius have ascribed to him a voyage around the Gulf of Mexico and up the United States coast as far as the Chesapeake, but the country described by Vespucius is clearly that of northeastern South America, perhaps stretching south on his later voyages nearly to La Plata.

Vespucius's narrative was translated in 1507 by Waldseemüller (q.v.), who printed it as an appendix to his *Cosmographie Instructio*. In this work he made a suggestion that inasmuch as Vespucius had been the first to make known this new southern continent, it might be proper to name the new continent 'America.' The new name was given only to the newly discovered southern continent, with no thought of extending it over the islands of the West Indies. Waldseemüller's suggestion was embodied in printed and manuscript maps, a few of which have survived to the present day. The name gradually became fixed in popular usage. The actual facts regarding Vespucius are given in Harrisse, *Discovery of North America* (London, 1892). Consult also Fiske, *Discovery of America* (New York, 1892). The details of Waldseemüller's christening of America are given in Thatcher's *Continent of America* (New York, 1896).

VEST, GEORGE GRAHAM (1830—). An American political leader, born at Frankfort, Ky. He graduated at Center College, Danville, Ky., in 1848, and later from the law department of Transylvania University at Lexington. He soon afterwards removed to Missouri, where he practiced his profession first at Georgetown, and then at Booneville. In 1860 he was elected to the State Legislature as a Democrat; was for two years a member of the Lower House of the Confederate Congress, and was then appointed to the Senate for one year. After the war he renewed the practice of law at Sedalia, Mo., and later at Kansas City. In 1878 he was elected to the United States Senate, and was three times reëlected.

VES'TA (Lat., connected with Gk. Ἑστία, *Hestia*, goddess of the hearth and home; connected with Gk. *ἄστυ*, *asty*, city, Skt. *vas*, to dwell, Goth. Skt. *vas*, to dwell, OIr. *foss*, remnant, Goth. *wisan*, to be, Eng. *was*). In classical mythology, the goddess of the hearth-fire. In Greece Hestia plays but a very small part in legend. She appears as the eldest daughter of Cronos and Rhea, and as wooed by Poseidon and Apollo, whose suit she escaped by vowing eternal virginity. To her, therefore, was given the honor of a place in all temples of the gods and all houses of men. If legend made little of Hestia, her cult was widespread in all Greek lands. Every community had its comon hearth where the sacred fire burned, and from which every colony took the sacred flame which was to kindle a new sacred centre in close connection with the old. Even confederacies recognized a central hearth, as the Arcadians at Tegea, the Cyclades at Delos, and the Amphictyonic Council at Delphi. In some places the sacred fire was in charge of maidens, in others of old women, and we hear of priestesses of Hestia in Athens and Sparta. At Rome this cult reached a far more prominent place than it seems to have assumed in Greece. *Vesta mater* is the only female in the original series of great Roman gods, and as Janus occupied the first place in the ritual invocations, so Vesta closed the series. The worship of the goddess was also spread throughout Latium, though the evidence for its early existence elsewhere in Italy is unsatisfactory. Her festival, the *Vestalia*, fell on June 9th, while on the first of March the sacred fire was solemnly renewed. The state worship was, however, the most important. Near the Forum, at the foot of the Palatine, close to the fountain of Juturna and the temple of Castor, was the little circular temple of Vesta, containing no image, but only the sacred hearth with the ever-burning fire, and a shrine in which were kept the implements and provisions for the sacrifices, and, according to popular belief, the Trojan palladium and other sacred objects on which the safety of the city was believed to depend. Near the temple was the *Atrium Vestæ*, where the Vestal Virgins lived.

VESTED RIGHT. A technical legal phrase denoting a present fixed interest resting in a definite person or corporation in or to a property right or franchise. It is the opposite of a prospective or contingent interest of any nature. For the security of property interests and the general welfare, the law very jealously protects such rights, and will not permit their destruction or allow their holders to be hindered in the full enjoyment of them, except for the public good, and then only upon just compensation being made therefor. The Fifth Amendment of the United States Constitution provides that no person shall be deprived of property without due process of law, but as this has been construed to be a restraint upon the Federal Government only, it became necessary to incorporate in the Fourteenth Amendment a prohibition against any State taking such action. These constitutional provisions make vested rights secure and leave only the difficulty of determining what may be included under that head. A right in or to real or personal property not subject to a condition or contingency is considered as vested in the person who enjoys it. An expectant interest is, however, sometimes confused with one which has become fixed and unconditional. For example, the *right* of a husband to courtesy his wife's property is, during her lifetime, inchoate or contingent in its nature, depending upon his survivorship. Therefore, it amounts only to an expectancy during that period, and may be regulated or even taken away by statute.

No one has a vested interest or property right in the rules of the common law as such, or the law as contained in statutes, and, therefore, the law may be changed by statute, even though the amendment may cause damage and hardship to persons who may have taken action relying upon the continuance of the existing law. For example, a great business may be established and built up under a high tariff act, which would be rendered very unprofitable if the tariff was reduced, but the owners of such an enterprise have no constitutional right to object to an amendment of the tariff act. Thus, also, the rules of descent may be changed, as the living have no heirs, but such a change would not affect the rights of persons who inherited property upon the death of ancestors before the amendment. Consult Cooley, *Constitutional Limitations;* PROPERTY, and the authorities there referred to.

VESTERÅS, vĕs'tĕr-ōs'. The capital of the Province of Vestmanland, Sweden, on a northern bay of Lake Mälar, 69 miles by rail northwest of Stockholm (Map: Sweden, G 7). The handsome Gothic cathedral, built by Birger before 1271 and since then twice restored, has a tower 309 feet high, the loftiest in Sweden. The Episcopal library of more than 12,000 volumes contains the books taken by the Swedes from Mainz in the Thirty Years' War. There are iron and copper mines in the vicinity of the town. Vitriol is manufactured. The vegetables raised here are in high repute. Population, in 1900, 11,999. During the Middle Ages Vesterås was of commercial prominence. At a diet held here in 1527 Gustavus Vasa secured the establishment of Protestantism in Sweden.

VESTIBULE (Lat. *vestibulum*, fore-court, entrance, probably connected with *Vesta*, goddess of the hearth and home, Gk. *ἄστυ*, *asty*, city, Skt. *vas*, to dwell; less plausibly associated with Lat. *ve-*, apart + *stabulum*, abode). An entrance lobby preceding the more important entrance-hall or other interior space for general circulation and communication. In dwellings and small buildings it is the space between the outer or 'storm' door and the inner entrance door. Its function is, first, to provide an intermediate space between the out-door air and the interior of the building, so that the wind, rain, heat, or cold from out of doors may not penetrate the building with every entrance or exit of one or more persons; secondly, to form an approach or gradual transition from the exterior architecture to that of the interior; thirdly (this especially in ancient Roman buildings), to provide a waiting place sheltered and inclosed for persons awaiting admission to the house or hall. In this sense the term is also often applied to an ante-room intervening between a public hall, corridor, or lobby and an important office or suite of offices, and to the lobby intervening between the public hall of an apartment-house and the general private hall or corridor of any of the apartments. The narthex of a church or basilica is also called the vestibule.

VESTIGIAL (from Lat. *vestigium*, footprint) OR **RUDIMENTARY STRUCTURES.** Organs which in some plants and animals appear not to function, but which resemble functional organs in others, especially lower, groups. They are believed to be phylogenetic and formerly useful. There are reasons for believing that vestigial structures are rarely, if ever, present in plants.

VESTMENTS, SACRED. See COSTUME, ECCLESIASTICAL.

VES'TRIS, MADAME (LUCIA ELIZABETH MATHEWS, née BARTOLOZZI) (1797-1856). An English actress, born in London. At sixteen years of age she was married to Armand Vestris, a celebrated dancer and ballet-master at the King's Theatre. She then studied singing under Corri and made her début in Winter's *Il Ratto di Proserpina* in 1815 at the King's Theatre, London. She became a favorite artist with the public at large and appeared with varying success at different places in England and France. A large part of her success was undoubtedly due to her good fortune in securing great artists to appear with her. For instance, in Paris she played Camille in *Les Horaces* with the celebrated Talma as *Horace*. Her greatest English success was as Tilla in the *Siege of Belgrade* (London, 1820), which permanently established her in London as a popular favorite. Here again she had the advantage of introducing a number of very popular ballads such as *Cherry Ripe, I've Been Roaming,* and *Meet Me by Moonlight Alone.* She accumulated a considerable fortune and became manager in turn of the Olympic, Covent Garden, and Lyceum theatres. Her husband deserted her in 1817. She married in 1838 Charles Mathews the younger, and together with him produced at Drury Lane the most important operas and musical productions of the period. She died in London.

VESTRY (OF., Fr. *vestiaire*, from Lat. *vestiarium*, wardrobe, neu. sg. of *vestiarius*, relating to clothing, from *vestis*, clothing; connected with Gk. *ἐσθής*, *esthēs*, clothing, *ἐννύναι*, *hennynai*, Skt. *vas*, to clothe, Goth. *wasti*, clothing, *wasjan*, AS. *werian*, Eng. *wear*). The representative and administrative body in parishes of the Church of England and of the Episcopal Church in the United States. In England vestries are either general or common, i.e. composed of all the parishioners who are ratepayers, or select, i.e. composed of certain select parishioners, the number being fixed by custom or statute. Anciently all the affairs of a parish, as such, whether ecclesiastical or civil, were regulated in vestry. At the present time, however, the only duties of an ecclesiastical nature which a vestry has to perform are the election of a church warden (q.v.), the levying of church rates, and the reception of the accounts of church trustees. A vestry cannot interfere (except by observation and complaint) with the manner in which the services in the church are conducted. Although the minister is the proper head of the vestry, and, if present, is entitled to preside at all meetings, he is not an essential part of it.

The vestry in American parishes is a much more highly developed body with wider powers. The number of vestrymen is fixed by the statute law of each State. They, together with two wardens, are elected by the members of the congregation at the annual parish meeting to serve for one year. The rector is *ex officio* a member of the vestry, and is entitled to preside, if present, at all its meetings. The function of the vestry is to represent the congregation in law, to have charge and care of its property, and to collect and disburse its revenues. The vestry, acting for the parishioners, and under the jurisdiction of the bishop of the diocese, choose and call a minister to be rector of the parish and make provision for his support. In the absence of the rector they are bound to see that no person ministers to the congregation without sufficient evidence that he is duly qualified to do so. If the rector prove unworthy or incompetent, they, in the interests of the parishioners, make complaint to the bishop of the diocese. In some dioceses the vestry, instead of the body of parishioners, elect the lay deputies to represent the parish in the convention or council of the diocese.

VESUVIANITE, or IDOCRASE. A mineral basic calcium-aluminum silicate crystallized in the tetragonal system. It has a vitreous lustre and is brown to green, sometimes light-blue, in color. It was originally found among the masses ejected from Vesuvius and Monte-Somma, Italy. But it has also been abundantly discovered in limestone, serpentine, gneiss, and other rocks. The crystallized varieties are sometimes cut as gems, especially in the form of the letters *v* and *i*.

VESU′VIUS. A volcano, situated near the eastern shore of the Bay of Naples about 10 miles from the city of that name. It is a solitary mountain rising from the plain of Campania, with a base of about 30 miles in circumference, and surmounted by two summits. The higher of these is a nearly perfect cone known as Vesuvius proper. The other, of ridge-like outline, partially inclosing the central cone, is called Somma. Up to the year A.D. 79 Vesuvius was looked upon as a truncated mountain, its volcanic origin being unsuspected. The crater formed a deep depression in the summit, and its sides were forest-clad. Suddenly on August 24th of that year an eruption began with the appearance of a huge black cloud which rose from the mountain, accompanied by an explosion that blew off the top and rained a mass of ashes, lapilli, and mud on the towns and cities in that region. No lava was ejected in this eruption, nor in fact during any other eruption within historic times until the year 1066. In the first historic eruption Pompeii was buried under a thickness of 20 feet of loose ashes, and Herculaneum was covered by a torrent of mud. The elder Pliny, who commanded the Roman fleet at Misenum, sailed to help the distracted inhabitants. He landed near the base of the mountain and was himself suffocated by the vapors emanating from the volcano. The younger Pliny gives a graphic account of the eruption in two letters to Tacitus (written long after the event), which are well known.

Since the year 79 there have been a number of eruptions. One occurred in the year 203, and another in the year 472, during which the ashes were carried as far as Constantinople. Other outbursts were noted in the years 512, 685, 983, and 1066. In 1631 the villages at the base of Vesuvius were covered with lava and torrents of boiling water. During an eruption of 1779 showers of ashes, scoriæ, and stones were thrown to a great height, and streams of lava poured down the side of the cone. In 1794 another violent outburst took place which destroyed much of the town of Torre del Grecco, and in the eruption of 1822 the mountain is said to have lost 800 feet of its height, but most of this loss has been made up by subsequent eruptions. Previous to this eruption of 1822 the summit is said to have been a rough and rocky plain, covered with blocks of lava and scoriæ, and rent by numerous fissures, from which issued clouds of smoke; it was then altered to a vast elliptical chasm, 3 miles in circumference, and about 1000 feet deep. Another remarkable eruption took place in May, 1855, and a series of outbursts began in 1865. More recent eruptions have occurred in 1872, 1878, 1880, and 1895. The present height of Vesuvius is a little over 4000 feet, and that of Somma 3730. The lavas of Vesuvius belong to the acid types, and among the gases hydrochloric acid has been detected in considerable quantities. Ferric chloride often forms a yellow crust on the lava, especially in the vicinity of fumaroles. A railroad has been built from the base of the cinder cone to the summit near the edge of the crater.

BIBLIOGRAPHY. Bonney, *Volcanoes* (New York, 1899); Shaler, *Aspects of the Earth* (ib., 1890); Lyell, *Principles of Geology*, vol. ii. (11th ed., ib., 1889).

See VOLCANO; POMPEII.

VESZPRÉM, vĕs′prām (Ger. *Veszprim*). The capital of the County of Veszprém, Hungary, on the Séd, 60 miles southwest of Budapest (Map: Hungary, E 3). It has a fine cathedral, a Piarist college, a gymnasium, and an institution for disabled priests. The vine, fruits, and tobacco are cultivated; there are coal-mines, iron-works, and large cattle-markets. Population, 1900, 14,114, mostly Magyars.

VĒTĀLAPAÑCAVIṀŚATI, vȧ-tä′lȧ-pän′-chȧ-vĭm′shȧ-tē (Skt., twenty-five stories of a demon). A collection of Sanskrit novelettes. According to the framework of the tales, King Vikrama (q.v.) is bidden by an ascetic to carry a corpse which hangs on a certain tree to a graveyard where certain magic rites are to be performed which will give the monarch supernatural powers. While bearing this corpse, complete silence is enjoined on the King. A Vikrama carries the body, a Vetala, or demon, which enters corpses, tells him a story, which ends in a problem that he asks the King to solve. Vikrama, forgetting the prohibition laid on him, answers, and the corpse returns immediately to the tree again. This takes place until the Vetala has told twenty-five stories. The tales are of much interest and the entire Vetalapancaviṁśati bears a marked resemblance to the two other principle Sanskrit collections of like genre, the *Simhāsana-dvatriṁśikā*, or *Thirty-two Stories of the Lion-Throne* (also called *Vikramacarita*, or *Adventures of Vikrama*) and the *Sukasaptali* (q.v.), or *Seventy Stories* of a Parrot. The Vetalapancaviṁśati has been edited by Uhle (Leipzig, 1881) and translated by Burton, *Vikram and the Vampire* (new ed., London, 1893).

VETANCURT, vä′tȧn-kōōrt (or **VETANCOUR**), AUGUSTÍN DE (1620-1700). A Mexican historian, born in the City of Mexico. He joined the Franciscan Order at Puebla, became a member of the provincial chapter, and when he died was commisario-general of the Indies. He was a profound Aztec scholar, and published *Arte de lengua mexicana* (1673), and *Teatro Mexicano, Descripción breve de los sucesos exemplares,* *históricos, politicos, militares y religiosos* (2 vols., 1697-98). Much of the work is based upon that of Torquemada, but it is nevertheless of great value. A reprint of the *Teatro*, etc., was issued at Mexico in 1870-71 as vols. vii.-x. of the *Biblioteca Iberia*.

VETCH (OF. *veche*, *vesse*, *vesce*, Fr. *vesce*, from Lat. *vicia*, vetch; connected with Gk. *βικίον*, *bikion*, vetch, Lat. *vincire*, to bind). A name properly applied to the genus Vicia, but also loosely related to other genera of the natural order Leguminosæ. There are numerous species, mostly climbing annual, biennial, and perennial herbs, natives of Europe, Northern Africa, Western Asia, and America. Their cultivation for seed and for forage dates back to the Romans. At the present time they are cultivated to a considerable extent in Europe and certain species are gaining favor in the United States. The crop can be grown on a wide variety of soils, but heavy well-tilled soils produce the best yields. They are generally grown with a cereal crop which serves as a support and keeps them off the ground. The annual species most commonly cultivated in Europe is the common or spring vetch or tare (*Vicia sativa*). In the United States this species, which is very susceptible to dry and hot weather, has not given general satisfaction. One of the best species introduced into the United States is the hairy vetch (*Vicia villosa*), an annual which has been successfully grown in various sections of the country. Hairy vetch is sown in August and September when intended for winter forage, and in regions where the winter is not too severe it will grow again in the spring and produce a very early crop. For summer forage it is sown from the middle of April to the middle of May. The yield of hay varies from 2 to 4 tons per acre. See Plate of USEFUL LEGUMES.

HAIRY VETCH (*Vicia villosa*).

Some of the most important species not belonging to the genus Vicia are kidney vetch, or horned pod clover (*Anthyllis vulneraria*), winter vetch (*Lathyrus hirsutus*), and Dakota vetch (*Hosackia Purshiana*). Kidney vetch is a perennial found wild in Europe on dry, thin soils with calcareous subsoil. Its cultivation originated in Germany about 40 years ago. The yield of hay is usually quite small. Winter vetch is a valuable species in southern latitudes, where it furnishes forage late in autumn and early in spring. In the United States it is not hardy north of the latitude of 40°. Dakota vetch is a common bushy annual, native to the Rocky Mountain region of the Northwest, affording pasturage and hay in its wild state. Both green and cured vetches are fed to farm animals. Uncured spring vetch cut in bloom and seed has the following average per cent. composition: Water, 83.9; protein, 4.0; fat, 0.6; nitrogen-free extract, 6.3; crude fibre, 3.2; and ash, 2.0. Hairy Vetch: Water, 68.7; protein, 5.2; fat, 1.3; nitrogen-free extract, 14.7; crude fibre, 7.7; and ash, 2.4. Vetch hay contains: Water, 11.3; protein, 17.0; fat, 2.3; nitrogen-free extract, 36.1; crude fibre, 25.4; and ash, 7.9 per cent. Like other leguminous crops, vetch is comparatively rich in protein.

VETCH, SAMUEL (1668-1732). The first British Governor of Nova Scotia, born near Edinburgh, Scotland. In 1705 he was sent by Governor Dudley of Massachusetts to Canada to negotiate a treaty of neutrality and arrange for an exchange of prisoners. A plan for the capture of Canada proposed by him in 1708 was accepted by the British Government, but was never carried out. Subsequently, as the representative of the colonists, he induced the Government to undertake an expedition against Arcadie. Vetch was one of the commanders of this expedition, and after the capture of Port Royal in October, 1710, he became Governor of the conquered territory, part of which was now renamed Nova Scotia. In 1711 he was besieged in Port Royal by the French, but was relieved by the approach of a British squadron. In 1712 he was superseded as Governor by Sir Francis Nicholson, but was again Governor in 1715-17. He died a prisoner for debt in London.

VETERAN LEGION, UNION. A patriotic organization, organized in Pittsburg, Pa., in March, 1884. The simple requirements for admission to the Grand Army of the Republic (q.v.) had led to criticism, and in consequence the Union Veteran Legion requires for admission to membership that the applicant must have volunteered prior to July 1, 1863, for a term of three years and have served his full term of enlistment unless discharged by reason of wounds. There are organizations in 21 States and the District of Columbia, and about 150 local bodies known as encampments, with a total membership of nearly 20,000. It has as an auxiliary an organization of women known as Ladies of the Union Veteran Legion.

VETERAN UNION, UNION. A patriotic society founded in Washington, D. C., in 1886. Membership is extended to veterans who served honorably in the army, navy, or marine corps of the United States between April 12, 1861, and April 30, 1865, who participated in one or more engagements or battles, and received an honorable discharge. There are about 70,000 members.

VETERINARY MEDICINE (Lat. *veterinarius*, relating to beasts of burden, from *veterina*, *veterinum*, beast of burden, old, experienced, from *vetus*, old). In the earliest historical times men depended closely on domesticated animals for food and transportation. Much attention was therefore devoted to a study of the nature and means of combating animal plagues. From the first the causes of animal diseases were grossly misunderstood, on account of the prevalence of superstitions regarding these matters, but certain men acquired considerable reputation from their practical skill in the treatment of diseases by the application of empirical therapeutics. Some of the earliest veterinary literature is found in the ancient writings of India. Among the Greeks considerable literature was produced on the anatomy and diseases of animals. Hippocrates found hydatids in the lungs of animals, and described articular dislocations, dropsy, epilepsy, and gid. Xenophon in his work on the horse mentions a number of diseases of that animal. Aristotle described with accuracy the chief symptoms of angina, tetanus, glanders, and various other diseases. Among the Romans there were many writers on veterinary topics. Special mention may be made of Censorinus, Varro, Celsus, Columella, Pliny, Galenus, Apsyrtus, Pelagonius, and Vegetius Renatus. The last-named writer called attention to the great similarity in certain animal and human diseases, and suggested the possibility of intertransmission. He described glanders as occurring under seven forms, and recommended that healthy horses be prevented from coming in contact with diseased ones, and that the carcasses of horses dead of glanders be deeply buried. The symptoms and course of many other diseases were carefully described by this writer.

The anatomical knowledge of the Greeks and Romans was largely based on the dissection of domesticated animals. Animal dissection was extensively practiced by physicians and veterinarians alike. The organs and parts of the animal body were well understood and accurately described by such writers as Aristotle, Herophylus, Erasistratus, and Galen. Concerning the nature and occurrence of animal plagues in ancient times we have many records. Mention of destructive epizoötics among domestic animals is made in Deuteronomy and by Ovid, Homer, Thucydides, Vergil, Columella, and many other Greek and Roman writers.

In ancient times the practice of veterinary medicine was largely in the hands of physicians or the attendants of domestic animals. There were veterinarians attached to the Roman armies, but Vegetius states that their work was not skillful and that the profession was not held in high esteem. During the Middle Ages the Arabs made some progress in the treatment of diseases of the horse. In general, however, little real advance was made in veterinary medicine from A.D. 500 to 1500. Empiric 'horse doctors' were found in considerable numbers among the Germanic and Celtic peoples. Quite elaborate treatises on horse-shoeing were also published, particularly the works of Jordanus Ruffus, Bonifacius, and Laurentius Rusius. The extensive movements of various peoples, especially the nomadic races, during the Middle Ages were responsible for the enormous distribution and destructiveness of animal plagues at this period. Not less than 32 epizoötics spread over the greater part of Europe during the Middle Ages and affected not only all domestic animals, but also man. During the first part of the Middle Ages the study of human anatomy was greatly neglected. With the revival of this study in the thirteenth, fourteenth, and fifteenth centuries, veterinary science was crowded into the background. The *Anatomia del Cavallo*, by Carlo Ruini, however, marked a distinct advance in the study of animal anatomy.

While much information regarding animal diseases was thus accumulated in ancient times and during the Middle Ages, this knowledge was mere empiricism, a collection of experiences without any formulation of underlying principles. Modern veterinary medicine, however, has been placed upon the same basis as human medicine and by similar methods of investigation. The veterinary investigator has found a most fruitful field in the pathology of organic, constitutional, functional, and infectious diseases of animals, as well as in bacteriology, methods of vaccination and immunization, and animal hygiene and methods of disinfection. Systematic investigations have been made in veterinary pharmacology and toxicology (including mineral and plant poisons).

The field of veterinary medicine now includes meat and milk inspection, the establishment of quarantine, regulating traffic in live stock, and stamping out animal plagues, as well as general practice on miscellaneous diseases. While in the past there was most demand for the practitioner's services in connection with the horse, the raising of more improved stock and the increased value of live stock in general have caused greater attention to be given to their ailments and to providing proper conditions of hygiene and ventilation for them. In large cities there is demand for specialists in the diseases of dogs, cats, and other pets. The establishment of veterinary schools has done much to promote the study of animal diseases and to place the science on a firm basis. The first veterinary school was established at Lyons, France, in 1762. The names of some of the later and more important schools, with dates of establishment, follow: Alfort (1766), Copenhagen (1773), Vienna (1777), Marburg (1789), Berlin (1790), London (1792), Madrid (1793), Saint Petersburg (1808), Stockholm (1820), Edinburgh (1825), New York (1857), and Montreal (1866). In the United States the best veterinary schools are connected with State universities or other institutions of learning. Among the more important of these are the Universities of Pennsylvania, Cornell, and Harvard. In connection with a number of the agricultural colleges courses in veterinary science are given and veterinary degrees granted.

Until recently the entrance requirements and standard of instruction in veterinary schools have not been as high as they should be. In some schools no previous academic training was required of entering students and the entire course of study consisted merely of two six-month sessions. With such low entrance requirements and defective instruction the graduates were little if any better prepared to diagnose and treat animal diseases than the empirical 'horse doctors' found everywhere in both cities and rural districts. The veterinary profession was accordingly considered distinctly lower than that of human medicine. The persistent efforts of the more progressive veterinarians, however, have brought about the gradual elevation of entrance requirements in the better class of veterinary schools, the extension of the course so as to include three or four years of regular academic length, and a decided improvement in the social and scientific standard of the veterinary profession. The American Veterinary Medical Association wields a strong influence in the same direction, since graduation from an approved school is required for eligibility to membership.

As a good example of a four years' veterinary course that recently organized at the Iowa Agricultural College may be cited. The entrance requirement is a certificate of graduation from an accredited high school, or examination in subjects covering an equivalent course. The subjects taught during the veterinary course include the following: Comparative anatomy, histology, physiology, pharmacy, materia medica, therapeutics, structural botany, chemistry, poisonous plants, entomology, pathology, bacteriology, physical diagnosis, vertebrate zoölogy, animal parasites, animal husbandry, theory and practice of veterinary medicine, ophthalmology, surgery, embryology, horse-shoeing, milk inspection, meat inspection, sanitary science, obstetrics, jurisprudence, etc. It will readily be seen that such a course offers instruction not only in the subjects immediately concerned in veterinary practice, but also in related fields, so that the student receives a rounded, comprehensive education.

Within recent years great changes have taken place in veterinary practice. In place of the indiscriminate use of firing iron, purgation, and bloodletting, we have a more rational system of treatment on a humane basis. Moreover, the excessive use of drugs has been abandoned and more attention given to the proper care and diet of animals and to preventive medicine. The course and severity of most diseases may be greatly modified by the use of pure water and wholesome food in reasonable quantities. Careful attention to the temperature and ventilation of stables is also important, especially in the treatment of diseases of the respiratory organs. It is along the line of preventive medicine, however, that the greatest progress has been made. Successful methods of vaccination and immunization have been devised for the prevention of anthrax, blackleg, hydrophobia, hog cholera, tetanus, and tuberculosis. (See these articles.) The period of incubation of various diseases has been definitely determined and upon the data thus obtained quarantine regulations for dealing with infectious diseases have been formulated. The importance of isolating diseased animals and thoroughly disinfecting the premises after the occurrence of animal plagues is well understood. The adoption of such measures tends to restrict the spread of any epizoötic. Sometimes great losses to the animal industry of a country have been avoided apparently by the application of very drastic methods of eradication, including the destruction and innocuous disposal of all affected animals. Such measures are usually accompanied with the payment of an indemnity by the Government. Great advances have recently been made in methods of disinfection by means of formalin, live steam, lime, copper sulphate, lysol, carbolic acid, and other antiseptics. The development of antisepsis has yielded as important results in veterinary practice as in human surgery. In ordinary veterinary practice, however, the observance of strict antiseptic precautions is an exceedingly difficult matter.

In veterinary surgery a much larger proportion of operations are made without anæsthesia than in human surgery. It is generally believed that minor operations cause less pain and inconvenience to the animal than the struggles during the process of etherization and the after-effects of anæsthesia. Ether or chloroform is used in general anæsthesia of the larger animals, and ether alone for cats and dogs. In minor operations and in determining the location of lameness cocaine is extensively used and with satisfactory results. In veterinary practice drugs are ordinarily administered in the allopathic form, while homœopathy is seldom practiced. Medicines are administered by way of the mouth in the form of balls, boluses, pills, capsules, and drenches; by hypodermic, intratracheal, intravenous, intra-abdominal, or intragastric injections; or per rectum in the form of an enema. The actual drugs used in veterinary medicine are for the most part the same as those used in human medicine, and are classified in the same general manner. The doses, however, are usually larger than for man and vary according to the size of the animal.

As a rule veterinary dentistry is merely one branch of the ordinary practitioner's work, and is confined almost entirely to equine practice. There are but few locations where there is demand for specialists to devote their whole time to this work. Decayed molars are usually pulled from the side by trephining the maxillary bone. Some horses require frequent attention to their teeth on account of the tendency to develop sharp points and other irregularities.

The importance of veterinary science to animal industry can scarcely be overestimated. The veterinary inspection and quarantine service makes it possible to import high-bred stock from foreign countries without danger of introducing infectious diseases among the home herds. The improvement of the dairy and beef industries in the Southern States was not possible until a method was discovered for immunizing Northern cattle to Texas fever. Before this was accomplished high-bred dairy and beef cattle were not imported into the South, for the reason that from 70 to 90 per cent. of them died after exposure to infection. In South Africa the method of bile inoculation devised by Koch has greatly reduced the losses from rinderpest, and put the business of cattle-raising on a stable basis. As long as animals affected with tuberculosis had to be destroyed the improvement of our dairy and beef herds was a difficult and expensive matter. The Bang method for controlling tuberculosis, however, makes it possible to utilize full-blooded tuberculous animals for breeding purposes without danger to the future of the herd. In short, animal industry in its present proportions, particularly the production of blooded stock, is impossible without the existence of an effective veterinary service.

The relation of this service to human health is best shown in the inspection of milk and meat. Since many diseases are considered intertransmissible between man and animals, it is deemed necessary to exercise some control of the milk and meat supply. The importance of sanitary regulation of the traffic in milk and meat is gradually gaining the recognition of legislators, and inspection of these products is required in Montana, New York, and Pennsylvania, and in many large cities. In Germany there is a federal inspection of all meat and meat products, and in the United States export meat is inspected by the federal authorities. Inspection is merely one of the functions of the veterinary service.

The organization of the veterinary service differs somewhat in different countries, according to local conditions. In Germany, England, and other European countries there is an army veterinary corps, the personnel of which bear titles corresponding to the regular army grades. In the United States veterinarians attached to the army are civil and not military officers. Nearly all European and other foreign countries maintain some form of official veterinary service, charged with the duties of investigating outbreaks of contagious or otherwise serious diseases among domesticated animals, and of inspecting animals and animal products which may be imported into the country. Germany has developed an elaborate organization of her veterinary service, with department and district veterinarians in various parts of the Empire. Appeal may be taken from the decisions of these officials to the Federal Veterinary Commission or to the Imperial Health Office. From time to time special commissions are appointed for the investigation of urgent problems. In most of the English colonies there is a Government veterinarian or chief inspector, with numerous deputies and assistants.

In the United States these duties devolve upon the Bureau of Animal Industry of the United States Department of Agriculture, and upon the various State veterinarians and State Boards of Agriculture. The Bureau of Animal Industry maintains inspectors and special agents in various parts of the country, and has charge of quarantine regulations. The State veterinarians have full authority to investigate animal diseases and to enforce all State laws concerning such matters. Many of the larger cities maintain municipal veterinarians in connection with the Boards of Health. The majority of animals kept in captivity in zoölogical gardens are subject to the diseases which affect farm animals. Tuberculosis is the most important of these diseases, and affects nearly all species of captive animals. It is especially fatal to apes and monkeys. On account of these facts it has been found necessary to fulfill the conditions of ventilation and other sanitary requirements in the construction of animal houses. Official veterinarians are maintained in connection with the larger zoölogical gardens and administer treatment in cases of curable disease. The administration of medicines to most wild animals in captivity is not an easy matter, but may usually be accomplished in connection with food and drink. Surgery on such animals is largely confined to the reduction of dislocations and the setting of broken bones. Veterinary medicine compares favorably in its achievements with human medicine. The etiology, pathology, treatment, and prevention of a number of animal plagues have been carefully and satisfactorily worked out. Blackleg and Texas fever, for example, are controlled as easily as smallpox and diphtheria in man and rather more effectively. The recent discoveries regarding the etiology of malaria and yellow fever in man have been paralleled by equally brilliant and important results obtained in studying the protozoön diseases of animals—e.g. surra, dourine, mal de caderas, nagana, etc. Many problems, however, remain to be solved, and investigators have, in the study of animal diseases, a very tempting field which already boasts of such distinguished names as Koch, Ostertag, Von Behring, Kitt, Chauveau, Nocard, Arloing, Perroncito, McFadyean, T. Smith, Salmon, Pearson, Law, Moore, etc.

The literature of veterinary science is extensive and rapidly increasing. Among books the following may be consulted: Nocard and Leclainche, *Maladies microbiennes des animaux* (1903); Ellenberger and Baum, *Handbuch der vergleichenden Anatomie der Hausthiere* (1903); Ostertag, *Handbuch der Fleischbeschau* (1902); Eichbaum, *Grundriss der Geschichte der Thierheilkunde* (1885); Smith, *Physiology of Domestic Animals* (1889); Fleming, *Text-book of Veterinary Obstetrics* (1882); Hoare, *Manual of Veterinary Therapeutics and Pharmacology* (1896); Hopkins, *Veterinary Elements* (1901); Law, *Farmer's Veterinary Adviser* (1892); Law, *Text-book of Veterinary Medicine* (1896-1903); Smith, *Manual of Veterinary Hygiene* (1887); Williams, *Principles and Practice of Veterinary Medicine* (1897); Winslow, *Veterinary Materia Medica and Therapeutics* (1901); Moore, *The Pathology of Infectious Diseases of Animals* (1902); and Thompson, *Elementary Veterinary Lectures* (1903). A large and increasing number of veterinary journals are published, among which may be mentioned *The Journal of Comparative Medicine and Veterinary Archives*, and *The American Veterinary Review*, published in the United States. The bulletins and reports of the Bureau of Animal Industry and of the State Experiment Stations and State Boards of Agriculture are also important sources of veterinary information.

VÉTILLART, vā'tē'yär', **Marie Michel Henri** (1848—). A French civil engineer, born in Le Mans and educated at the Polytechnique and at the Ecole des Ponts et Chaussées, where he graduated in 1874 with highest honors. He was resident engineer of the port of Calais from 1875 to 1886, chief engineer of the ports of Boulogne and Calais until 1892, and then chief engineer of Havre and the ports of the lower Seine. He utilized the water-jet to sink foundations of locks and piers, built the new port of Calais and improved the canals of that city, and finished the great breakwater at Boulogne. One of the foremost of modern harbor engineers, Vétillart was a prominent figure in the Maritime Congresses of London, Manchester, and Washington, and wrote: *Foncage des pieux par injection d'eau* (1877), *Le port de Calais* (1889), *La navigation aux Etats-Unis* (1892), and, with Quinette de Rochemont, *Les ports maritimes de l'Amerique du Nord sur l'Atlantique* (1902).

VET'IVER, VITIVERT (from East Indian *vitivayr*), or Cuscus. The dried roots of an East Indian grass (*Andropogon squarrosus*) which has an agreeable and persistent odor, resembling sandal-wood, due to an essential oil which is distilled from it. It is much prized in India and elsewhere for perfuming linen, etc., making baskets, fans, and mats. It grows in low, moist, rich soils, and upon such it has been introduced in the West Indies, Brazil, and Louisiana, where it has spread to some extent. It has been successfully grown in Tennessee, but the plants did not bloom.

VETO (Lat., I forbid). In its most general application, the power of the chief executive of a government to negative the acts and resolutions of the legislature. There are several forms and degrees of veto power, namely, the suspensive, qualified, and absolute vetoes, and the so-called 'pocket' veto. The suspensive veto is the form employed in France, where the President is empowered to suspend the operation of any law passed by the legislature and demand its reconsideration by that body. If, however, the bill is repassed by the ordinary majority it becomes a valid law, notwithstanding the disapproval of the President. The qualified veto is the form most generally employed in constitutional States. It allows the executive a negative on all bills passed by the legislature, subject to the power of the legislature to override the effect of the veto by an extraordinary majority. The absolute veto is one which cannot be overridden by the legislature either by the usual or extraordinary majority. The 'pocket' veto will be defined later in the article.

The veto is the remnant of the more extensive legislative power formerly possessed by the Crown. This power was gradually cut down until only the veto power remained. In Great Britain the right of veto was unquestioned from the time of the Tudors until the Revolution of 1688. From then it was used more sparingly until 1708, when the refusal of Queen Anne to give her assent to a militia bill was the last instance of its exercise by an English sovereign.

In the American colonies the royal governors were given the authority to veto any measure passed by the colonial legislatures, while in all the colonies except Rhode Island and Connecticut and possibly Maryland the King or the proprietaries had an absolute veto on all measures, even though approved by the Governor. In the Constitutional Convention of 1787 Gerry introduced the principle of the Massachusetts veto and after much discussion it was ultimately adopted. The clause provides that every bill which shall have passed the two Houses shall be presented to the President for his signature; if he approve it he shall sign it, but if not he shall return it with his objections to the House in which it originated. The two Houses are then required to enter the objections upon their respective journals and proceed to reconsider it. If after such reconsideration two-thirds of each House shall approve the measure it shall become law, notwithstanding the executive veto. If any bill is not returned by the President within ten days (Sundays not included) after presentation to him it shall become law without his signature unless Congress by adjournment prevent its return. This is the so-called 'pocket' veto. The most notable instances of the exercise of the veto power by the chief executive of the United States were the vetoes of the bills for the recharter of the United States Bank by Presidents Jackson and Tyler; the veto of the Civil Rights, Freedmen's Bureau, and Reconstruction bills by President Johnson; and the veto of the currency-inflation bill by President Grant. The veto power was used rather sparingly by the first six Presidents. President Cleveland during his first term vetoed 301 bills, or nearly twice as many as had all his predecessors combined. The majority of President Cleveland's vetoes were private pension bills which had passed with little or no opposition and only two of these were passed over his veto. The principle of the veto has been incorporated in all the State Constitutions except those of Delaware, North Carolina, Ohio, and Rhode Island, in which the legislative authority is vested in the Legislature alone. Consult Mason, *The Veto Power* (Boston, 1891).

VET'TER, or **WETTER,** LAKE. A lake in Sweden, second in size to Vener (q.v.). It lies about 25 miles southeast of the latter, and 115 miles southwest of Stockholm (Map: Sweden, F 7). It is of elongated shape, with a length of 82 miles and a maximum breadth of about 14 miles, and has an area of 738 square miles. It occupies a deep inclosed valley whose bottom is below sea level, the altitude of the lake surface being 289 feet, and the depth of the water 390 feet. The shores are high, steep, and picturesque, and the water is remarkably clear. The lake receives no streams of much size, and is supposed to be fed by springs below the surface. Peculiar disturbances, such as rapid currents, sudden waves and eddies without apparent cause, and periodic fluctuations in the level, support this theory. The outlet of the lake is the Motala River, discharging eastward into the Baltic. This river has been canalized, and the Göta Canal connects the lake with Lake Vener, thus making it a link in the transpeninsular waterway. The chief town on Lake Vetter is Jönköping, near its southern extremity.

VEUILLOT, vẽl'yō'; LOUIS (1813-83). A French ultramontane publicist and author, born at Boynes (Loiret). Entirely self-educated, he began his literary career as a contributor to journals supporting the government, edited from 1831 the *Echo de Rouen* and from 1837 in Paris the *Charte de 1830* and afterwards *La Paix*. After a visit to Rome in 1836 he had become the most uncompromising representative of ultramontanism in France and as contributor to (since 1843) and editor of (since 1848) its chief organ, the *Univers Religieux*, upheld with great talent and reckless energy the claims of the papacy to unrestricted dominion over Church and State. His violent polemics against the Italian policy of Napoleon III. in 1860 led to the suppression of the *Univers*, which was not allowed to appear again until 1867. During the Council of the Vatican (1869-70), he succeeded by threats and denunciations in holding at bay the remotest Gallican manifestations on the part of the French episcopate. His political influence reached its height under the government of the so-called moral order in 1877, whereafter, confined to his room by gout, he only seldom imparted his opinions through the medium of the *Univers*. Of his numerous publications, including edifying romances and saintly stories, political, historical, and literary essays, and poems, may be mentioned: *Pélerinages de Suisse* (1838, 21st ed., 1894), *Pierre Saintive* (1840), *Rome et Lorette*, (1841 and frequently after), *Les Français en Algérie* (1845, 10th ed., 1889), *Les libres penseurs* (1848) *L'esclave Vindex* (1849), *Le parfum de Rome* (1861, 12th ed., 1890). *Historiettes et fantasies* (1862), *Les odeurs de Paris* (1866, 10th ed., 1876), *Les couleuvres* (1869), a collection of poems, *Paris pendant les deux sièges* (1871); *Rome pendant le Concile* (1872), *Molière et Bourdaloue* (1877),

Etudes sur Victor Hugo (1885). A collection of his writings he published under the title *Mélanges religieux, historiques, politiques et littéraires* (1857-76. Consult the biographies by his brother Eugène Veuillot (Paris, 1883), and by Cornut (ib., 1891).

VEVEY, vĕ-vā′. A town of the Canton of Vaud, witzerland, on the left bank of the Veveyse, near its influx into Lake Geneva, 11 miles east-southeast of Lausanne (Map: Switzerland, A 2). Vevey, the scene of Rousseau's *Nouvelle Héloïse,* is a charming tourist resort, with a magnificent view of the Valais Alps. The climate is mild and delightful. The town is well and regularly built and dotted with fine gardens. It has an extensive system of quays. The Tour de Peliz (thirteenth century) is now used as a prison. There is a modern museum, containing a natural history collection, paintings, and a public library. Chocolate, children's food, and condensed milk are extensively manufactured. Population, in 1900, 11,781.

VEZ′IN, HERMANN (1829—). An actor, born in Philadelphia and educated at the University of Pennsylvania. He went to England and obtained an engagement at the Theatre Royal at York in 1850. His London début was made at the Princess Theatre under Charles Kean's management in 1852. Two years later he 'starred' through the English provinces. In 1857 he appeared in the United States, returning to England in 1858. The next year he appeared at the Surrey Theatre in an important series of Shakespearean rôles, including Macbeth, Hamlet, Shylock, and Othello. Then for a time he played at the Sadler's Wells Theatre. He married in 1863 Mrs. Charles Young, with whom he successfully brought out Marston's *Donna Diana* at the Princess's Theatre in 1864. Among his subsequent impersonations may be mentioned *Dr. Davey* (1866), James Harebell in Wills's *Man o' Airlie* (1867), Martel in Merwale's *Son of the Soil* (1872), Jacques in *As You Like It* (1875), *Daniel Druce* (1876), which ran for one hundred and six times at the Haymarket, and Dr. Primrose in Wills's *Olivia* (1878). Later he also became known as a teacher of elocution and as a writer.

VIADANA, vē′a-da′nȧ (properly GROSSI) LODOVICO (c.1564-1645). An Italian composer, credited with being the inventor (1602) of the *basso continuo.* Little is known of his life, save that he was born at Viadana, near Mantua, became a monk, and held successive posts as organist and choirmaster at Mantua, Rome, and elsewhere. Among his numerous works may be mentioned the famous *Cento concerti ecclesiastici a una, a due, tre e quattro voci, con il basso continuo per sonar nell' organo* (1602, 1603, 1609, 1611, and 1612); *Sinfonie musicali a otto voci* (1617). Consult Parazzi, *Della vita e delle opere musicali di Lodovico Grossi-Viadana* (Milan, 1876).

VI′A DO′LORO′SA (Lat., dolorous way). The name, probably given during the Middle Ages, applied to a narrow zigzag street in Jerusalem, indicated by a doubtful tradition as the street through which Jesus carried His cross from the Hall of Judgment to Mount Calvary. The fourteen stations are marked by tablets. The location of these spots has varied at different times.

VIADUCT (ML. *viaductus,* from Lat. *via,* way, road + *ductus,* a leading, from *ducere,* to lead). A structure for conveying a roadway across a valley or low level. They are of every kind of construction—of wood, iron, stone, and brickwork. In recent years, and more particularly in America, where the design originated, the term viaduct has come to mean more specifically a metal structure composed of a number of comparatively short spans carried by tower-like piers of steel framework. These piers usually consist of four column-like legs spread wide apart at the bottom and converging toward the top, which are braced together in all directions.

PRINCIPAL DIMENSIONS OF NOTABLE HIGH RAILWAY VIADUCTS

Viaduct	Des Moines.	Gokteik.	Pecos River.	(Kinzua) old.
Country	United States.	Burma.	United States.	United States.
Railway	Chic.& N. W.	Burmah State.	So. Pacific.	Erie.
Gage	4 ft. 8½ ins.	3 ft. 3⅜ ins.	4 ft. 8½ ins.	4 ft. 8½ ins.
Number of tracks	Two.	One.	One.	One.
Length	2,685 ft.	2,260 ft.	2,180 ft.	2,053 ft.
Height, maximum	185 "	335 "	321 "	301 "
Width between girders	27 "	11 "	10 "	10 "
Width of floor	…………	…………	20 "	18 "
Width of base, maximum	70 ft.	156 ft.	90 ft 3 ins.	…………
Weight of metal	5,680 tons.	4,310 tons,	1,820 tons.	1,400 tons.
Tower spans	45 ft.	(16) 40 ft.	35 ft.	38½ ft.
Intermediate spans	75 "	(7) 60 ft. (10) 120 ft.	65 "	61 ft.
Maximum span	(Truss) 300 ft.	120 ft.	185 ft.	61 ft.
Date of construction	1900-01.	1900.	1891-92.	1882.

Viaduct	Kinzua (new)	Panther Creek.	Loa.	Verrugas (old)	Verrugas (new)
Country	United States.	United States.	Bolivia.	Peru.	Peru.
Railway	Erie.	Wil. B. & E.	Antofagasta.	Lima &	Oroya.
Gage	4 ft. 8½ ins.	4 ft. 8½ ins.	2 ft. 6 ins.	4 ft. 8½ ins.	4 ft. 8½ ins.
Number of tracks	One.	One.	One.	One.	One.
Length	2,053 ft.	1,650 ft.	800 ft.	575 ft.	575 ft.
Height, maximum	301 "	161 "	336½ ft.	252 "	252 "
Width between girders	9 "	7 "	8 ft, 10 ins.	…………	…………
Width of floor	18 "	…………	13 ft.	…………	…………
Width of base, maximum	102 ft. 8¼ ins.	…………	124 ft.	…………	58 ft. 4 ins.
Weight of metal	3,352 tons.	830 tons.	1,115 tons.	…………	…………
Tower spans	38½ ft.	30 ft.	32 ft.	50 ft.	60 ft.
Intermediate spans	61 ft.	40, 60, & 65 ft.	80 "	100 & 125 ft.	235 ft. centre. 150 " shore.
Maximum span	61 ft.	65 ft.	80 ft.	125 ft.	235 "
Date of construction	1900.	1893.	1888.	1872.	1890.

This construction was best typified for a great many years by the viaduct crossing Kinzua Creek in northwestern Pennsylvania, on the Erie Railroad, which is familiarly known as the Kinzua viaduct. The accompanying table gives the main characteristics of the more important viaducts of this type. See Bridge.

VIA MALA, vē'ȧ mä'lȧ (Lat., Bad Road). A famous road, made in 1470, through a deep gorge of the Rhine in the Grisons, Switzerland. The present road, seven yards in width, was built in 1818-24. It passes between limestone cliffs 1600 feet high and crosses the river three times by bridges spanning the ravine at a great height above the water. The Via Mala forms the first part of the Splügen Road.

VIARDOT, vyȧr'dō', Louis (1800-83). A French art critic. He was born in Dijon, studied law in Paris, took up journalism, managed the Grand Opera (1838-41), and married the opera singer Pauline Garcia (1840). He traveled widely and made many translations from Spanish and Russian, writing also *Etudes sur l'histoire des institutions et de la littérature en Espagne* (1835); *Histoire des Arabes et des Maures d'Espagne* (1851); and *Les merveilles de la peinture* (1868), translated in part as *The Wonders of Italian Art.*

VIARDOT-GARCIA, gär-thē'ȧ, Pauline (1821—). A celebrated French vocalist, born in Paris. She was the daughter of the famous tenor Manuel Garcia, and sister of Madame Malibran. She was taken with her family first to England, then to the United States, and in 1828 returned to Europe. She was one of Liszt's most accomplished pupils. Her concert début was at Brussels in 1837, and her first London appearance was at the Opera House, in 1839, as Desdemona in Rossini's *Otello.* She then appeared in Italian opera at the Paris Odéon with equal success. In 1841 she married the director of the Paris Italian Opera, Louis Viardot. After her marriage she made numerous European tours, until her retirement in 1863. Her name is associated with the first performances of Meyerbeer's *Les Huguenots* and *Le Prophète*, and Gounod's *Sapho.* She sang the title rôles in the revivals at Paris of Gluck's *Orphée* (1859) and *Alceste* (1861). In 1871 she settled in Paris as a teacher of singing. Her compositions include several operas, sixty popular vocal melodies, instrumental pieces, and an *Ecole classique de chant.*

VIAREGGIO, vē'ȧ-rĕd'jō. A winter resort in the Province of Lucca, Italy, situated on the shore of the Mediterranean, 33 miles by rail southeast of Spezia (Map: Italy, E 4). The scenery is attractive, and there are excellent bathing facilities. There is a monument erected to Shelley, who was drowned near Viareggio. Population (commune), in 1901, 17,166.

VIA SA'CRA. See Sacred Way.

VIAT'ICUM (Lat., journey-money, provision for a journey). The word applied in ecclesiastical terminology to the communion administered to dying persons. The special ministration of the Eucharist to the dying was the one exceptional case in which, during the times of rigorous canonical penance, the penitents were admitted to the communion before the completion of the appointed cycle of penance. The Roman Catholic Church, which in all other cases requires an absolute fast from the midnight before communion, dispenses dying persons from this obligation. The viaticum may be given frequently during the same sickness, at intervals anciently of ten or seven days, but by the modern practice even daily, should it be earnestly desired by the sick person.

VIAUD, vē'ō', Julien. A French writer. See Loti, Pierre.

VIBERT, vē'bâr', Jean Georges (1840-1902). A French genre painter, born in Paris and educated at the Ecole des Beaux-Arts, where he was a pupil of Barrias and Picot. He first exhibited in 1863, his early productions being in the grand style, such as "Repentance," "Narcissus Transformed into a Flower," "Christian Martyrs in the Lion's Den," and "Entry of Bull Fighters." His material success began when he turned his attention to genre, for which the popular demand was large, producing "Roll Call After the Pillage," and following it with a long succession of subjects mainly drawn from clerical life. In the satirical vein are "The Cardinal's Menu;" "The Missionary's Story" (Collis P. Huntington); "The Convent Under Arms;" "The Wonderful Sauce;" "The Antechamber of Monseigneur;" "The Startled Confessor;" and four others in the Metropolitan Museum, New York. In 1867 he was one of the five who originated the Society of French Aquarellists, which, under his presidency, had an influence in raising the technical standard of the Salon.

VIBORG, vē'bŏrg. A government occupying the southeastern part of Finland, Russia (Map: Russia, C 2). Area, 13,525 square miles, exclusive of its portion of Lake Ladoga (q.v.). The coast region along the Gulf of Finland and Lake Ladoga is low and exceedingly indented. The interior is rocky and mountainous and interspersed with marshes and lakes. The latter occupy one-tenth of the total area and are connected with each other by short streams. The chief rivers are Kymenne and the Wuoxen. Viborg has extensive deposits of building stone, copper, lead, and iron. Agriculture is less developed than in most regions of Finland, owing to the scarcity of suitable land and the severity of the climate. Rye, oats, and barley are grown. The forests occupy a large part of the area and are an important source of income. Hunting and fishing also give occupation to many of the inhabitants. The manufacturing industries are highly developed, and the annual value of manufactures is over $6,000,000, chiefly lumber and other products of wood and paper, leather, metal products, and articles of rubber and bone. The commerce is mainly with Russia. Population, in 1897, 394,412, chiefly Finns.

VIBORG (Finnish *Wiipuri*). The capital of the Government of Viborg, in Finland, Russia, and a third-class fortress, situated at the northern end of a deep inlet of the Gulf of Finland, at the mouth of the Saima Canal and about 75 miles northwest of Saint Petersburg (Map: Russia, C 2). It is a clean, well-built town, with an ancient castle now used as a prison. It has a school of navigation and a museum. The harbor is not sufficiently deep for large vessels, which anchor at Transund, about 8 miles distant. Viborg has extensive sawmills and carries on a large trade in lumber, dairy products, paper, and products of iron. Population, in 1900, 31,388.

VIBRATION. See Acoustics; Music; Harmonics.

VIBRATO, vē-brä'tō (It., vibrated). A term denoting an effect somewhat similar to tremolo (q.v.). On stringed instruments it is produced by the quick oscillation of the finger on the string which it is stopping. The result is a pulsating, wavering tone. In vocal music it is a partial suppression and reinforcement of a note, producing an apparent reiteration.

VIBURNUM (Neo-Lat., from Lat. *viburnum*, the wayfaring tree). A genus of shrubs and a few trees of the natural order Caprifoliaceæ. The numerous species are characterized by their opposite, dentate or lobed leaves, showy cymes of white flowers and red or blackish fruits. Many are popular as ornamentals in gardens, perhaps the best known being the snowball (*Viburnum Opulus*), which is a horticultural derivative of the 'high-bush cranberry.' Other well-known species are *Viburnum Tinus*, the laurustinus or laurestinus, which blooms from May to August; *Viburnum cassinoides*, the white-rod or Appalachian tea, well known from Newfoundland to North Carolina and westward to Manitoba; *Viburnum Lentago*, the nanny-berry or sheep-berry, also well known in the above territory and as far south as Mississippi and Georgia, and whose black berries are often eaten; *Viburnum prunifolium*, the stag-bush or blackhaw, frequent from Connecticut and Michigan to the Gulf States; *Viburnum alnifolia*, the American wayfaring tree, a companion of the white-rod, except in its more northerly quarters; *Viburnum dentatum*, arrowwood, and *Viburnum acerifolium*, dockmackie, of similar range to the previous species. There are several evergreen species, of which *Viburnum Japonicum* is the most hardy. The hardy species are easily propagated by seeds, cuttings, or layers, and easily cultivated in almost any soil.

VICAR (OF., Fr. *vicaire*, from Lat. *vicarius*, substitute, from *vice*, in place of; connected with Gk. *εικειν*, *eikein*, AS. *wican*, OHG. *wihhan*, Ger. *weichen*, to yield). A person deputed or authorized to perform the functions of another. The common usage of the term is ecclesiastical.

A vicar in the Church of England is an incumbent of an appropriated benefice, who receives only a part of the emoluments; generally speaking, a share of the glebe and the small tithes. (See Tithes.) He is supposed to act as the deputy of the rector, who receives the great tithes.

A corresponding office and title of vicar has developed in a few of the larger city parishes of the Episcopal Church of the United States which support two or more places of public worship. To such vicar is deputed the care of souls by the rector for a particular congregation, but his support is fixed by the vestry of the parish, as in the case of curates or other assistant ministers.

VICAR APOSTOLIC. The title of certain prelates in the Roman Catholic Church. The vicars apostolic of the Middle Ages corresponded to the *legati nati* of later times (see Legate); those of the present time are delegated by the Pope to exercise pastoral care in certain churches or districts, not in their own name, but in that of the Pope. Vicars apostolic are appointed (1) for missionary countries where as yet dioceses are merely in the course of formation—as in some parts of the United States; (2) for the Roman Catholic portion of the population in some countries that have been lost to the Roman obedience; (3) in urgent cases, where the administration of a diocese fully organized becomes temporarily disordered—that is, by the absence, captivity, sickness, and the like of its bishop. Consult Smith, *Elements of Ecclesiastical Law* (New York, 1895).

VICAR-GENERAL. The title of an ecclesiastical functionary in the Roman Catholic Church and in the Church of England. In the former a vicar-general is one who is appointed to exercise, in a general way, episcopal jurisdiction in the bishop's stead, and in such manner that his acts are considered the acts of the bishop himself. He must be an ecclesiastic, though he need not be in major or even minor orders. A vicar-general, even though he be a bishop, cannot perform actions of the *ordo episcopalis*, e.g. blessing holy oils, giving confirmation, consecrating churches, or conferring orders without special mandates. In the United States a vicar-general can (unless the bishop disposes otherwise) give priests faculties, together with the cure of souls, and revoke them for just reasons. He cannot, however, erect, unite, or divide benefices or parishes, nor can he give another bishop permission to exercise pontifical functions in the diocese.

In the Church of England a vicar-general is a lay legal officer of some dioceses, whose duties are practically the same as those of a chancellor (q.v.).

VICAR OF BRAY, The. A popular ballad, written in the first half of the eighteenth century by an officer in the English army. The subject is an historical character, a clergyman, variously called Simon Alleyn, Pendleton, or Symonds, notorious for his changes of faith under different sovereigns, from Henry VIII. to Elizabeth, during which period he retained his office. His name is proverbial as a type of political hedging.

VICAR OF WAKEFIELD, The. A novel by Oliver Goldsmith (1766). It narrates the misfortunes of a worthy but simple-minded country clergyman, Dr. Primrose, whose poverty and unworldliness lay him open to petty swindles and misfortunes, which are ultimately righted. It gained immediate popularity as a perfect expression of homely English sentiment, and in its feeling for nature shows the approach of the Romantic movement.

VICE-ADMIRAL. See Admiral; also Flag Officer.

VICE-CHANCELLOR. In England, a judge of the Court of Equity who is appointed by the Crown under letters patent as an associate to the Lord Chancellor. The office was created in the reign of Henry II. and later fell into disuse, but was revived by the statute 53 George III., c. 24, appointing one vice-chancellor, and the act of 5 Victoria, c. 5, s. 19, by which two vice-chancellors were appointed, because of the increase of business on the abolition of the equitable jurisdiction of the Court of Exchequer. The vice-chancellor presides over a branch of the Court of Equity, and is authorized to perform the duties of the Lord Chancellor in the latter's absence or illness. The term is employed in a few of the United States, as New Jersey, to designate an associate of a chancellor of a court of equity.

The vice-chancellor of a university is an officer with authority to discharge certain duties of a chancellor, generally those connected with granting degrees in the absence of the latter.

VICENNIAL PRESCRIPTION. In Scottish law, a limitation of 20 years within which certain actions relating to real property may be commenced.

VICENTE, vē-sĕn'tā, Gil (c.1470-c.1536). The founder of the Portuguese drama, born probably in Lisbon. He studied jurisprudence at the University of Lisbon, but soon gave himself up to literature. His first production was a pastoral monologue in Spanish, which he recited in 1502 to celebrate the birth of the prince who became John III. Similar dramatic pieces followed, a number of them being the religious mysteries called *autos*, and many of them comedies of various types. One of his best pieces, the farce called *Inez Pereira*, was composed impromptu. He wrote both in Spanish and in Portuguese, and sometimes used both languages in a single play. Vicente was an actor as well as a poet; and his children often appeared with him in his productions. After his death a collected edition of his works was published by his son (Lisbon, 1561), and twenty-five years later a new edition appeared after expurgation by the Inquisition. Eight of his Spanish pieces are included in Böhl von Faber's *Teatro Español anterior á Lope de Vega* (Hamburg, 1832). His collected works were published by Bareto Feio and Monteiro in 1834 (Hamburg). Consult: De Ouguella, *Gil Vicente* (Lisbon, 1890); Braga, *Historia do theatro portuguez no seculo XVI.* (Porto, 1870).

VICENZA, vē-chĕn'tsa. The capital of the Province of Vicenza, Italy, situated at the confluence of the Retrone and the navigable Bacchiglione, 41 miles by rail west-northwest of Venice (Map: Italy, F 2). The encircling plain, studded with villas and rich in vineyards, is very beautiful. Seven bridges span the rivers. The city lies in a compact shape, and is surrounded by a moat and by walls half in ruins. Many of the magnificent palaces for which the city is justly famed are by Palladio. The Piazza de' Signori, the remarkably fine square in the centre of the town, contains the Palazzo della Ragione, or town hall, surrounded by the splendid Basilica Palladiana—a beautiful colonnade having two stories and with a slender campanile 265 feet high. In the handsome Palazzo Chierecati is the valuable municipal museum with some good paintings, and archæological and natural history collections. Near by, in the northeastern part of the city, is the fine wooden Teatro Olimpico by Palladio, finished in 1584. The curious scenery in its interior represents a kind of piazza with diverging streets. On Monte Berico, looming picturesquely on the south of the city, stands the pilgrimage church of Madonna del Monte, containing a number of paintings by Bartolommeo Montagna. East of it is situated the well-known but now ruined villa Rotonda Palladiana, a square structure with a Greek colonnade, and a round domed room in the centre.

Vicenza has an academy of science, literature, and art. There is a public library of over 50,000 volumes. The Corpus Christi festival is of great interest. The principal industry is the production of silk and silk goods. Straw hats, woolen goods, leather, machinery, and musical instruments are also manufactured. The trade is active in wine, grain, and vegetables. Population (commune), in 1881, 39,431; in 1901, 44,777.

Vicenza, the Roman Vicetia, rose into prominence in the early part of the Middle Ages as the capital of a Lombard duchy. It was one of the cities which, banded together in the Lombard League, opposed Frederick Barbarossa in the twelfth century. It was stormed and pillaged in 1236 by the Emperor Frederick II. Having freed itself from Padua in 1311, it was successively in the hands of the Scala and Visconti families. It became subject to Venice in 1404.

VICE-PRESIDENT. The second officer of the Government of the United States in rank and chosen for the same term and in the same manner as the President, except that in case no candidate for the Vice-Presidency receives a majority of the electoral votes, the election is thrown into the Senate, which then chooses by a majority vote one of the two leading candidates. Previous to the election of 1804 the electors were not required to specify which candidate was voted for as President and which as Vice-President. Although described as an executive officer, he performs no executive functions whatever, his only duty being to preside over the deliberations of the Senate except when it is sitting as a court of impeachment for the trial of the President, when the Chief Justice presides. He has a casting vote in the Senate in case of a tie, and he presides at the joint meeting of the two Houses when the electoral votes are counted. The chief importance of the office consists in the fact that the Vice-President is made by the Constitution the successor of the President in case of the latter's removal from office or of his death, resignation, or inability to discharge the powers and duties of the office. Of all these contingencies only one has so far occurred, namely, the death of the President. The deaths of Presidents Harrison in 1841, Taylor in 1850, Lincoln in 1865, Garfield in 1881, and McKinley in 1901 caused the succession to devolve upon the Vice-President. The qualifications required of the Vice-President are the same as those of the President. His salary is $8000 per year.

VICEROY. An American butterfly (*Basilarchia disippus*) which so closely resembles or 'mimics' in color and markings the monarch (*Anosia plexippus*) that it is not infrequently mistaken for the latter. The monarch is protected by a nauseous taste and smell from the attack of birds; the viceroy has no such protection. (See Mimicry.) The viceroy ranges over nearly all of the United States. Its larvæ feed on the willow, poplar, cottonwood, aspen, and balm of Gilead. The eggs are laid on the tip of a leaf, and the young larva, feeding at the tip, attaches bits of leaf to the midrib, thus stiffening its perch and preventing it from curling as it dries. Toward winter a tube-like case is formed along the midrib, and in this the larva passes the winter. The pupa is suspended to a twig by a silken attachment at its posterior end, and is characterized by a projection like a Roman nose which issues from the middle of the body.

VICH, vēk, or **VIQUE**. A city of the Province of Barcelona, Spain, on a hill-girt plain, 38 miles north of Barcelona (Map: Spain, G 2). Its cathedral, built about 1040, was repaired and modernized in 1803. Interesting pictures and sculptures are found in the Museum of Art and Archæology. Corn, fruit, and a poor wine are the products of the vicinity; the inhabitants are employed in weaving, and in the manufacture of hats, paper, and cotton goods. In the vicinity are mines of copper, coal, amethyst, topaz, and crystals. Population, in 1900, 11,146. Vich, the Roman Ausa, was afterwards called Ausona and Vicus Ausonensis, of the first part of which its present name is a corruption.

VICHY, vē'shē'. A town of the Department of Allier, France, on the right bank of the Allier, 69 miles by rail south-southeast of Paris (Map: France, K 5). It is one of the most famous of watering places, its numerous springs being annually visited by 60,000 persons. Vichy consists of the mediæval and the new towns and is almost surrounded by parks and gardens. In the old town are the Romanesque Church of Saint Louis and the Pavillon de Sévigné, now a hotel. Here Madame de Sévigné, who first brought Vichy into prominence, passed the year 1676. The attractive new town, on the north, contains a fine promenade flanked by the Casino and large bazaars on one side, by the main establishment of the baths on the other. The splendid Renaissance Casino is modern. The elegant thermal establishment is an immense edifice surrounded by a massive arcade, with a large annex on the west. It is owned by the State and leased to a company. There are yearly exported 7,000,000 bottles of Vichy water, the total daily supply being over 65,000 gallons. Salts, pastilles, and barley sugar are manufactured. The Vichy linen is made here. Population, in 1901, 14,254. The waters of Vichy were known to the Romans. It became a fashionable resort under the Second Empire, owing to the patronage of the Court.

VICIOUS INTROMISSION. In Scotch law, the assuming of possession or charge of goods and chattels of a deceased person without authority, as where a person takes such property before the will of the deceased owner is probated. Such a person corresponds to an executor *de son tort* in English law, and is liable in damages which may be caused by his acts.

VICKS'BURG. The largest city of Mississippi and the county seat of Warren County, 236 miles north by west of New Orleans; on the Mississippi River, and on the Yazoo and Mississippi Valley, the Alabama and Vicksburg, and the Vicksburg, Shreveport and Pacific railroads (Map: Mississippi, D 6). It is attractively situated among the Walnut Hills. The Federal Government building and the county court house are noteworthy structures; and among the prominent institutions of the city are the Charity Hospital and Saint Aloysius College. The National Cemetery here has 16,727 graves, 12,723 of unknown dead. Vicksburg is a commercial centre of importance, being noted especially for its cotton trade, and in manufacturing it ranks second among the cities of the State. The leading industrial establishments include railroad shops, lumber mills, cottonseed-oil mills, and manufactories of machinery, carriages, shoes, etc. Population, in 1890, 13,373; in 1900, 14,834.

Vicksburg was laid out on the plantations of William Vick and John Lane, and was incorporated in 1840. It was strongly fortified in 1861 and was provided with a large garrison, which, after a long siege, surrendered to General Grant on July 4, 1863. (See VICKSBURG, CAMPAIGN AGAINST.) Consult a sketch in Powell's *Historic Towns in the Southern States* (New York, 1900).

VICKSBURG, CAMPAIGN AGAINST. The campaign or series of operations in 1862 and 1863, during the Civil War, which had for its object the capture by the Union troops under Generals Grant and Sherman of Vicksburg, Miss. It was pronounced by Sherman 'one of the greatest campaigns in history.' The year 1862 had been fruitful in reverses to the Union cause, and the Washington authorities realized that, both for political and military reasons, redoubled efforts must be made to turn the tide. In the West the great territorial object was the possession of the Mississippi River, which in the Autumn of 1862 remained in the hands of the Confederates, who maintained strong garrisons at several points below Memphis—the largest force, under General Pemberton, being stationed at Vicksburg. In October, 1862, the Union forces near the Corinth and Memphis line comprised about 48,000 men under General Grant. He decided to assume the offensive, and having concentrated (November 4th) a part of his command on the Mississippi Central Railroad (which in that vicinity runs parallel to the great river) at Grand Junction, prepared to move upon Vicksburg with an expedition down the Mississippi River under Sherman, and a force under his personal direction advancing by the way of the railroad. Sherman started December 20th with 32,000 men and 60 guns, reached Millikin's Bend, on the Yazoo River, twenty miles from Vicksburg, attacked the Confederate position at Chickasaw Bluffs (q.v.), and was repulsed with a loss of 2000 men. In the meanwhile Grant's communications had been cut by cavalry under Forrest and Van Dorn, the latter having destroyed the Union depot of supplies at Holly Springs, while the former tore up the railroads in Grant's rear, compelling him to retire and recall Sherman. The project of a combined land and water movement upon Vicksburg had failed through the cowardice or incapacity of the commanding officer at Holly Springs, who surrendered the post without striking a blow, and from the unforeseen strength of the Confederate position at Chickasaw Bluffs. McClernand, who had been assigned to command the river expedition from Washington simultaneously with Sherman's advance, but whose order miscarried, now assumed command. Escorted by gunboats under Admiral Porter, he ascended the Arkansas River to Arkansas Post. Here was a strong work known as Fort Hindman, defended by 5000 men and 17 guns under General Churchill. A combined attack of land and naval forces resulted in the capture of the entire garrison on January 11, 1863, of which 200 were killed, the Union loss aggregating 977 killed, wounded, and missing. A new campaign was now planned by Grant to get below Vicksburg and operate from the south. At first he intended to pass around the city through a canal to be cut across the peninsula opposite Vicksburg, but after much labor on the work it was abandoned. An attempt was then made to get in rear of the city by land from the north, several methods being tried and in turn rejected. These attempts to pass around the Confederate right involved tremendous labor in penetrating cypress swamps and enlarging the bayous to enable the gunboats to pass through, and served to illustrate the wonderful ingenuity and resourcefulness of the American soldier. They also illustrated the pertinacity of the commander, which quality eventually enabled him to achieve complete success. Finally it was determined to move the Union land force by a series of bayous running from Milliken's Bend past Richmond to New Carthage, on the west bank of the Mississippi, thirty miles below Vicksburg, while the gunboats ran the batteries protecting the city. This was successfully done on the night of April 18, 1863, by the naval force under Porter, consisting of 8 gunboats, 3 transports, with army supplies, and a number of barges loaded with coal. Although under fire for an hour, during which each vessel was hit, a coal barge or two sunk, and one of the transports burned and abandoned by her crew, but very little damage was done to the vessels and less than a dozen men were wounded, and those only slightly. On the 20th six transports loaded with supplies, protected by cotton bales, and towing twelve coal barges, also ran the batteries, with the loss of one transport. The ensuing operations, which brought Grant's army in rear of Vicksburg and to its final investment, must be referred to very briefly. Within a period of three weeks the battles of Grand Gulf (April 29th), Port Gibson (May 1st), Raymond (May 12th), Jackson (May 14th), Champion's Hill (May 16th), and Big Black Bridge (May 17th), and two assaults upon Vicksburg (May 19th and 22d), occurred. On the last day of March General Pemberton's returns showed an effective strength of 50,000 men. Grant's returns for April gave the actual strength of the forces operating against Vicksburg as 50,000, including the troops guarding his communications. Against the advantage of a naval auxiliary force may be set the superiority of position on the other side and familiarity with the country. It was therefore an even thing between the opposing armies except in point of leaders: on the one side Grant, Sherman, and McPherson; on the other Pemberton and Johnston. The Confederate generals (however able one at least was) were handicapped by divided responsibility and widely separated forces. The casualties on the Confederate side were 8000 in killed, wounded, and missing, and there was also a loss of 88 guns; on the Union side, 3408 men.

Reckoning upon the apparently demoralized condition of his enemy, who had given way precipitately in the affair at Big Black Bridge, Grant on May 19th promptly assaulted the works in his front with a part of his force, but after some hours was obliged to desist and prepare to invest the city completely. After establishing a depot of supplies and strengthening his communications with the Yazoo, Grant determined upon one more effort to dislodge the Confederate garrison. On the 21st he attacked with his entire force. The defenses were armed on the west and north sides with 128 guns, of which 36 were siege pieces; in addition water batteries comprising 44 guns protected the western front. The result again proved the superiority of the defense under such advantages of position. Although Grant's troops got inside the advanced line of works, they could not penetrate farther, and after eight hours' exposure to a severe and continuous fire from the Confederate works the Union troops withdrew with the loss of 4075 men. The siege was now commenced in earnest; 12 miles of trenches and 89 batteries were constructed, armed with 220 guns—most of which were field pieces; in addition at several points, where the hostile lines were separated by a few yards, small mortars were improvised by boring out tough logs and strengthening them with iron bands. After twelve days of incessant bombardment from the gunboats and the land forces, during which the Confederate garrison, cut off from relief and reduced to 'one biscuit and a mouthful of bacon a day,' showed signs of mutiny, General Pemberton surrendered on July 4, 1863. The number actually paroled was 29,391 officers and men; 790 refused paroles. The artillery found comprised 172 pieces. The capture of Vicksburg and the simultaneous defeat of Lee at Gettysburg marked the turning point of the war.

Consult: the *Official Records;* Johnson and Buel (eds.), *Battles and Leaders of the Civil War* (New York, 1887); *Personal Memoirs of U. S. Grant* (ib., 1895); Sherman, *Memoirs* (ib., 1892); Greene, *The Mississippi* (ib., 1882), in the "Campaigns of the Civil War Series;" Swinton, *Twelve Decisive Battles of the War* (ib., 1867); and Nicolay and Hay, *Abraham Lincoln: A History* (ib., 1890).

VICO, vē'kō, GIOVANNI BATTISTA (1668-1744). An Italian philosopher. He was born at Naples, spent the whole of his life in that city, and died there. He studied law, history, and philosophy, and obtained the chair of rhetoric in the University of Naples. In 1734 he was appointed historiographer to Charles III., King of Naples. The great work which has made his name illustrious, the *Principj di una scienza nuova d'intorno alla commune natura delle nazioni*, first appeared at Naples in 1725; but it was completely recast in a subsequent edition, published in 1730. A third edition, in which the work was considerably enlarged, was published in 1744, shortly after the author's death. On account partly of its obscure and enigmatical style, the work was long in arriving at its proper place in European literature. The *Scienza nuova* was virtually unknown out of Italy until 1822, when a German translation of it appeared at Leipzig. It was five years later translated into French by Michelet; and the author has since that time found his proper rank among the most profound of modern thinkers.

Vico proposed to himself the task of distinguishing amid social phenomena the regular from the accidental; of finding out the laws which govern the formation, the growth, and the decay of all societies; in fine, of tracing the outlines of the history of peoples—the idea of which he himself believed to have existed from eternity in the mind of God. In 1818 the Marquis de Villa Rosa published Vico's complete works. A second edition appeared in 1835. Consult: Ferrari, *Vico et l'Italie* (Paris, 1839); Cantoni, *Vico* (Turin, 1867); Flint, *Vico* (Edinburgh and London, 1885).

VICOL, vē-kōl′, or **BICOL.** A numerous Malay people related to the Tagal (q.v.), living in Camarines Peninsula, Southeastern Luzon, and in Catanduanes and Masbate islands. They have advanced somewhat in culture and possess a kind of writing. See PHILIPPINE ISLANDS.

VICOMTE DE BRAGELONNE, vē′kôNt′ de brȧ′zhe-lŏn′, LE. A romance by the elder Dumas (1848), a sequel to *Vingt ans après*. A charming criticism of it is Stevenson's essay, "A Gossip on a Novel of Dumas's," in *Memories and Portraits* (London, 1887).

VIC′TOR. A city in Teller County, Colo., 50 miles southwest of Colorado Springs; on the Florence and Cripple Creek, the Midland Terminal, and the Colorado Springs and Cripple Creek District railroads (Map: Colorado, E 2). It is strikingly situated in the vicinity of picturesque mountain scenery. Victor is of considerable importance as the centre of a region noted for its extensive mineral deposits, and has lumber mills, reduction works, ore-sampling mills, novelty works, bottling works, etc. The government is vested in a mayor, chosen biennially, and a unicameral council. The water-works are owned and operated by the municipality. Victor was settled in 1894 and was incorporated the same year. Population, in 1900, 4986.

VICTOR. The name of three popes.—VICTOR I., Saint, Pope 189-98, an African by birth. His best known activity was in connection with the time for the celebration of Easter (q.v.); he was only prevented from excommunicating the Quartodecimans of Asia Minor by the representations of Saint Irenæus. Saint Jerome designates him the first Latin ecclesiastical author.—VICTOR II., Pope 1055-57, Gebhard by name, son of the Count of Tollenstein and Hirschberg, and a relation of Leo IX., whom he succeeded. He was nominated for the Bishopric of Eichstätt by the Emperor Henry III., who opposed his elevation to the Papacy through unwillingness to lose so faithful a counselor. His reign was distinguished by its purity and zeal against the prevalent vices, and by its constant alliance with the Imperial house. Henry III. died in his arms, and he secured the succession of the youthful Henry IV. under the regency of his mother, Agnes.—VICTOR III., Pope 1086-87, Desiderius by name, of the family of the princes of Benevento. He became a Benedictine monk at an early age, in spite of the strenuous objections of his family, and ultimately became Abbot of Monte Cassino (1058). In the following year he was named cardinal and vicar of the Holy See in Southern Italy, and conducted the negotiations between the Pope and the Normans. He was chosen to succeed Gregory VII., but his excessive modesty induced him to refuse the honor, and he was crowned almost by force. Soon afterwards the pressure of the Imperial party forced him to leave Rome, and he laid aside the Papal insignia and retired to Monte Cassino. In the following year, however, he was enthroned in Saint Peter's, which had previously been occupied by the Antipope Guibert, though the latter still contested the possession of the city with him. Though he had been an intimate friend of Gregory VII., and maintained the refusal to concede the Emperor's claims in the investiture question, his attitude toward Henry IV. was somewhat more conciliatory than his predecessor's. The name of Victor IV. was assumed by two antipopes: Cardinal Gregorio Conti, who opposed Innocent II. in 1138, and Cardinal Octavian, whom the Imperial partly elevated against Alexander III., in 1159-64.

VICTOR, vēk′tôr′, CLAUDE PERRIN, Duke of Belluno (1764-1841). A French marshal. He was born December 7, 1764, at La Marche, in the Vosges. He enlisted in the army in 1781, gained the attention of Napoleon by his conduct at the siege of Toulon (1793), and was promoted at the close of that year to the rank of brigadier-general. He became general of division in 1797. In the Italian campaigns of 1796-97 and 1799-1800 Victor commanded the vanguard. He did brilliant service at Marengo. In 1806 he fought against Prussia, was captured in 1807, was exchanged for Blücher, and at Friedland won the baton of a marshal of France, and the title of Duke of Belluno. He was Governor of Berlin after Tilsit. In 1808 he commanded a corps in Spain, and gained several victories, but was defeated by Wellington at Talavera (July 27th-28th). In 1812 he commanded the Ninth Corps in the Russian campaign, and shared in the defense of the passage of the Beresina. In 1813 he fought at Dresden and Leipzig. In 1814 he was severely wounded at the battle of Craonne. He then went over to the Bourbons, from whom he received a peerage, was president of the military commission appointed to try those officers who deserted to Napoleon after the Emperor's return from Elba, and was very severe in his treatment of his former companions in arms. He was Minister of War in 1821-23, and second in command in the Spanish Peninsula in 1823, but was recalled on suspicion of complicity in fraudulent contracts. He was commissioned Ambassador to Austria, but the Austrian Government declined to receive him. Thereafter he took no part in public affairs. He died in Paris, March 1, 1841. There is a brief life, Boullée, *Biographie contemporaine*, vol. ii. (Paris, 1862).

VIC′TOR AM′ADE′US. The name of three sovereigns of the House of Savoy. See SAVOY, HOUSE OF.

VICTOR EMMAN′UEL I. (1759-1824). King of Sardinia from 1802 to 1821. He was born at Turin, July 24, 1759, the second son of Victor Amadeus III., and bore the title of Duke of Aosta. He commanded the Sardinian forces against the French in 1792-96, and after the conclusion of peace lived in Southern Italy and Sardinia. Upon the abdication of his brother, Charles Emmanuel IV., in 1802, he became King, all the dominions of his house at this time, except the island of Sardinia, being in the possession of the French. With the aid of an English subsidy he organized a fleet and army. The first Peace of Paris (1814) restored to him Piedmont, Savoy, and Nice, the second (1815) added the former dominions of Genoa. It was only then, when the fall of Napoleon had freed Northern Italy from the French, that Victor Emmanuel really came into his kingdom. He was thoroughly imbued with reactionary notions, and his policy led to a popular uprising in Turin and Alessandria in the early months of 1821. He abdicated March 13th in favor of his brother, Charles Felix. He died at Moncalieri, near Turin, January 10, 1824. See ITALY.

VICTOR EMMANUEL II. (1820-78). King of Sardinia from 1849 to 1861 and of Italy from 1861 to 1878. He was the son of Charles Albert (q.v.), King of Sardinia, and was born March 14, 1820. He was well educated under his father's guidance, commanded the brigade of Savoy in the campaign of 1848-49, and displayed great gallantry at Goito and Novara. Believing that his son could make better terms with Austria, Charles Albert, on the evening following the fatal day of Novara (March 23, 1849), abdicated in favor of his son. The new King chose for Ministers such men as D'Azeglio and Cavour (qq.v.), who sought to increase the strength and importance of the country by improved administration, rigid economy in the finances, care of the army, and encouragement of trade through the conclusion of commercial treaties with foreign nations. The property of the Church was sold, and various reforms intended to diminish greatly the privileges and restrict the influence of the clergy were adopted—changes which brought upon the King the displeasure of the Vatican; but Victor Emmanuel asserted and maintained his independence of the Papacy. Under the guidance of Cavour Sardinia joined England and France on the outbreak of the Crimean War, sending an army of 17,000 men under La Marmora. After the Peace of Paris (1856) he entered into a closer alliance with France, gave his elder daughter, Clotilde, in marriage (January 30, 1859) to Prince Napoleon, and, backed by the French arms, provoked a war with Austria. The campaign of 1859 was brief but decisive, the Austrians were completely defeated at Magenta and Solferino, and the Italians were hailing with exultation the near fulfillment of their long-cherished dreams of unity, when the preliminary treaty between France and Austria at Villafranca, while securing the liberation of Lombardy, left Venetia in Austrian hands. Victor Emmanuel was compelled by the agreement with Napoleon III. to yield Nice and Savoy to France.

In the meanwhile Tuscany, Parma, and Modena had emancipated themselves from their despots, and the Romagna had thrown off the Papal authority, and at the beginning of 1860 these regions were annexed to the dominions of Victor Emmanuel. Another step in the building up of his Italian kingdom was taken in the liberation of the Two Sicilies by Garibaldi (q.v.), who turned them over to the King. At the same time the Sardinian forces advanced into the Marches of Umbria, which were seeking to free themselves from the rule of Pius IX., and these regions were also annexed by Victor Emmanuel. On February 26, 1861, Victor Emmanuel II. was declared King of Italy by the National Italian Parliament assembled at Turin, and on March 17th he formally assumed the title. When, in 1862, Garibaldi attacked the Papal States, the King was compelled to interfere, and the patriot leader was taken prisoner by the royal troops at Aspromonte. Italy joined Prussia against Austria in 1866, and, although defeated on land (Custozza) and on the sea (Lissa), she achieved her aim in the acquisition of Venetia. In 1870, after the outbreak of the war between France and Germany, the French garrison was withdrawn from Rome, and the Italian troops entered the Imperial city, which, finally united to the kingdom, became the capital of Italy. The last years of Victor Emmanuel's life were uneventful. He died after a short illness, January 9, 1878, and was succeeded by his son Humbert. Consult: Godkin, *Life of Victor Emanuel II.* (London, 1879); Ruffer, *König Victor Emanuel* (Vienna, 1878); Massari, *La vita ed il regno di Vittorio Emanuele II.* (Milan, 1880); Cappelletti, *Storia di Vittorio Emanuele II. e del suo regno* (Rome, 1894). See ITALY.

VICTOR EMMANUEL III. (1869—). King of Italy, the only son of King Humbert I. (1844-1900) and Queen Margherita of Savoy (1851—). He was born at Naples November 11, 1869, and until he succeeded to the throne bore the title Prince of Naples. He was educated under the direction of his mother and of Colonel Osio, and, outgrowing the ill-boding weakness of his early years, he entered the army in 1887 as a second lieutenant. In 1890 he became colonel of the First Infantry Regiment at Naples, in 1892 major-general, in 1894 lieutenant-general, and in 1897 commanding general at Naples. Meanwhile the Prince had given much attention to horsemanship and to the study of warfare, extending his military knowledge by frequent visits to the German army. He represented King Humbert at the coronation of Czar Nicholas II. in 1896, at the Victorian Jubilee in 1897, and at the celebration of the coming of age of the German heir apparent in 1900. On October 24, 1896, he married Princess Helena (1873—), daughter of Prince Nicholas of Montenegro. She was a sister of Princess Militza (1866—), wife of the Russian Grand Duke Peter Nikolaievitch, and of Princess Zorka (1864-90), wife of Peter Karageorgevitch, who became King of Servia in 1903. King Humbert was assassinated at Monza July 29, 1900, and on the 11th of the following August Victor Emmanuel formally ascended the throne. The new King, who had the respect and confidence of his subjects, showed Liberal tendencies together with the ability and desire to exercise a forceful and just rule. To Queen Helena were born Princess Yolanda Margherita, June 1, 1901, and Princess Mafalda, November 19, 1902. Consult Basletta, *Vittorio Emanuele III.* (Rome, 1901).

VICTO'RIA. A State of Australia, occupying the southeastern portion of the continent. It is triangular in shape, with the apex pointing eastward, and is bounded on the northeast by New South Wales, on the south by the Tasman Sea, Bass Strait, and the Indian Ocean, and on the west by South Australia. It is the smallest of the continental States, having an area of 87,884 square miles, only 210 square miles less than that of Great Britain.

Victoria is traversed from west to east by an irregular range of mountains, an extension of the Great Dividing Range. It sends out numerous branching spurs, which make the whole surface of the State very diversified, except the northwestern portion, which belongs to the Great

Plains. The mountains are low in the west, but rise toward the east into the rugged and romantic Australian Alps, whose highest peak in Victoria, Mount Bogong, has an altitude of 6508 feet. The coast is lined with broken ranges of hills, and is irregular, with granitic headlands and land-locked bays, such as Port Phillip, the harbor of Melbourne. The rivers are short and of no importance for navigation. Those on the northern watershed are tributaries of the Murray, which forms most of the boundary on the side of New South Wales. Most of the rivers are torrential in the wet season, while many are almost dry for the rest of the year.

The climate is cooler and more agreeable than that of the States to the north, though the maximum temperature in summer may be above 100°. In the lowlands the temperature is seldom below 32°, and the annual mean at Melbourne is 58°. The rainfall is very irregular. At Melbourne the average is about 26 inches, but may vary in different years between 15 and 50 inches, and droughts are liable to occur. The rainfall is heavier in the east and on the mountains, but on the northwestern plains it is not over 14 inches a year. These plains are very dry and treeless, covered with a scanty scrub vegetation. In other sections there are grassy slopes or open, parklike forests, becoming dense on the mountains. The eucalyptus tree reaches an extraordinary height. In general the flora and fauna of the State are not distinctive. See *Flora* and *Fauna* under AUSTRALIA.

The mountain system consists of greatly denuded Lower Paleozoic strata, chiefly Silurian, with numerous extensive intrusions of granite. In the southwest there is a large basaltic plain, with recent volcanic outflows and numerous extinct craters and cones. Tertiary deposits cover the surface of some coast districts and of the northwestern plains. The mountains and drift deposits are rich in minerals, of which gold is the most important.

About two-thirds of the enormous gold production of Australia has been obtained in Victoria. From 1851 to 1901 the value of the gold produced in the State aggregated £260,492,881. The value of the output in 1901 was £3,106,433, but for several years it has averaged somewhat in excess of that amount.

General farming is more extensively followed in Victoria than in any other Australian State, the rainfall there being more propitious for crop-growing. The area under crops has about doubled since 1880. There were 3,924,898 acres under cultivation in 1901. Nearly half of this area (2,017,321 acres) was in wheat. The principal other cereals raised in the same year were oats, 363,000 acres, and barley, 59,000 acres. Hay crops, consisting chiefly of wheat and oats, cut green, covered an area of 502,000 acres, and 38,000 acres were devoted to potatoes. Much attention is given to fruits, particularly grapes, 28,592 acres being devoted to vines in 1902. Stock-raising is more extensively carried on in connection with cropping than in any other Australian State. In 1901 there were 10,839,746 sheep, 1,602,987 head of cattle, and 392,529 horses. The quality of the sheep has improved greatly since 1860. Dairying has made marked progress since 1890, and the dairy produce now receives more favorable recognition in the English market.

In 1900, 64,207 persons were employed in factories, of whom 18,413 were females. The industries employing the most persons were clothing and textile fabrics; metal work, machinery, etc.; preparations of food and drink, such as dairy products, wine, etc. There were 107 factories employing over 100 hands each.

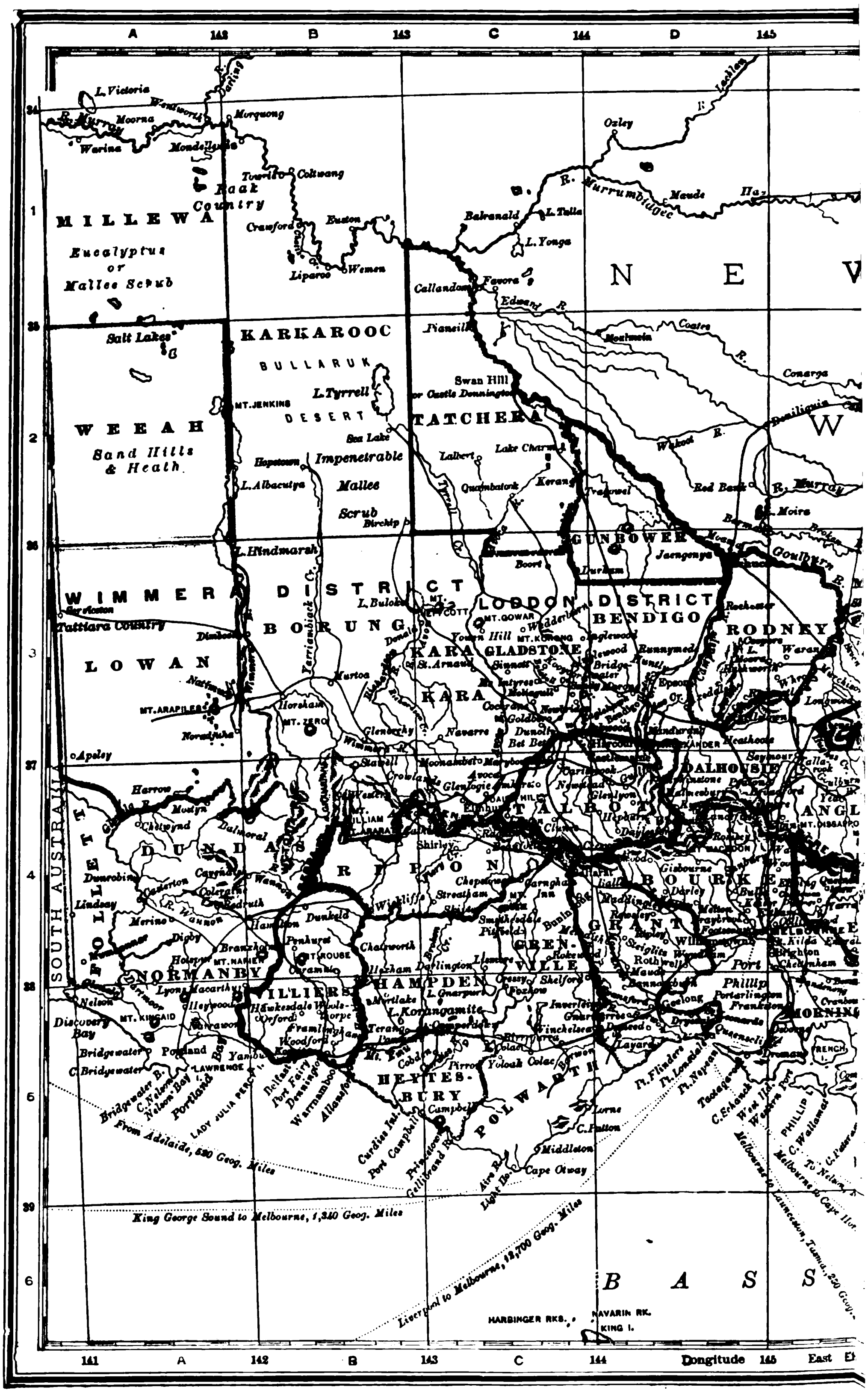
In 1900, 2101 vessels entered Victorian ports, with an aggregate of 2,929,389 tons. Of the total, 2,827,949 entered the port of Melbourne. About half of the total tonnage was British. Victoria ranks next to New South Wales in the amount of its foreign trade. Ordinarily the imports and exports are about equal in value; in 1900 the former amounted to £18,301,607 and the latter to £17,422,552. In both the trade with the United Kingdom is largest, followed closely by the trade with other Australian States. In the relatively small trade with foreign countries France has the largest share. The most valuable items of export are gold, wool, butter, and wheat.

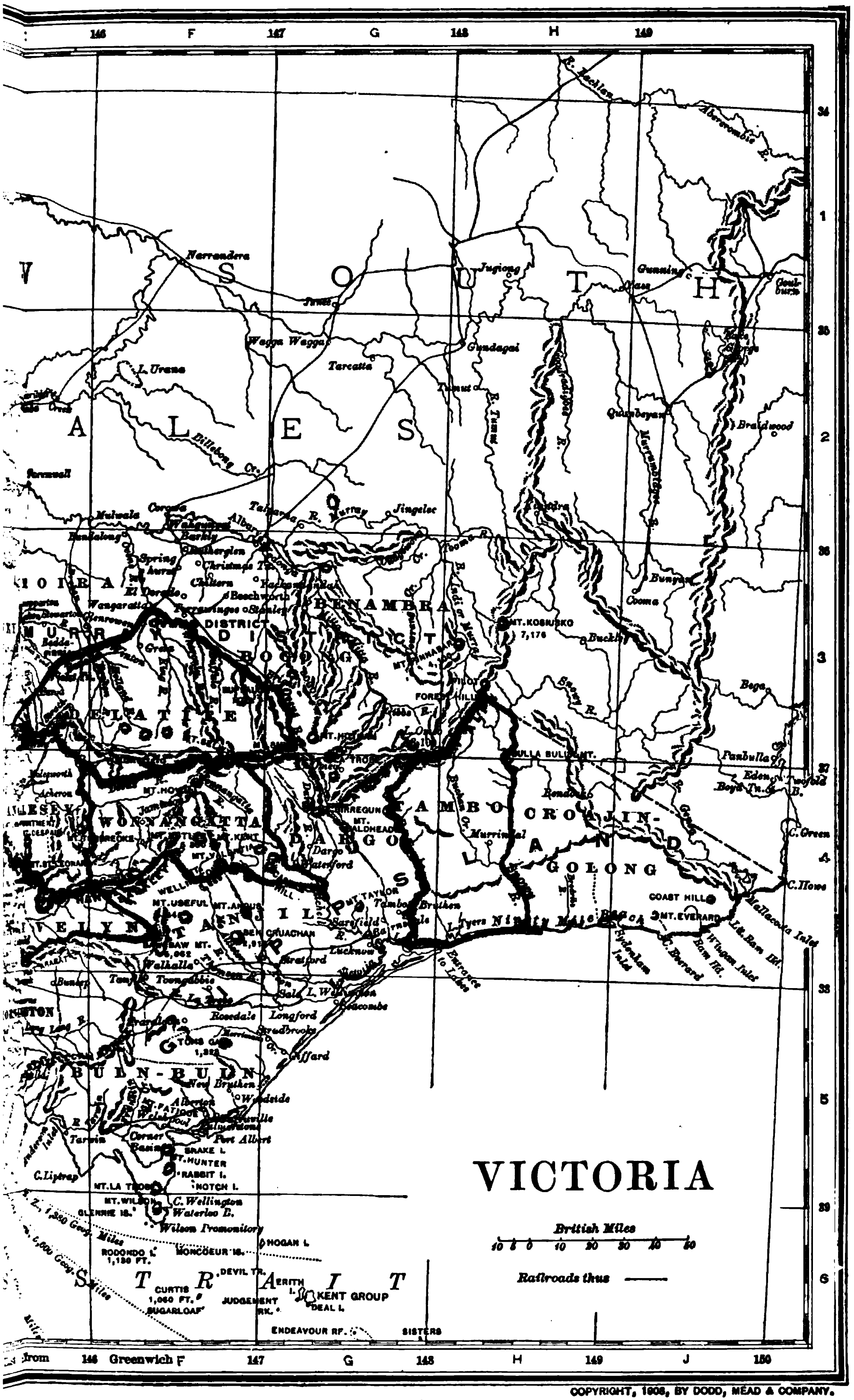
All the railroads belong to the State. The management of the system is in charge of a commissioner. A special committee from both Houses of Parliament considers all proposals for new lines and reports to Parliament. There were 3221 miles open in 1900. The system connects with both the New South Wales and the South Australia lines. The gross earnings for 1901 were £3,337,797 and the working expenses £1,984,796. The net earnings are less than the interest on the borrowed capital invested.

The Governor receives his appointment from the British Crown. The Parliament consists of a Legislative Council of 48 members, elected for six years, and a Legislative Assembly of 95 members, elected for three years. A voter for members of the Council must satisfy a property qualification, but this does not apply to certain classes, chiefly professional. No property qualification is required of those voting for members of the Assembly. Clergymen are not allowed to hold seats in either branch of Parliament. Victoria sends 23 members to the Federal House of Representatives. Melbourne is the capital. For a discussion of the State's activities, see AUSTRALIA.

The total general revenue in 1900 was £7,722,397 and the expenditure £7,683,079. The revenue from taxation amounted to £1,779,308, of which £1,065,397 was collected from customs duties. The revenue from the reproductive public works, principally railways and tramways, was £4,074,375. The largest items of expenditure were the working expenses of railways and the interest on the public debt. The State's construction of railways and participation in other revenue-yielding schemes have led to a heavy debt, which amounted in 1900 to £53,071,275.

Victoria is the second most populous of the Australian States, and ranked first prior to 1891. The most rapid growth of population occurred between 1850 and 1860. In 1891 the population was 1,140,405, and in 1901, 1,199,692. In recent years the emigration by sea has been in excess of the immigration by sea. In 1901 there were only 643 aborigines. There is a large urban population. Melbourne, the largest city of Australia, had with its suburbs in 1901 a population of 493,956. The principal other towns are Ballarat, Bendigo, and Geelong.


A
142
B
143
C
144
D
145
L. Victoria
Wentworth
Moorna
R. Murray
Warina
Mondellimin
Murquong
Tooriloo
Coltwang
Raak Country
MILLEWA
Eucalyptus or Mallee Scrub
Crawford
Euston
Liparoo
Women
Lachlan
Ozley
R. Murrumbidgee
Maude
Balranald
L. Tala
L. Yanga
Callandoon
Favora
Edward R.
N E W
Salt Lakes
KARKAROOC
BULLARUK
MT. JENKINS
L. Tyrrell
DESERT
WEEAH
Sand Hills & Heath
Hopetoun
Impenetrable Mallee Scrub
L. Albacutya
Sea Lake
Birchip
Swan Hill
TATCHERA
Lalbert
Lake Charm
Quambatook
Kerang
Wakool R.
Red Bank
R. Murray
Moira
Goulburn R.
Conargo
Coatra
GUNBOWER
Jaengenya
Boort
Durham
L. Hindmarsh
WIMMERA DISTRICT
LODDON DISTRICT
BENDIGO
Tattiara Country
BORUNG
L. Buloke
MT. GOWAR
GLADSTONE
RODNEY
LOWAN
KARA KARA
Dimboola
Natimuk
MT. ARAPILES
Horsham
MT. ZERO
Murtoa
St. Arnaud
Apsley
Glenorchy
Navarre
Dunolly
Stawell
Avoca
Maryborough
DALHOUSIE
Heathcote
Seymour
Harrow
Balmoral
DUNDAS
RIPON
TALBOT
ANGL
Dunrobin
Casterton
Coleraine
Cavendish
Shirley
Chepstow
Streatham
Skipton
Gisborne
BOURKE
GRANT
Lindsay
Merino
R. Wannon
Hamilton
Dunkeld
Wickliffe
Smythesdale
Buninyong
Melton
Footscray
Melbourne
St. Kilda
Digby
Branxholm
Penshurst
MT. ROUSE
Chatsworth
Darlington
GREN-VILLE
Brighton
Cheltenham
NORMANBY
MT. NAPIER
Caramut
HAMPDEN
Lismore
Port Phillip
Portarlington
Frankston
Nelson
Lyons
Macarthur
VILLIERS
Hawkesdale
L. Corangamite
Geelong
MORNINGTON
Discovery Bay
MT. KINCAID
Woodford
Framlingham
Terang
Camperdown
Winchelsea
Queenscliff
Bridgewater
Portland
Yambuk
Colac
Cobden
Birregurra
HEYTES-BURY
POLWARTH
Pt. Lonsdale
Pt. Nepean
Dromana
FRENCH I.
C. Bridgewater
Lawrence
Bridgewater B.
C. Nelson
Nelson Bay
Portland Bay
Lady Julia Percy I.
Belfast
Port Fairy
Warrnambool
Allansford
Curdies Inl.
Port Campbell
Princetown
Gellibrand R.
Aire R.
Light Ho.
Cape Otway
Middleton
C. Patton
Lorne
Torquay
C. Schanck
West Hd.
Western Port
PHILLIP I.
C. Woolamai
From Adelaide, 520 Geog. Miles
King George Sound to Melbourne, 1,340 Geog. Miles
Liverpool to Melbourne, 12,700 Geog. Miles
Melbourne to Launceston, Tasmania, 250 Geog.
B A S S
HARBINGER RKS.
NAVARIN RK.
KING I.
SOUTH AUSTRALIA
34
1
35
2
36
3
37
4
38
5
39
6
141
142
143
144
Longitude
145
East



COPYRIGHT, 1906, BY DODD, MEAD & COMPANY.

There is no State Church, nor State assistance to any religion. The Church of England, the largest denomination, had 432,732 adherents in 1901. The adherents of the other denominations in the same year numbered as follows: Roman Catholics, 263,712; Presbyterians, 191,471; and Wesleyans and other Methodists, 180,287.

In 1891 nearly 96 per cent. of the population over 15 years of age could read and write. School attendance is compulsory between the ages of 6 and 13. The public system is secular and the primary grades are free. In 1900 there were 243,667 pupils enrolled in 1948 State schools. The average attendance was 147,020. Secondary education is in the hands of private and denominational interests. In 1900 there were 51,834 scholars in attendance at 884 private schools. The Roman Catholic schools contained over half of the total private school enrollment. The State encourages attendance at the grammar schools and universities by the awarding of scholarships. The higher educational institutions include 18 technical schools, 3 workingmen's colleges, 10 schools of mines, an agricultural and horticultural school, and 5 schools of art. For a comparison with other Australian States, see AUSTRALIA.

HISTORY. The coast of Victoria was sighted by Captain Cook in 1770, and the first explorations were made in 1798 by George Bass, who discovered Bass Strait. In 1802 Lieutenant Murray took formal possession of Port Phillip Bay, and in 1803 an unsuccessful attempt was made by the English Government to establish a settlement. Exploring parties traversed the country from time to time, but the first permanent settlement was not made until 1834, and was then accomplished by the individual enterprise of one Henty. The settlement of the Henty family is usually regarded as the founding of Victoria. Henty and his seven sons were squatters on the shore of Portland Bay, where they set up a whale-fishing establishment, and also carried on sheep-farming. That type of settlement had been a source of much vexation to the home Government, and Henty was unable for some time to obtain any legal recognition. His settlement never grew, but was absorbed in the Port Phillip Association, led by John Batman, from Tasmania, in 1835, and reinforced during the year by colonists under a trader named Faukner, who is jointly with Batman entitled to the credit of founding the colony. The settlers bought land of the natives. Such titles were not favored by Great Britain, but the colony at Port Phillip obtained such accessions of number that its recognition could not be avoided. It was incorporated within the territory of New South Wales in 1835, and formally opened for settlement in 1836. In 1837 the town of Melbourne was laid out, and in 1842 it received a city charter. The colony grew rapidly. In 1842 agitation began for separation from New South Wales. This was accomplished in 1850, although the new colony of Victoria was not formally organized until 1851. By this time the population had reached 77,000. Upon the discovery of gold Victoria had an extraordinary rush of immigration, the population increasing from 77,455 in 1851 to 540,322 in 1861. Discontent with the severe mining regulations imposed by the Legislature led to serious miners' riots at Ballarat in 1854 and to the enactment of more liberal laws. The period after 1855 witnessed the rise of a powerful democratic party, which entered into bitter conflict with the squatter or land-owning class on the question of a protective tariff for the purpose of encouraging home industries. The conservative attitude of the squatters, who were in control of the Upper House of the legislature, kept back until after 1860 the full development of the agricultural resources of the colony. Like its sister colonies, Victoria during the last ten years of the nineteenth century enacted many legislative measures of a decidedly democratic and even socialistic character. Among other things these acts provided for old age pensions, and for every trade established mixed tribunals of employers and employees for the determination of a minimum wage. The people of Victoria were from the beginning overwhelmingly in favor of Australian federation (q.v.), and in 1898 ratified the first draft of the Federal Constitution by a vote of five to one.

BIBLIOGRAPHY. McCoy, *Victoria and Its Metropolis* (Melbourne, 1889); Coghlan, *Seven Colonies of Australia* (ib., annually); Jenks, *The Government of Victoria* (London, 1891); Bannow, *The Colony of Victoria* (ib., 1897). For ethnology, consult Smyth (comp.), *The Aborigines of Victoria* (Melbourne, 1878); Curr, *The Australian Race* (ib., 1886-87); Hare, *The Last of the Bushrangers* (London, 1894). For geology, Murray, *Victoria Geology and Physical Geography* (Melbourne, 1895). For history, Labilliere, *Early History of the Colony of Victoria* (London, 1878); Turner, *History of Victoria* (Melbourne, 1879).

VICTORIA (Brazilian, *Nossa Senhora da Victoria*). A seaport, the capital of the State of Espiritu Santo, Brazil, situated on the island of Espiritu Santo, 275 miles northeast of Rio de Janeiro (Map: Brazil, J 8). The former Jesuit College, now used as the Government palace, is the chief edifice. The harbor is good, with a lighthouse and batteries. The chief exports are sugar, coffee, rice, and manioc. The town was founded in 1535. Population, about 10,000.

VICTORIA. The capital of Hong Kong (q.v.).

VICTORIA. A town of Luzon, Philippines, in the Province of Tárlac, situated six miles northeast of Tárlac, near the confines of Nueva Ecija (Map: Luzon, D 4). Population, 10,362.

VICTORIA. A town of Venezuela, situated on the Aragua River, 45 miles southwest of Carácas, near Lake Valencia. Its favorable position gives it an extensive trade in coffee, sugar, and cacao. Population, about 12,000.

VICTORIA. The capital of the Province of British Columbia, Canada, and of the Victoria district, at the southeast extremity of Vancouver Island, on the Strait of San Juan de Fuca, and the Esquimalt and Nanaimo Railroad, 84 miles southwest of Vancouver (Map: British Columbia, E 5). It was originally a trading post of the Hudson's Bay Company, was platted for a town in 1852, incorporated as a city in 1862, and has since become the most important Canadian city on the Pacific. It has extensive commercial interests, good harbor accommodation, regular steamship communication with San

Francisco, Alaska, New Westminster, and other points on the northwest coast. Esquimalt (q.v.), the British Pacific naval station, is three miles distant. Victoria's public buildings include the fine Government building, opened in 1897, comprising the Parliament House, a provincial museum and library, and administrative offices. Other important edifices are the city hall, the Anglican and the Catholic cathedrals, the exhibition building, the Anglican Women's College, hospitals, and charitable institutions. Victoria is favored with a perennially temperate climate. Population, in 1891, 16,841; in 1901, 20,821.

VICTORIA. The county-seat of Victoria County, Tex., 128 miles southwest of Houston; on the Guadalupe River, and on the Southern Pacific and the San Antonio and Aransas Pass railroads (Map: Texas, F 5). It is the seat of St. Joseph's College (Roman Catholic), and has the Nazareth Seminary, an attractive courthouse, and a handsome city hall. Victoria is of considerable importance as a shipping point for farm and dairy produce, and as the centre of large stock-raising interests. The industrial establishments include a large planing mill, cotton gins, an oil mill, etc. The water-works are the property of the municipality. Population, in 1890, 3046; in 1900, 4010.

VICTORIA (Neo-Lat., named in honor of Victoria, Queen of England). A genus of plants of the natural order Nymphæaceæ, resembling the common water-lily. Only one species is known, *Victoria regia*. This is said to have been first observed by Hänke, about 1801, but was not described until 1832, when Pöppig found it in the river Amazon. It is found in other waters of Northern South America. Its floating leaves are orbicular and attain a diameter of 5 to 6 feet; have the margin turned up about two inches, are purplish beneath, and exhibit prominent veins, furnished with prickles. The flowers rise among the leaves upon prickly stalks. They are more than a foot in diameter, white, internally rose-colored, and are very fragrant. The fruit is a capsule, almost globose, with a depression on the top, about half the size of a man's head, fleshy within, and divided into numerous cells, full of round farinaceous seeds, which are an agreeable article of food. The plant is called *maïs del agua*, or water maize, in some parts of South America. To the cultivation of the plant special hot-houses have been devoted in some places in the United States and in Europe. It has been introduced into India from seeds produced in England.

VICTORIA REGIA.

VICTORIA, Ciudad. The capital of the State of Tamaulipas, Mexico. See Ciudad Victoria.

VICTORIA (1819-1901). Queen of the United Kingdom of Great Britain and Ireland, Empress of India. She was the daughter and only child of Edward, Duke of Kent, fourth son of George III. Her mother, Victoria Mary Louisa, fourth daughter of Francis, Duke of Saxe-Coburg-Saalfeld, and sister of Leopold, King of the Belgians, was married to the Duke of Kent in 1818, four years after the death of her former husband, the Prince of Leiningen. Victoria (baptized as Alexandrina Victoria) was born May 24, 1819, at Kensington Palace, whence her parents had temporarily removed from their home in Germany, in order that the child, a possible claimant for the British throne, might be born on English soil. The princess, left fatherless when eight months of age, was taught by her mother and the Duchess of Northumberland. She ascended the throne on the death of her uncle, William IV. (q.v.), June 20, 1837. Her uncle, the Duke of Cumberland, became King of Hanover in virtue of the Salic law, and thus terminated the connection which had lasted 123 years between the crowns of England and Hanover. Victoria was proclaimed June 21, 1837, and crowned at Westminster, June 28, 1838.

On her accession she found at the head of the Whig Government Viscount Melbourne, by whom her early political course was largely influenced. Her long, prosperous, and comparatively peaceful reign included the administrations of Melbourne (till 1841), Peel (1841-46), Russell (1846-52 and 1865-66), Derby (1852, 1858-59, and 1866-68), Aberdeen (1852-55), Palmerston (1855-58 and 1859-65), Disraeli (1868, and as Earl of Beaconsfield, 1874-80), Gladstone (1868-74, 1880-85, 1886, and 1892-94), Salisbury (1885-86, 1886-92, and 1895 to the end of the reign), Rosebery (1894-95). Of the legislative record of her reign the most important events are the establishment of penny postage (1840), amendment of the poor laws of Scotland (1845) and Ireland (1847), repeal of the corn laws (1846), the Irish encumbered estates act (1848), repeal of the navigation laws (1849), the removal of the disabilities of the Jews (1858), the reform act of 1867, the disestablishment of the Irish Church (1869), elementary education act (1870) and abolition of religious tests in the universities (1871), Irish land acts (1870, 1881), abolition of purchase in the army (1871), Scotch educational act (1872), and the franchise bill of 1884. Events of national and international importance were numerous in her long reign, among them being the rebellion in Canada (1837-38), Afghan War (1838-42), Opium War in China (1840-42), culmination of the repeal agitation in Ireland under O'Connell (1843), First Sikh War (1845-46), Irish famine (1846-47), chartist agitation (1848), Second Sikh War (1849), the establishment of a Catholic hierarchy in England (1850), Crimean War (1854-56), war with China (1856-58), Indian Mutiny (1857-58), transfer of India from the East Indian Company to the Crown (1858), expedition to China (1860), complicated relations with the United States during the Civil War (1861-65), Canadian confederation (1867), Abyssinian War (1867-68), Ashanti War (1873-74),

QUEEN VICTORIA
FROM A PHOTOGRAPH

the assumption by Victoria of the title of Empress of India (1876), Afghan War (1878-80), Zulu War (1879), Transvaal War (1880), and the virtual establishment of British domination in Egypt (1882), the struggle for the reconquest of Nubia for Egypt (1884-98), the conquest of Burma (1885), Ashanti War (1896), the great Boer War (begun in 1899), Australian federation (1900-01). The reign of Victoria witnessed an extraordinary development of Imperial Britain as shown in the growth and political organization of the Canadian, Australian, and African colonies. For many years the agitation for home rule in Ireland was the main feature of internal politics. Victoria is preëminent among sovereigns by her personal character. She "for many years . . . exerted an almost unbounded moral control over the larger policies of the British Empire. She was industrious and methodical, patient and tactful, with a memory that was a great storehouse of knowledge of things past and present." The leading feature of the Victorian epoch was "the new conception of the British monarchy which sprang from the development of the colonies and dependencies of Great Britain, and the sudden strengthening of the sense of unity between them and the mother country. The Crown after 1880 became the living symbol of Imperial unity, and every year events deepened the impression that the Queen in her own person typified the common interest and the common sympathy which spread a feeling of brotherhood through the continents that formed the British Empire."

Queen Victoria was married, February 10, 1840, to her cousin, Albert, Prince of Saxe-Coburg-Gotha, second son of the then reigning Duke. Although the union was not at the time greatly approved of by the Queen's advisers and subjects, it proved a most felicitous one, marked by a degree of mutual affection rarely found in marriages of state. The Prince Consort died December 14, 1861; Victoria never ceased to mourn him. To them were born four sons and five daughters: The Princess Royal, Victoria, born November 21, 1840, married January 25, 1858, to Frederick William, who in 1888 became Frederick III., Emperor of Germany of brief reign (died 1901); Albert Edward, now King of Great Britain, born November 9, 1841, married March 10, 1863, Princess Alexandra Caroline, eldest daughter of Christian IX., King of Denmark; Princess Alice, born April 25, 1843, married July 1, 1862, Prince Frederick William of Hesse (died 1878); Prince Alfred, born August 6, 1844, created Duke of Edinburgh, 1866, married January 23, 1874, Marie, only daughter of the Emperor of Russia (died 1901); Princess Helena, born May 25, 1846, married in 1866 to Prince Christian of Denmark; Princess Louisa, born March 18, 1848, married in 1871 to the Marquis of Lorne; Prince Arthur, born May 1, 1850, created Duke of Connaught, 1874, married in 1879 Princess Louise Marguerite of Prussia; Prince Leopold, born April 7, 1853, was created Duke of Albany, 1881, and married to Princess Helena of Waldeck in 1882 (died 1884); Princess Beatrice, born April 14, 1857, married, 1885, Prince Henry of Battenberg.

In her seclusion from public life after the death of the Prince Consort, and as later testimonials of her affection for him, Victoria supervised the publication in 1867 of *The Early Days of His Royal Highness, the Prince Consort;* published in 1868 *Leaves from the Journal of Our Life in the Highlands;* supervised a second *Life of the Prince Consort* in 1874; adding in 1884 *More Leaves from the Journal,* etc.

Among the almost numberless biographies, memoirs, and sketches of Queen Victoria the most serviceable is Lee, *Queen Victoria* (London and New York, 1903). Others include Ward, *Reign of Queen Victoria* (London and Philadelphia, 1887), a series of essays on various phases of the Victorian era; Holmes, *Queen Victoria, 1819-1901* (London, 1901), a revision of his sketches of 1897; Macaulay, *Life and Reign of Queen Victoria* (ib., 1887); Smith, *Life of Her Majesty Queen Victoria* (ib., 1886); Wall, *Fifty Years of a Good Queen's Reign* (ib., 1887); Wilson, *Life and Times of Queen Victoria* (ib., 1888); Jeaffreson, *Victoria, Queen and Empress* (ib., 1893); Arnold, *Victoria, Queen and Empress: the Sixty Years* (ib., 1897); Tooley, *Personal Life of Queen Victoria* (ib., 1897).

VICTORIA, ADELAIDE MARIE LUISE (1840-1901). The oldest daughter of Prince Albert and Queen Victoria, who at the age of seventeen years was married to Prince Frederick William of Prussia, subsequently Frederick III. (q.v.). After his death she retired to her country place, Friedrichshof, near Cronberg, where she remained until her death.

VICTORIA, GUADALUPE (1789-1843). The first Mexican President, who changed his name of Manuel Felix Fernandez during the wars of independence. Born at Durango, he joined the revolutionary movement of 1810, was promoted to be general, figured conspicuously in the revolt which deposed the Emperor Iturbide in 1823, and was elected President in 1824. This position he filled with distinguished success until the outbreak of the civil wars in 1828-29. At the expiration of his term of office he retired to private life.

VICTORIA CROSS. The most highly prized decoration of the British military and naval services. It was instituted by royal warrant, dated January 29, 1856, and promulgated in the official *Gazette* on February 5th. It is a Maltese cross in shape, and is made from cannon captured in the Crimean War, principally at Sebastopol, the design on the obverse side consisting of the royal crest, a crowned lion, beneath which is the inscription 'For Valour.' Non-commissioned officers and men, and such commissioned officers as may have risen from the ranks, who have been awarded the Victoria Cross receive an annuity of £10, which, under special circumstances, may be increased to £50. The ribbon is blue for the naval service and red for the military. Civilians acting in a volunteer capacity are eligible for the medal, which from the time of its origin to the close of the Boer War in 1902 had been granted to about 500 men, including three civilians and one army chaplain. See Plate of ORDERS.

VICTORIA EMBANKMENT. See THAMES EMBANKMENT.

VICTORIA FALLS (native name *Mosi-wa-Tunya,* Thundering Smoke). A magnificent cataract on the middle Zambezi in Rhodesia, a few miles below the Kwando confluence (Map:

Africa, G 6). The river, here nearly a mile wide, suddenly plunges into a cleft or chasm 400 feet deep and only 100 to 300 feet wide, running transversely across the river bed. A dense cloud of vapor rises far above the falls, and as it condenses it darkens to the appearance of smoke, whence the native name. The name Victoria was given to the falls by Livingstone, who discovered them in 1855.

VICTORIA INSTITUTE, The. A society founded in London in 1870 with the object of bringing together men of scientific attainments as well as those interested in the investigation of philosophy and science in the inquiry how far these may be found to harmonize with the great truths taught in the Holy Scripture; also by the discussion of these truths to test the faith of the members in 'one eternal God.' The results of such discussions are printed in the *Transactions* of the Institute. The membership is about 1000, one-third of whom are residents of British colonies and foreign countries.

VICTORIA LAND. See South Victoria Land.

VICTORIA NYANZA, nē-ăn'zȧ, or Ukerewe. The largest lake in Africa, and, next to Lake Superior, the largest sheet of fresh water in the world. It lies between British and German East Africa, about 400 miles from the Indian Ocean, and 175 miles northeast of Lake Tanganyika, extending from latitude 0° 25′ N. to 3° S. (Map: Africa, H 5). Its length from north to south is over 200 miles, its average breadth 150 miles, and its estimated area about 26,000 square miles. The lake occupies a broad depression, probably due to a series of faults in the ancient crystalline rocks of the East African plateau. Its surface lies at an elevation of 3775 feet. The shores, especially on the south and east, are very irregular, with numerous headlands and deep bays, and the lake contains several large and numerous smaller islands with an aggregate area of about 2300 square miles. The largest islands are Ukerewe, in the southeast, and Sesse, in the northwest. The islands are generally densely wooded, and some of them contain a number of villages, while others, even some of considerable size, are uninhabited. The western shore of the lake is high, steep, and rocky in the south, becoming lower and densely forested northward. The southern shore is low and marshy, while the country bordering the lake on the east is mostly an open steppe region. The water is clear and fresh. There are many fish in the lake and it abounds in mollusks. Crocodiles are numerous, and on the uninhabited islands there are many hippopotamuses. None of the streams entering the lake are of great size. The largest is the Kagera, which may be regarded as the extreme upper course of the Nile, as that river, known here as the Somerset Nile, forms the outlet of the lake. The Victoria Nyanza is now navigated by two steamers, one of which was launched in 1900 and the other in 1896; but the main volume of trade is still carried in native boats. The lake was discovered by Speke in 1858, circumnavigated by Stanley in 1875, and subsequently explored at various times by him and others, but only a portion of the coasts has been accurately surveyed.

VICTORIA UNIVERSITY. An English university founded in 1880 by the union of Owens College, Manchester, University College, Liverpool, and Yorkshire College, Leeds. Its government is vested in a council and a board of studies. Part of the Fellows are chosen by a convocation, consisting of teachers and graduates of the university, part by the Crown. There is, unlike London University, a regular course of study, and the university is, through its colleges, a teaching as well as an examining institution. In this it resembles Oxford and Cambridge, but differs from them in that its colleges are situated in three different cities. Like the latter, it has as chancellor a distinguished nobleman, and the office of vice-chancellor is held in turn by the principals of the colleges as the real head of the institution. Each college is supported by its own funds, and is independent, as in the case of the older universities. The number of students in 1900 was about 3000.

VIC'TORI'NUS, Gaius Marius. A Latin grammarian and rhetorician of the fourth century. He was an African by birth, went to Rome about A.D. 300 to teach rhetoric, Saint Jerome being among his pupils, and in his old age became a Christian. His translations from the Greek of Plotinus and other Neo-Platonists were the indirect means of Augustine's introduction to that philosophical system. His commentaries on the Pauline Epistles and polemics against the Arians and Manichæans are edited in Migne's *Patrologia Latina* (vol. viii.); but his greater fame is as a grammarian, a commentary on Cicero's *De Inventione* (in Halm, *Rhetores Latini*, 1863); an *Ars Grammatica*, dealing almost entirely with prosody (edited with other grammatical fragments in Keil, *Grammatici Latini*, vol. vi., 1874); and a treatise *De Definitionibus* (edited by Stangl, 1888) being the chief of his works.

VIC'TORS, Jan (also called Fictoor, Victoors, and Victor) (1620-c.82). A Dutch genre and biblical painter, pupil and follower of Rembrandt. He was a native of Amsterdam. The works of his later period, when he attempted to free himself from the influence of his master, have little merit. Paintings by him at Amsterdam are: "The Market Place," "The Village Dentist," "Joseph Interpreting Dreams;" at Brunswick, "The Taking of Samson;" at Copenhagen, "The Death of David;" at Dresden, "The Finding of Moses;" at Prague, "The Stirrup Cup;" and at Saint Petersburg, "The Fortitude of Scipio."

VICTOR VITEN'SIS (c.430-c.490). A Latin historian, of whose life little is known. As early as 455 he was a cleric in the Carthaginian Church, and in 483 he was employed by Eugenius, metropolitan of Carthage, to help the clergy made destitute by the persecution of the Arian Vandals. The *Historia Persecutionis Vandalicæ seu Africanæ sub Genserico et Hunnerica, Vandalorum Regibus* (edited in Migne's *Patrologia Latina*, vol. lviii., and by Petschenig in the Vienna *Corpus*, vol. vii., 1881) is valuable for the information it gives of orthodox and heretic churches in Africa and of the survival of pagan superstitions.

VICTORY, The. Lord Nelson's flagship in the battle of Trafalgar, October 21, 1805.

VICUDA, vē-kōō'dȧ. One of the barracudas (*Sphyræna ensis*), about two feet long, and a food-fish of some importance on the Pacific coast of Mexico and Central America.

VICUÑA or **VICUGNA**, vē-kōō'nyȧ (Sp., from Peruv. *vicuna*, Mex. *vicugne*. One of the Andean llamas (*Lama vicunia*). In size it is intermediate between the llama and the alpaca. Its neck is longer and more slender; its wool finer, short, and curled. It is of a rich brown color, with patches of white across the shoulders and on the inner side of the legs. The vicuña inhabits the most desolate parts of the Cordillera, at great elevations, and delights in a kind of grass, the ychu (*Stipa ychu*), which abounds there in moist places; but it seldom ventures to the rocky summits, for which its tender feet are ill adapted. It is commonly found in small herds of from 6 to 15 females with one male. The vicuña is a very active and alert animal, like the wild goat or the antelope. The Indians seldom kill it with firearms, but set up a circle of stakes, about a mile in circumference, and so entrap it. It has never been domesticated. Compare ALPACA; GUANACO; LLAMA. See Plate of CAMELS AND LLAMAS.

VICUÑA-MACKENNA, vē-kōō'nyȧ mȧ-kĕn'-nȧ, BENJAMIN (1831-86). A Chilean historian and politician, born at Santiago. He was educated in the institutions of his native country and devoted himself to literature. After engaging in the revolution of 1851-52 he was imprisoned and condemned to death, but escaped to the United States, whence he went to Europe. After his return to Chile in 1856 he was elected to Parliament, became Senator in 1871, and was Mayor of Santiago from 1872 to 1874. His Senatorial term expired in 1876, and he was reelected in 1879. Mackenna was the author of popular studies in Chilean history. They include: *El ostracismo de los Carreras* (1857); *El ostracismo del General O'Higgins* (1860); *Historia de la administración Montt* (1862); and *Historia de Chile* (1868).

VIDA, vē'dȧ, MARCO GIROLAMO (1480-1566). An Italian Neo-Latin poet, born in Cremona, Italy. He was educated at Padua and Bologna, and became a canon of Saint John Lateran at Rome. In 1532 he was made Bishop of Alba. Vida was a learned Latinist and a profound scholar. He composed three didactic poems in Latin, viz. the *De Arte Poetica*, the *Bombyx* (on silkworms), the *Scacchiæ Ludus* (on chess), and an epic, the *Christias*, published in 1535 at the instance of Pope Leo X.

Consult: *Marci Hieronymi Vidæ Poemata Omnia* (Padua, 1721, and London, 1732); Baldi, *Die Ars poetica des M. Hieronymus Vida* (Würzburg, 1881); Lancetti, *Della vita et degli scritti di Vida* (Milan, 1840).

VIDA ES SUEÑO, vē'dȧ ȃs swā'nyō, LA (Span., Life is a Dream). The best known of Calderon's romantic productions, written about 1630. Sigismundo, the chief character, is a proud and selfish prince, kept captive by his father, who is gradually changed by experience into a noble and charitable type.

VIDAL, vē'dȧl', PIERRE. A Provençal poet. He was the son of a furrier of Toulouse, and became a favorite in the courts of Southern France and of Spain, being on terms of special intimacy with Barral, Viscount of Marseilles, whose wife he celebrated under the name of Vierna.

He lived for a time in the East, in later life visited the Marquis of Montferrat and the King of Hungary, and probably went on a crusade with the former. His death occurred in the first decade of the thirteenth century. Among his poems are to be found some of the best specimens of Provençal literature. His sirventes and particularly his crusade songs are powerful and full of moral earnestness. An edition of Peire Vidal's songs was published by Bartsch (Berlin, 1857), but it is now out of print. Consult Schopf, *Beiträge zur Biographie und zur Chronologie der Lieder des Troubadours Peire Vidal* (Breslau, 1887).

VIDAURRI, vē-dou'rē, SANTIAGO (1803-67). A Mexican general and statesman, born in the Province of Nuevo Leon. He began life as a lawyer, served in several wars, attained the rank of general, and became Governor of Nuevo Leon in 1853. He assisted in the operations against Santa Anna, 1854-55, and participated in the 'war of reform,' 1857-60. After 1856 he united Coahuila to Nuevo Leon by force, and ruled in practical independence of the general Government, which was constrained to enter into treaty relations with him. He was suspected of designing to establish an independent republic in Northern Mexico. He opposed, at first, the French domination, but after 1864 submitted and was made lieutenant of the Empire by Maximilian in 1867. Taken prisoner in the same year by the Liberal forces, he was shot as a traitor.

VIDOCQ, vē'dōk', FRANÇOIS-JULES (1775-1857). A celebrated French criminal and detective. He was the son of a baker of Arras, where he was born July 23, 1775. When a boy he stole from his father and was sent to the house of correction, but immediately on his return appropriated a considerable sum of money. He was for a time an acrobat, and then entered the army. Returning home, he lived a disreputable life, and in 1796 was sentenced to the galleys for forgery. Escaping, he joined a band of highwaymen, afterwards turned them over to the police, and soon acquired some note as a spy upon criminals. In 1812 he was made chief of a small detective force, the *brigade de sureté*, which developed great efficiency in detecting crime, and in creating crime to detect. On suspicion of this latter, Vidocq was removed in 1825. He became a paper manufacturer, failed, opened a secret information bureau, and died in Paris, April 28, 1857. His *Mémoires* (1829) are of doubtful authenticity, and, if authentic, are unreliable.

VIEILLE, vē'ȧ'y', PAUL (1854—). A French engineer and inventor, born in Paris. He graduated from the polytechnic school of that city in 1875, and went into the Government service as engineer in the department of explosives. In 1879 he was nominated assistant chief of the central laboratory of powders and saltpetre at Paris. There he conducted a series of investigations on projectiles which led to his invention in 1884 of a smokeless powder, which was adopted by the French Army. For his scientific discoveries he was admitted to the Legion of Honor and was awarded (1889) by the Academy of Sciences the Lecomte prize of 50,000 francs.

VIEIRA, vê-ā'rȧ, ANTONIO (1608-97). A Portuguese preacher and missionary, born at Lisbon. He was taken to Brazil in 1615, was educated in the Jesuit schools of Bahia, and was ordained in 1635. He returned to Lisbon in 1641, and rose to the post of Court preacher. He was sent by his Order to Brazil in 1652 as director of the northern missions. There he was imprisoned by the colonists in 1661 and sent back to Portugal. On the charge of teaching doctrines condemned by the Church in 1665, he suffered imprisonment by the Inquisition for two years more, but was released finally without any demand upon him to retract. In 1681 he returned to Brazil, and died there as provincial of his Order. His sermons (1679-99) are considered examples of the best Portuguese prose. Among his other writings may be named: *Discurso sobre el cometa que apareció en Bahía en 25 de Octubre de 1694*, and *Inquisición en Portugal con sus prisioneros.*

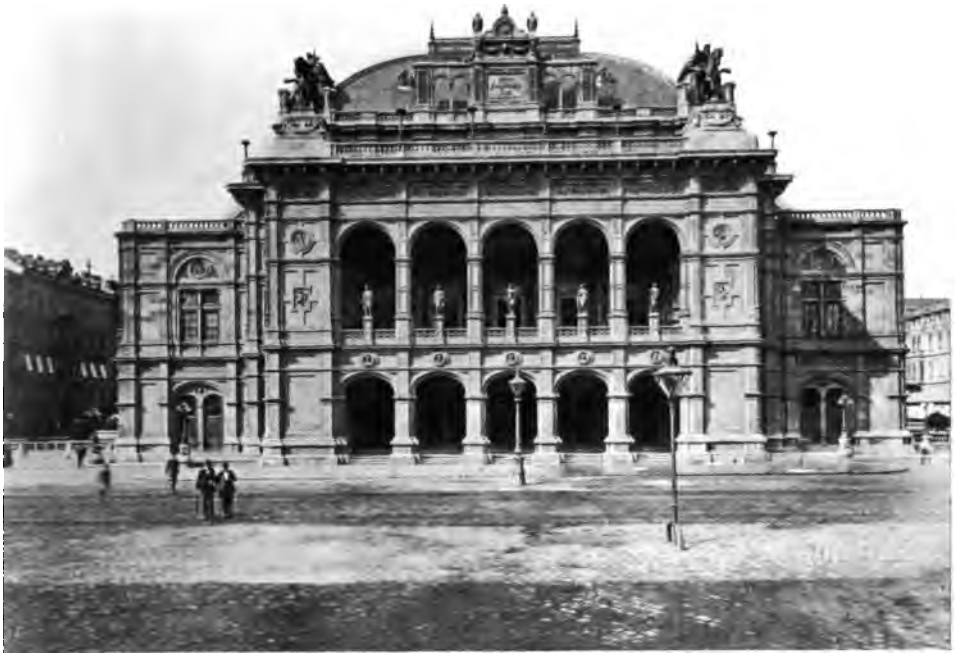
VIELE, vē'lê, EGBERT LUDOVICKUS (1825-1902). An American soldier and civil engineer, born at Waterford, N. Y. He graduated at West Point in 1847; served under General Scott in Mexico; and became a first lieutenant in 1850, but resigned in 1853. From 1854 until 1857 he was topographical engineer of New Jersey; in 1857-58 he was chief engineer of Central Park, New York, and later became chief engineer of Prospect Park, Brooklyn. He reëntered the army on the outbreak of the Civil War; became a brigadier-general of volunteers in August, 1861; commanded the land forces in the capture of Fort Pulaski; was engaged in the advance on Norfolk, Va., and was Governor of that place from August, 1862, until October, 1863, when he resigned from active service. In 1883 he became commissioner of parks for New York City, and in the following year was made president of the department. In the same year he was elected to Congress as a Democrat, but two years later was defeated in a contest for reëlection. He published: *Handbook for Active Service* (1861); *Topographical Atlas of the City of New York* (1865); and *Report of the Board of Visitors to the United States Military Academy at West Point* (1886).

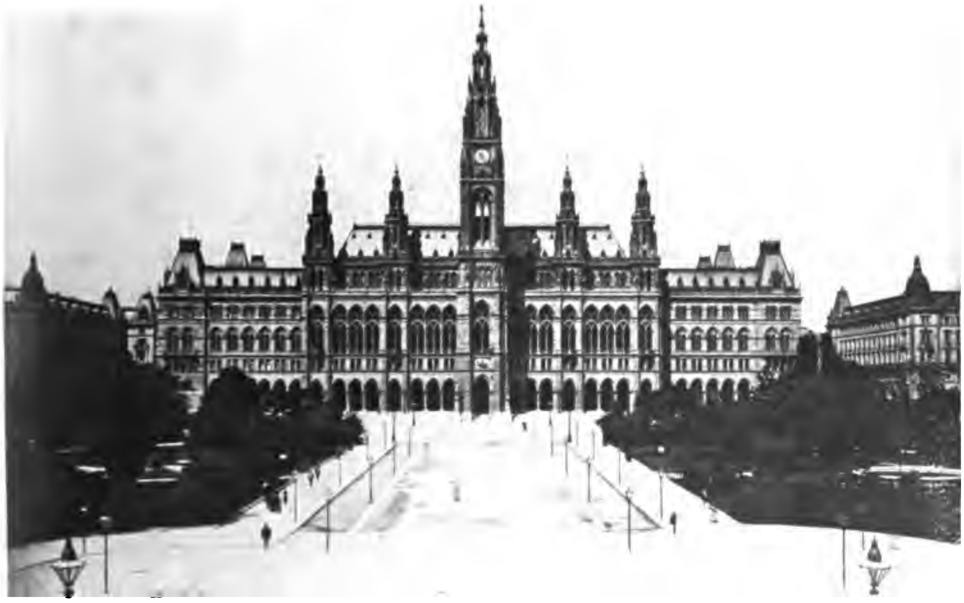
VIELÉ-GRIFFIN, vē'*e*-lȧ' grē'făɴ', FRANCIS (1864—). A French poet of American birth. He was born at Norfolk, Va., but was educated for the most part in France. He there allied himself with the group of literary men who were known, first among themselves and later to a wider circle, as Symbolists. His publications include *Cueille d'Avril* (1886) made up of verses which appeared in *Lutèce; Les Cygnes* (1887); *Anœus* (1888); *Joies* (1889); *Entretiens politiques et littéraires* (1890-92); with Paul Adam and Bernard Lazare, *Swanhilde* (1893); *Poèmes et poésies* (1895); *Phocas la jardinière* (1898); and *La légende ailée de Wieland* (1900). Consult: Thompson, *French Portraits* (Boston, 1900); and Beres and Léautaud *Poétes d'aujourd'hui* (Paris, 1900).

VIEN, vē'ăɴ', JOSEPH MARIE, Count (1716-1809). A French painter. He was born in Montpellier, and studied under Natoire, in Paris. In 1873 he won the Prix de Rome, and after his return to Paris he became the head of an influential school, in which were trained the principal leaders of Classicism in France. In 1775 he was made director of the French Academy at Rome, and in 1789 Court painter to the King. Napoleon made him Senator and count of the Empire. His art represents the period of transition from the Rococo to Classicism. His masterpiece, "Saint Denis Preaching to the Gauls," is in the Louvre, which also contains "Dædalus and Icarus," and other works.

VIENNA, vê-ĕn'nȧ. The capital of Austria-Hungary, situated on the right bank of the Danube and intersected by an arm of the river called the Danube Canal, into which the small river Wien here empties; latitude 48° 12′ N., longitude 16° 23′ E. (Map: Austria, E 2). It has a temperate climate, the mean annual temperature being 48.8° F. The annual rainfall is 23.42 inches; the altitude, from 560 to 655 feet. The last northeastern outliers of the Alps (Wiener Wald) here reach the Danube plain. Vienna, as enlarged by the incorporation of the suburbs in 1891, is distinguished by an unusually large acreage of forests and meadows within its confines, the extent of the total area being very much greater than that of Berlin.

DESCRIPTION. Vienna is notable for the magnificent Ringstrasse (q.v.) lined with imposing Renaissance structures and beautiful public parks and squares, and for its general air of gayety, due to its genial, music-loving population. In modern architectural development, both in extent and in artistic value, perhaps no city is its equal. The traditional Vienna baroque style, with its open-air embellishments in relief and in color, give everywhere a lively and varied aspect. The modern improvements of every kind, especially in fine new streets, are remarkable. This modernization of the city has been continuous since 1858. The old inner city, which still has many Durchhaüser, or short-cut passages through the courts of houses, is encircled by the Ringstrasse, marking the site of the interior fortifications finally demolished in 1857. The southwest section of the inner city is occupied by the Imperial Hofburg, and by the Volksgarten and the Hofgarten, with the extensive square lying between. The 'Burg,' or Imperial residence, is a vast, confused, and generally somewhat uninteresting edifice, which has been the official home of the Hapsburgs since they originally obtained possession of the city. In the spacious inner court, the Franzensplatz, stands an elaborate monument to Francis II. Through a portal on the east may be entered the Josefsplatz, with the equestrian bronze statue of Joseph II. Here rises the splendid Imperial library, dating from 1722, crowned by a great frescoed dome, and a long, handsomely embellished gallery, with statues. The library contains over 900,000 volumes. There is also an immense and invaluable collection of engravings (over 300,000). In the Outer Burgplatz, which separates the Burg from the Ringstrasse, are two fine equestrian statues by Fernkorn, one to Archduke Charles, the other to Prince Eugene of Savoy. Here on the Ringstrasse is the Burgthor, with five passages, formed by Doric columns. Two immense wings by Semper connect this gate with the old palace. The attractive and popular Volksgarten dates from 1822 and contains the notable modern Grillparzer monument (1889), of elaborate design.





VIENNA
THE OPERA HOUSE (UPPER)
THE CITY HALL (LOWER)

Passing from the Hofgarten northward farther into the former inner city, the Augustiner Kirche is noted, in the vicinity of various Government palaces and offices. It is a mediæval Gothic building and contains Canova's famous monument to the Archduchess Maria Christina. Near by, on the Augustiner Bastei, one of the few remnants of the old bastions, stands the palace of the Archduke Friedrich (formerly the property of the Archduke Albert), containing the Albertina Library with its famous collections of drawings and engravings. Of the latter there are more than 200,000.

The Imperial Opera, in the style of the Renaissance, situated on the Opern-Ring, is one of the superb modern art temples of Europe. It was completed in 1869. The luxurious interior is adorned with frescoes, statues, busts, etc., of great excellence. The vicinity is the fashionable centre of the capital, and hence the spacious Kärntnerstrasse, now (1903) being widened, one of the busiest thoroughfares of the city, leads northeast past the *Neuer Markt*, to the cathedral. The spacious *Neuer Markt* contains a fine fountain, by Raphael Donner. In the Capuchin Church here is the Imperial vault. In this section palaces and governmental establishments abound.

A little distance to the north, near the centre of the inner city, towers the Cathedral of Saint Stephen. It is the most famous structure in Austria. The present edifice dates mainly from the fourteenth century. Its shape is that of a Latin cross. It is 355 feet long, and has been partially restored in recent times. From its impressive steeple, whose cross is about 470 feet high, a magnificent view of the city and the surrounding country may be had. Between the cathedral and the Burg extends the wide modernized Graben northwest and southeast, a fashionable business street. In the northeast section of the inner city is found the baroque university church, with the Academy of Sciences (1846) near by in the old university. In the extreme northeast corner of the old city are the post-office and the Imperial Ministry of Commerce. The Greek Church is seen to the west, and to the south are the Horticultural Society building, and the splendid Renaissance Palace of Archduke Eugene.

Entering the northwest section of the inner city from the Graben, the Austrian Kunstverein is noticed. It holds a permanent exhibition. To the northeast is the square called Hoher Markt, said to be the site of the forum of the ancient Vindobona. This is the most ancient part of the town. In the centre of the square rises a votive monument by Fischer von Erlach. West is the spacious square Am Hof, where dwelt the ancient rulers of the Babenberg family. Farther northwest, on the Freiung, is the Harrach Palace containing a fine picture collection of some 400 canvases. Near by is the far less valuable Schönborn collection. In the vicinity are the Schottenhof and the Mölkerhof—immense structures owned by religious bodies and holding many hundreds of inmates. Some of these establishments—a characteristic feature of Vienna—contain over 200 different dwellings. Southward in the general direction of the Volksgarten are the fine Hofburg theatre; the imposing Landhaus of the Lower Austrian Diet (containing the Museum of the Imperial Agricultural Society); the Minorite Church, dating from the fourteenth century, with Raffaeli's splendid mosaic of Da Vinci's "Last Supper" done at the command of Napoleon I.; and the notable Liechtenstein palace. The Renaissance Hofburg Theatre, which was practically completed in 1889, can seat 2000 persons. The interior is richly embellished and contains a valuable collection of actors' portraits. Near the northwestern corner of the inner city is the splendid modern Renaissance stock exchange. It holds the valuable Museum of Trade, collections of industrial products, etc.

Beginning here at the northwestern end of the Ringstrasse, by the river, there may be mentioned conveniently in succession the objects of interest lining the street. The Stiftungshaus, a benevolent establishment, has an expiatory chapel built by Francis Joseph on the spot where the Ring Theatre was destroyed by fire in 1881 with great loss of life. To the west is the striking Gothic Votivkirche, one of the chief modern ornaments of the city, completed in 1879 with a beautiful façade, towers, and a resplendent interior. It commemorates the Emperor's escape from an assassin in 1853. In this region is the excellent Leichtenstein picture gallery, with over 800 good canvases. Rubens's "History of Decius" and "Two Sons" and Van Dyck's famous portrait of Maria Louisa de Tassis are here. A park and a fine new palace of Prince Liechtenstein are near by. On the south of the Votivkirche extends the wide Universitasstrasse, entering the Ringstrasse, and having the university on the south. This is the most superb part of the Ringstrasse. The immense quadrangular university building, exhibiting the Tuscan Renaissance, was completed in 1884, and contains the famous college collections, library, etc. See VIENNA, UNIVERSITY OF.

South of the university extends the Rathaus Park, opposite the Hofburg Theatre, and with the sumptuous Rathaus on the west. This unsurpassed Gothic town hall was completed in 1883, at a cost of $6,000,000. It abounds in statuary and frescoes. Its majestic tower rises 320 feet. It holds the valuable historical museum of Vienna, the municipal library (over 50,000 volumes), and the municipal collections of weapons. The first is rich in antiquities, costumes, and objects of personal interest. On the south of the Rathaus Park and opposite the Volksgarten rise the imposing Houses of Parliament, designed in the Greek style, by Hansen. They are approached by a columned portico. About a hundred yards farther south is the fine Palace of Justice, in German Renaissance, finished in 1881. South of it stands the attractive Deutsches Volkstheater, in Italian Renaissance. To the east are the celebrated natural history and art history museums in two new spacious and imposing edifices flanking the Maria-Theresiaplatz opposite the Burgthor. Here is to be seen the colossal bronze Maria Theresa Monument, erected in 1888.

The museum buildings are twin, domed edifices in the Italian Renaissance, and were completed in 1889. They are abundantly decorated with symbolic and portrait statuary, and in the interior with new frescoes and marbles by great artists. The natural history collections, among the most famous in the world, date from 1748.

The equally celebrated art museum includes the art treasures of the Imperial House. In this section are some of the principal military institutions, such as the Military Geographical Institute.

Southeast of the art museum, near the Ring, is the Schillerplatz, with Schilling's fine bronze Schiller monument. The square is flanked on two sides by the Palace of Justice and the Academy of Art. The Goethe monument, by Hellmer, is to the north. In the vicinity is the fine Elizabeth bridge (with statues) leading over the Wien to the southern suburb of Wieden. Adjacent, facing south on the river, in the narrow space which from this point lies between the Wien and the Ringstrasse, are the Commercial Academy, the Künstlerhaus with a permanent exhibition of modern pictures, and the Renaissance building of the Musikverein. In the last are the Vienna Conservatory of Music, with a musical library of over 20,000 works, and a museum.

In the district of Wieden is the Polytechnic Institution, with collections and a laboratory. Turning northeast from the Wieden district, along the exterior side of the Ring, we pass the Schwartzenberg monument, the Academic Gymnasium, and the bronze statue of Beethoven erected in 1880. The charming little Stadt-Park farther on has an attractive Kursalon. Here are the fine monuments to Schubert, by Kundmann, and to the painter Schindler, by Hellmer. Beyond are the Austrian Museum of Art and Industry and the Art Industrial School—both in sightly brick Renaissance edifices, embellished with attractive features, and connected by a passageway. These institutions are models of their kind. Extensive quays along the Donaukanal, which is spanned in this section by the Aspern, Ferdinand, Stephanie, and Maria Theresa bridges, connect the extremities of the Ring.

East of the Wien, just above its mouth, stretches the Landstrasse district, with the custom-house, the central markets, the mint, the geological institution, the botanic garden, and the Metternich palace. South from this section extends the Belvedere Garden, with a palace at either end. Immediately to the west are the Schwarzenberg Palace and Gardens. The district northeast of the Danube Canal, opposite the old city, is the Leopoldstadt. Adjoining this section on the north is the Augarten Park. The main artery of the Leopoldstadt is the fine and broad Praterstrasse, stretching northeast to Prater. The International Exhibition of 1873 was held here.

Among ecclesiastical buildings not hitherto mentioned are the Karlskirche, erected in the eighteenth century by Fischer von Erlach, in the district of Wieden, and the Church of Maria Stiegen (Maria am Gestade) in the inner city, dating from 1394. The inner city also contains the Church of Saint Michael, originally erected early in the thirteenth century. The Altlerchenfeld Church, in the district of Neubau, is a fine modern brick edifice, in the Italian mediæval style. In the Leopoldstadt is the handsome modern Jewish synagogue, in the Moorish style. One of the most striking of secular buildings is the arsenal, in the southeastern section, with its fine army museum. Near it are the stations of the Southern and State railways. The finest railroad station is the Nordbahnhof, near the entrance to the Prater. Among places of burial, the large Central Cemetery, with its fine monuments, claims attention.

A new quarter of the city, called the Donaustadt, has sprung up on both sides of the Danube, northeast of the Leopoldstadt, as a result of the Danube improvement works, which have provided a broad new channel for the river and done away with the inundations formerly so destructive. An even more remarkable triumph of engineering skill was the recently completed regulation of the Wien, which in the centre of the city now flows largely underground.

The environs of Vienna have much of interest and charm. On the northwest rise the Kahlenberg and the Leopoldsberg, whose summits, about 1400 feet above the sea, present an impressive view of mountains, city, and the Danube plain. A mountain railway leads to the top of the Kahlenberg. The historical Schönbrunn Palace (q.v.) is on the southwest of the city, and the battlefields of Aspern and Wagram lie on the Marchfeld plain to the east, with the island of Lobau. In this latter direction may be visited the picturesque Brühl—a ravine converted into beautiful pleasure grounds.

INDUSTRIES AND COMMERCE. Vienna is a great and growing centre of manufactures and has of late enormously increased its number of factories; but its commercial range is becoming restricted, owing to the rivalry of Berlin and Budapest. The Imperial prestige and traditional gayety of Vienna have relatively declined as the result of party strife. Taste and artistic ingenuity characterize Vienna manufactures; the city is noted for its elegant shops and its objects of art. It produces also machinery, metal wares, fine furniture, pottery, clothing, millinery, musical instruments, etc. The product of the great Vienna breweries is celebrated. Among the chief articles of commerce are grain, cattle, wine, textiles, coal, iron, flour, wood, clothing, shoes, leather goods, books, and art publications.

ADMINISTRATION. Administratively the city is subject to the Diet and Governor of Lower Austria, and its Burgomaster must be approved by the Emperor. It is, however, virtually autonomous. The number of its districts or wards was increased to 20 in 1900. The modern sanitary reforms have greatly diminished the annual death rate (approximately 20 per 1000). It was not until 1873 that the city was first supplied with good drinking water by an aqueduct, and this supply has been greatly increased and improved. Vienna is surpassed by many cities with respect to lighting and facilities for intercommunication. It can, however, now boast of an admirably constructed metropolitan railway. The finances are on the whole on a good footing. In 1900 the total municipal receipts were approximately $22,300,000—about one-eighth being extraordinary. The total expenditure was $23,600,000. The great increase in these figures in late years has been due naturally to the extensive improvements of every nature. The city owns the gas and electricity works, and the tramway system.

POPULATION, EDUCATION, AND CHARITIES. The population in 1900 was 1,674,957, Vienna being the largest city in Austria-Hungary and the fourth largest in Europe. About three-quarters of the population are Germans and Roman Catholic. Great advance has been made in the educational facilities. The Grand Opera is second to none in the world, and the acting at the Hofburg Theatre is scarcely surpassed anywhere. In addition to the educational institutions already mentioned, and including the famous conservatory of music, the Oriental Academy (a school for training in diplomatic service, dating from 1754) claims particular attention. The Government printing establishment is one of the most complete of its kind. Among the charity institutions not already mentioned are the soldiers' asylum, famous institutions for the blind and the deaf and dumb, the general hospital, the largest in Europe, with 2000 beds, and the veterinary hospital, with more than 1000 students.

HISTORY. Vienna is the Vindobona of the Romans, under whom it was strategically important. At the close of the eighth century it passed from the possession of the Avars to that of the Franks. In the twelfth century it became the residence of the Babenberg dukes of Austria. The traffic which arose in connection with the Crusades caused Vienna to prosper. Ottokar of Bohemia, in the middle of the thirteenth century, enlarged the bounds of the city. Soon afterwards it became the capital of the Hapsburg rulers of Austria. In 1365 the university was founded. From the fifteenth century the Hapsburgs permanently occupied the Imperial throne of Germany, which added greatly to the importance of Vienna. The Turks twice besieged it without success, in 1529 and 1683. The second time, when it was heroically defended by Starhemberg, it was on the point of falling into the hands of the Mussulmans, when it was rescued by the splendid victory of the Polish King, John Sobieski, and the German princes, achieved before its walls (September 12, 1683). In 1735 and 1738 treaties were concluded here in connection with the War of the Polish Succession. (See SUCCESSION WARS.) Vienna was greatly embellished by Maria Theresa and her sons. The city was for a brief period occupied by Napoleon in 1805 and 1809, and the battles of Aspern and Wagram were fought in its environs, the latter followed by the Treaty of Schönbrunn (1809). The famous Congress of Vienna was held in 1814-15. The city was the scene of a revolutionary movement in 1848, which ended in bloodshed. (See AUSTRIA-HUNGARY.) Under Francis Joseph Vienna has undergone an unparalleled transformation, and has become architecturally one of the most imposing capitals of the world.

Consult: Bermann, *Alt- und Neuwien* (Vienna, 1879); *Oesterreich in Wort und Bild* (ib., 1886); Weiss, *Geschichte der Stadt Wien*, contains bibliography (ib., 1882); Guglia, *Geschichte der Stadt Wien* (ib., 1892).

VIENNA, CONGRESS OF. A convention of the representatives of the European nations held after the first Treaty of Paris (1814), for the general settlement of the affairs of Europe. The congress first met on September 30, 1814. Russia was represented by Nesselrode; Prussia by Hardenberg; England by Lord Castlereagh, and afterwards by the Duke of Wellington; Austria by Metternich; France by Talleyrand. All Europe, with the exception of Turkey, was represented, the total number of those who assisted at the congress being about 500. Chief among the crowned heads present were Alexander I. of Russia, the Emperor Francis of Austria, and Frederick William III. of Prussia. An extraordinary round of festivities and entertainments was provided. The representatives of the minor States, who had expected a species of European Parliament, to which all would be admitted, were sadly disappointed by the preliminary resolution of the great Powers to constitute two committees, one to deliberate on the affairs of Germany, the other, composed of the representatives of Austria, Prussia, Russia, and Great Britain, to discuss the affairs of Europe generally and decide respecting new territorial boundaries. To this latter council, Talleyrand, by the influence of Castlereagh, who early saw the necessity of a counterpoise to the influence of Russia and her follower, Prussia, in the conferences, was admitted (October 5th); and three days after, it was increased by the representatives of Spain, Sweden, and Portugal. The master diplomacy of Talleyrand appeared in making France the champion of the minor Powers and thereby gaining their support, in utilizing the differences of the great Powers to divide them, and above all in appealing to the principle of legitimacy in order to preserve the integrity of France. The points which were at once and unanimously settled were: the constitution of Belgium and Holland into one kingdom (the Kingdom of the Netherlands); the union of Norway with Sweden; and the restoration of Hanover to the King of Great Britain, of Lombardy to Austria, and of Savoy to Piedmont. But the question as to the disposal of Poland, Saxony, and Genoa was not so easily settled. Russia and Prussia were bent on aggrandizement of the most extravagant sort, the former insisting on obtaining the whole of the Duchy of Warsaw (see POLAND), while nothing less than the whole of Saxony (whose King had fought on the side of Napoleon), besides new territories in Western Germany, would satisfy the latter. Both significantly hinted at the proximity of their armies, with the view of awing the other Powers into compliance. But Castlereagh steadily refused to yield to such pretensions and joined with Metternich and Talleyrand in a secret treaty, offensive and defensive, February 3, 1815, which was acceded to by Hanover, Sardinia, Holland, and Bavaria. The news of this agreement soon leaked out, and produced a considerable modification in the pretension of the northern Powers. At last it was agreed that Prussia, as far as her position in Germany was concerned, in addition to being reinstated and in the possession of most of the territories given up by her in the course of the French wars, should obtain half of Saxony (now Prussian Saxony), Berg Jülich, the greater part of the left bank of the Rhine as far as the Saar, and Swedish Pomerania, and that she should cede East Friesland and Hildesheim to Hanover in exchange for Lauenburg, Anspach and Bayreuth to Bavaria, and Lauenburg to Denmark (in exchange for Swedish Pomerania, made over to Denmark as a compensation for the loss of Norway). Of the Polish territories which Napoleon had taken from Prussia, and which had constituted the main portion of the Duchy of Warsaw, only the western part (Posen) was restored to her. The bulk of the Duchy of Warsaw was now constituted a new Kingdom of Poland, which was placed under the rule of the Russian dynasty. A tiny fragment of Poland was called into independent existence as the Republic of Cracow. Russia was recognized in the possession of Finland. Austria was reinstated in the possession of the territories relinquished by her in the course of the French wars, with the exception of Belgium, the Breisgau, and other districts in South Germany, and part of her Polish territories. The bulk of the dominions of the Venetian Republic was restored to her. The boundaries of France were fixed approximately as they had been at the outbreak of the Revolution. Maria Louisa, the wife of Napoleon, obtained Parma. Naples was restored to its Bourbon King, and Tuscany to its former ruler, a brother of the Austrian Emperor. The House of Savoy was reinstated in its continual dominions and invested with the territories of the former Republic of Genoa. The Pope was restored to his former position as a temporal sovereign, but Avignon and Venaissin remained in possession of France. The Swiss Confederation was reconstituted. England was allowed to retain Cape Colony, Ceylon, part of the Dutch possessions in Guiana, Mauritius, Tobago, Saint Lucia, Malta, and Helgoland. The news of Napoleon's return from Elba somewhat hurried the conclusion of these multifarious arrangements, yet the negotiations were not interrupted. The reorganization of Germany was finally effected by the act of June 8, 1815, which constituted a Germanic Confederation consisting of 39 members. The Diet of the Confederation was granted limited powers and the only general provision of importance was the requirement that representative institutions be erected in all the States belonging to the Confederation. Such a league utterly failed to satisfy the aspiration for national unity which the Napoleonic wars had fostered in Germany; yet it remained in existence till 1866. The questions of mutual indemnities, rectifications of frontier, etc., were subsequently settled (1819) at Frankfort, by a territorial commission composed of representatives of the great Powers. The questions of the slave trade and of the free navigation of the Rhine and its tributaries were brought up by England, and also satisfactorily settled. A formal treaty embodying the results of the labors of the congress was drawn up and signed June 9, 1815. It was the intention of the statesmen who dominated the congress to establish the balance of Europe and control by the great Powers so nicely as to prevent wars and Napoleonism in the future. The international statesmanship of Europe for the next forty years was directed to a maintenance of the status established by the congress. Consult: Wheaton, *History of the Law of Nations* (New York, 1845); Hertslet, *The Map of Europe by Treaty* (London, 1875-91); Metternich, *Memoirs* (Eng. trans., ib., 1880); Talleyrand, *Memoirs* (Eng. trans., ib., 1891), less informing than was expected before publication; Seeley, *Life and Times of Stein* (Cambridge, 1878); also an admirable account by Sorel, in Lavisse and Rambaud, *Histoire Générale*, vol. x. (Paris, 1898), with good bibliography; Debidour, *Histoire diplomatique de l'Europe* (Paris, 1891).

VIENNA, University of. One of the oldest and most famous universities of Europe, founded by Duke Rudolph IV. in 1365. Under its first rector it maintained but a precarious existence. Duke Albert III. obtained in 1384 from Pope Urban VI. the right to add a theological faculty to the three secular ones. At the same time the university was divided into four nations, modeled after those of Paris. In 1623 Ferdinand II. transferred the university to the Jesuits, who erected a number of buildings, some of which still exist. By the beginning of the reign of Maria Theresa it had lost what prestige it acquired during the Humanistic awakening. Gerard van Swieten, however, succeeded in rescuing the medical faculty from the general ruin, and it has since maintained an almost unrivaled position in the European medical world. Joseph II. reorganized the university as a practical State institution and deprived it of academic freedom. Reforms in 1848-50 introduced again the era of free academic life, and henceforth it regained its former renown. The magnificent new university building designed by the famous architect Ferstel was dedicated in 1884.

In 1902 the university consisted of the following faculties: (1) Law and political science; (2) theology; (3) medicine; (4) philosophy. The attendance in 1902-03 was over 6000, including some forty women. The university departments include besides a large number of seminaries, museums, and laboratories in art and sciences, three medical clinics, two surgical clinics, two lying-in clinics, one each for diseases of women, skin diseases, children's diseases, etc. These clinics have attained a world-wide reputation, due to the eminent specialists conducting them. The university library, founded in 1775 by Maria Theresa, has received since 1808 a copy of every work printed in Lower Austria. It includes nearly 600,000 volumes and 824 manuscripts. Notable also are the observatory, botanical garden, and Central Institute for experimenting in meteorology and terrestrial magnetism.

VIENNA PASTE. An unofficial compound of caustic potash and quicklime, used as a caustic.

VIENNA WHITE. See Crayon.

VIENNE, vē'ĕn'. A western interior department of France, forming the eastern part of the former Province of Poitou, and situated south of the Loire (Map: France, G 5). Area, 2711 square miles. The surface is mostly level, watered by the Vienne, a tributary of the Loire. Five-sixths of its area is cultivated, producing crops of wheat, oats, barley, potatoes, and beets. Large numbers of sheep are raised. Vineyards occupy about 72,000 acres, with an annual productive value of $3,500,000. The chief manufactures are cutlery, paper, and alcohol. Population, in 1896, 338,114; in 1901, 336,343. Capital, Poitiers.

VIENNE. The capital of an arrondissement in the Department of Isère, France, on the left bank of the Rhone, 20 miles by rail south of Lyons (Map: France, L 6). The Rhone, spanned here by a suspension bridge, is joined by the Gère, which flows through the town. Vienne is picturesquely situated among low hills, but poorly built and ill kept. The ancient ruins and antiquities are numerous. The Roman aqueducts, restored in 1822, supply the town with water. The remarkable Corinthian temple of Augustus and Livia, rebuilt in the second century, resembles the Maison-Carrée at Nîmes. It is 88 feet long and adorned with columns. The town has also some immense arches, now thought to belong to a Roman edifice. The Plan d'Aiguille, a pyramidal structure resting on arches, was formerly pointed out as Pilate's tomb, but is now recognized as a probable goal of an ancient circus. The Gothic Cathedral of Saint Maurice (twelfth to sixteenth century), with its two towers, façade, and balustrade, produces an attractive effect. The ruins of the Château de la Bâtie are picturesque. There are a library and a museum (rich in Roman remains), a Musée Lapidaire, and a handsome modern Hôtel de Ville. The value of the annual production of textiles is about $4,000,000. Gloves, cutlery, glass, paper, woolen caps, and leather are manufactured and there are foundries and brass works. The trade, by rail and river, is important, especially in wine, and there are iron and silver mines near. Population, in 1901, 24,619.

Vienne, the capital of the Allobroges, became a Roman colony, and was the earliest centre of Christianity in Gaul. It was the capital of the first and second Burgundian kingdoms. In 1349, with the rest of Dauphiné, it passed to France. The ecumenical council which abolished the order of the Knights Templars was held here in 1311-12.

VIENNE, HAUTE. A department of France. See HAUTE-VIENNE.

VIEQUES, vē-â′kâs, ISLA DE, or CRAB ISLAND. A small island belonging to Porto Rico, geographically one of the Virgin Islands. It lies seven miles from the eastern extremity of Porto Rico, and is 19 miles long, with a breadth of three miles (Map: Porto Rico, D 2). The surface is low, but hilly. On the south coast there are several spacious and land-locked harbors accessible for large ships. The soil is fertile, and sugar is cultivated, while many cattle are also raised. With the neighboring island of Culebra, Vieques forms a district of the Department of Humaco, and had in 1899 a population of 6642.

VIERGE, vē-âr′HÂ, DANIEL (1851—). A Spanish illustrator, born in Madrid. His father's name was Urribjeta, but the son adopted his mother's name. He studied under his father, a well-known draughtsman, and at the Madrid Academy under Haes, Madrazo, Villeyas, Rico, and Pradilla. He illustrated his first book, Eusebio Blasco's *Madrid La Nuit*, in 1867, and then went to Paris, where he first made a name by his drawings of events of the Commune. He worked principally for the *Monde Illustrée* and *La Vie Moderne*, supplying both these and other journals with a great number of sketches. He also illustrated works of Victor Hugo, Zola, Michelet, Poe, and Quevedo's *Pablo de Segovia* (1882). The latter is a masterpiece of illustration and is remarkable, as all his work is, for the drawing of scenery and architecture. Another noteworthy set of Spanish subjects are those done for Jaccaci's *On the Trail of Don Quixote* (1895). His right side was completely paralyzed when he was thirty years old, but he learned to draw with his left hand, and acquired such mastery with it that there is little difference between his earlier and later styles. He received the Legion of Honor and a gold medal at the Paris Exposition of 1889. The art of illustration owes much to Vierge. His influence was also great on the engravers who interpreted him. Vierge remained a typical Spaniard, and with all his variety of subject he is most at home in Spanish scenes. Most of his illustrations are done with the pen, and, as he realized the limitations of the printed page, they bear reproduction well.

VIERSEN, fēr′*zen*. A town in the Rhine Province, Prussia, 18 miles west of Düsseldorf (Map: Prussia, B 3). It has a mediæval, late-Gothic church and a charming park. Viersen manufactures silks, cottons, damask, linens, ribbons, and plush on a large scale, and has machine works and tanneries. Population, in 1900, 24,797.

VIERZON-VILLE, vyĕr′zôɴ′vēl. A town of the Department of Cher, France, 20 miles by rail northwest of Bourges, on the Cher and the Canal du Berry (Map: France, H 4). The manufacture of porcelain and the furnaces and steel-refineries are of importance. Population, in 1901, 11,796.

VIETA. The Latin name of the French mathematician Viète (q.v.).

VIÈTE, vē′ât′ (VIETA), FRANÇOIS (1540-1603). A French mathematician, born in Fontenay-le-Comte. He was educated for the law, and practiced this profession until the opening of his political career. In 1589 he was appointed as maître des requêtes under the Parliament at Paris. Viète was attached to the Court of Henry IV. during the war with Spain, and rendered his Government valuable service by deciphering the secret messages dispatched by the Spanish Court to the Governor of the Netherlands. Viète was the foremost French algebraist of the sixteenth century. His chief works are: *In Artem Analyticam Isagoge* (1591), to which were subsequently added the supplements *Logistice Speciosa* and *Zeticorum*, *Supplementum Geometriæ* (1593); *De Numerosa Potestatum* (1600). A collection of Viète's works was published by Van Schooten (Leyden, 1646).

VIEUSSENS, vyĕ′säɴ′, RAYMOND (1641-c.1720). A French anatomist, born in Rouergue, and educated at Montpellier. In 1671 he was appointed physician in the Hôpital de Saint Eloi and there devoted himself to the study of neurology. His *Neurographia Universalis* (1685), with an account of his important researches on the anatomy of the brain and of the spinal column, won him membership in the French Academy of Sciences and in the Royal Society of London. The 'valve of Vieussens' is a name still applied to the superior medullary velum, which he discovered.

VIEUXTEMPS, vyĕ′täɴ′, HENRI (1820-81). A Belgian violinist and composer, born in Verviers. Before five years of age he began to study the violin under a local teacher named Lecloux. Two years later, accompanied by his master, he made a tour of the principal towns of Belgium, and in Brussels met De Bériot, who gave him instruction for several months. In 1833 he made a tour of Germany, and in Vienna became a pupil of Simon Sechter, the Court organist. Later he was received with great enthusiasm at Moscow and Saint Petersburg. Other successful tours followed, notably those of America (1844-45, 1856, and 1870). In 1846 he was appointed solo violinist to the Emperor of Russia, and in 1871 was made first professor of the violin, in the place of De Bériot, at the Brussels Conservatory. In 1873, after he sustained a stroke of paralysis, he devoted himself to composition entirely. He died in Algeria. Vieuxtemps ranks with the greatest violin virtuosi of the world. As a composer for the violin he holds a high place. His compositions include solos, duets, études, variations, fantaisies, transcriptions, and caprices. Consult Radoux, *Henri Vieuxtemps, sa vie et ses œuvres* (Paris, 1891).

VIGAN, vē′gȧn. The capital of the Province of Ilocos Sur, in Luzon, Philippine Islands, 210 miles northwest of Manila, near the right bank of the Abra River and not far from the coast (Map: Philippine Islands, E 2). It has a number of fine public buildings. The surrounding country produces rice, indigo, cotton, sugar cane, and live stock. In the town there are fisheries, brick and tile kilns, and yards for the construction of small coasting vessels. There is an extensive traffic up the Abra River. The town, formerly called Villa Fernadina, has been a bishop's see since 1755. It has a monument erected to the memory of Juan de Salcedo, the conqueror of the province. Its population, in 1900, was 19,000.

VIGFUSSON, vĭg′fụs-son, Gudbrandur (1827-89). An Icelandic philologist. He was born in Frakkanes, Iceland, studied at the University of Copenhagen, and in 1864 went to England to complete and publish the Icelandic-English dictionary left unfinished by Richard Cleasby at his death. This was published in 1874, and is Vigfusson's most important work. It is still the only dictionary of Icelandic which approximates completeness. Its etymologies, however, are fantastic and untrustworthy. Vigfusson became in 1884 professor of the Icelandic language and literature at Oxford. Among his principal works, in addition to his *Dictionary*, may be mentioned *Um Tímatal í Islendingasögum* (1854); *Icelandic Sagas* (1887); and, in coöperation with F. York Powell, an edition of the *Sturlunga Saga* (1878); *An Icelandic Reader* (1879); and *Corpus Poeticum Boreale* (1883). He likewise published editions of the *Biskupasögur* (1856-62); *Bardersaga Snæfellsás; Víglundersaga; Fornsögur* (1890); *Eyrbyggja* (1864); and the *Fleteyjarbok* (1860-68).

VIGIL (OF. *vigile, vigilie*, Fr. *vigile*, from Lat. *vigilia*, watch, from *vigere*, to be lively; connected with Goth. *wakan*, OHG. *wahhēn*, Ger. *wachen*, AS. *wacian, wæccan*, Eng. *wake*). In the early Church, the watch kept in a church or cemetery on the night before a feast, the time being occupied in prayer. In the eleventh and twelfth centuries the vigil took the form of a preparatory time of devotion which went before the more solemn festivals of the Church year, and especially Christmas, Easter, Pentecost, and the principal martyrs' days. The observance of vigils is still retained in the Roman Catholic Church, by the use of a special office and in the case of some great festivals by a strict fast. In the English Book of Common Prayer the 'vigils or evens' of the chief festivals are retained in the calendar as days of fasting, but they have no special observance appointed for them.

VIGILANCE COMMITTEE. In the United States an unauthorized organization of citizens for the purpose of administering summary justice in the absence of a regular judiciary or when the courts are prevented from exercising their accustomed functions. In times of civil strife or other public emergency, vigilance committees are frequently formed for the purpose of ascertaining the loyalty of suspected persons and for enforcing against disloyal ones the punishment fixed by public opinion. Thus, during and immediately preceding the American Revolution, vigilance committees were formed in many communities to enforce the non-importation agreements and to ferret out Tories. These bodies were not very different from the Colonial Committees of Safety and of Correspondence except that their methods were less open and they were usually self-constituted. In the southern States prior to the Civil War vigilance committees were sometimes formed to enforce the will of the community against abolitionists or other persons suspected of disloyalty to the South, or to prevent the circulation of abolition literature. During the disorder and confusion of the Reconstruction period similar committees were often formed to warn 'Carpetbaggers,' 'Scalawags,' and obnoxious negro politicians. (See Ku-Klux Klan.) The most notable instance of the employment of the Vigilance Committee as a governmental improvization occurred in California during the years 1848 and 1849. Thousands of adventurous characters had immigrated to this region on account of the discovery of gold, and, as no legal government had yet been organized, the law-abiding citizens supplied the deficiency by the organization of vigilance committees, which undertook the task of administering justice and punishing criminals.

VIGILANTIUS, vĭj′ĭ-lăn′shĭ-ŭs. A Gallic writer and presbyter of the last years of the fourth century. Born in Calgurris (modern Cazères), in Western Gaul, he became an innkeeper, but about 395 he made the acquaintance of Sulpicius Severus, who recommended him to Paulinus of Nola. After Vigilantius's ordination, probably in 395, he went to visit Saint Jerome in Bethlehem, but immediately quarreled with him, attacking his personal beliefs and especially his study of Origen, and in turn being sharply assailed by Jerome's *Contra Vigilantium*, a pamphlet from which we gather that the Gallic presbyter, who probably returned to Gaul or to a charge in Barcelona, objected to the worship of relics, to invocation of saints, to celibacy of the clergy, and to monasticism. He resembled Jovinian (q.v.), but was little of a theologian and showed a lack of any grasp of fundamental principles. Consult: Lindner, *De Joviniano et Vigilantio* (Leipzig, 1840); and Gilly, *Vigilantius and His Times* (London, 1844).

VIGIL′IUS, Pope (c.537-555). He was a Roman by birth, of an old senatorial family. He appears first as a deacon in 531 and represented the Papacy at Constantinople during the pontificate of Silverius, to procure whose imprisonment and exile he was sent to Rome by Theodora, wife of the Emperor Justinian. Vigilius was elected to succeed him by the Roman clergy under the orders of Belisarius, but was not acknowledged as lawful Pope until after the death of Silverius. In 545 he was summoned by Justinian to Constantinople, that he might there condemn the 'Three Chapters.' (See CHAPTERS, THE THREE.) At first, considering the document orthodox, he refused to condemn it; but subsequently, under pressure, yielded to the Emperor's wishes, and then was allowed to return to Rome. On the way, however, he fell ill and died at Syracuse.

VIGNALI, vē′nyä′lē, JACOPO (1592-1664). An Italian painter, born at Prato. He was a pupil of Matteo Roselli of Florence, and belonged to the Florentine Mannerists. A large number of his works, both oil and fresco, survive, principally in Florentine churches. He appears to greatest advantage in the frescoes of the Capella Buonarotti, Florence.

VIGNAUD, vē′nyō′, HENRY (1830—). An American diplomat and writer, born of French stock in New Orleans. After teaching in that city (1852-56) he edited *L'Union de Lafourche* at Thibodeaux, La. (1857-60). He later assisted in founding *La Renaissance Louisianaise* at New Orleans, but left it to become a captain in the Sixth Louisiana Infantry at the outbreak of the Civil War. His diplomatic career began in 1863, when he was sent to Paris as assistant secretary to the Confederate agency in that city. He was translator to the Alabama Claims Commission, which met at Geneva in 1872, and entered the diplomatic service of the United States in 1875 as second secretary of the American legation at Paris. In 1885 he was appointed first secretary. He retained that position after the elevation of the legation to an embassy, and was several times called upon to act as chargé d'affaires. In 1861 he published *L'Anthropologie.* His other publications include: *Toscanelli and Columbus—The Letter and Chart of Toscanelli on the Route to the Indies by Way of the West* (1902); *Toscanelli and Columbus—Letters to Sir Clements R. Markham and C. Raymond Beazley* (1903); and *Critical and Bibliographical Notices of All Voyages which Preceded and Prepared the Discovery of the Route to India by Diaz and to America by Columbus.*

VIGNOLA, vē′nyô-lä, GIACOMO BAROZZIO DA (1507-73). An Italian architect. He was born at Vignola, near Modena, October 1, 1507; studied painting at Bologna and architecture at Rome, and was charged by Primaticcio with some commissions for Francis I. which led to a visit to France. He returned to Bologna, and was chosen as the architect of the Portico dei Banchi, several palaces, and public buildings. In 1550 he was made Papal architect by Pope Julius III., and the latter part of his life was spent in Rome, where he designed the casino of the villa of Papa Giulio and the church of the Jesuits. His masterpiece is probably the famous Caprarola palace and villa near Viterbo. He became the architect of Saint Peter's after the death of Michelangelo, and designed the two lateral cupolas. He was the author of *Regole delle cinque ordini d'architectura* (Rome, 1563) and *Regole della perspettiva prattica* (ib., 1583), which are still considered standard works.

VIGNOLES, vē-nyōl′, CHARLES BLACKER (1793-1875). An English engineer, born at Woodbrook, Wexford. He served under Wellington in the Peninsula and retired from the army in 1833. The Vignoles, or flat-footed, rail was introduced by him into Europe from the United States. He built the Dublin and Kingstown (1832-34), the Sheffield and Manchester (1835-40), and the London, Chatham and Dover (1855-64) railways, and carried out important works in Russia, including the great suspension bridge across the Dneiper at Kiev. He was professor in University College, London (1841-43), and published *Observations on the Floridas* (1823, with valuable map).

VIGNY, vē′nyē′, ALFRED, Count de (1799-1863). A French poet and novelist, born at Loches, Indre-et-Loire. He was educated in Paris and served in the army twelve years. His *Poèmes* (1822) and *Poèmes antiques et modernes* (1824-26) contained grandiose poetic evocations of the Middle Ages and were among the first attempts (*Le cor* and *Moïse*) to treat philosophic subjects in epic form. The epic *Eloa* (1824) served Lamartine as a model for his *Chûte d'un ange* and marks the influence of Hugo, whom it influenced in turn, as *Le cor*, inspired by the bloodless Spanish campaign of 1823, did Musset's *Contes d'Espagne et d'Italie.* In 1826 Vigny published a long historic novel, *Cinq-Mars.* Though a falsification of history, the novel attained immediate and great success; it has the merit of having been first in a field where Hugo and Dumas were to gather brighter laurels. In 1832 Vigny applied his unique 'historic method' in *Stello* to André Chénier and the English poets Gilbert and Chatterton. *Servitude et grandeur militaires* (1835), three military stories, contains his best work in fiction. Meanwhile he had borne his part in the romantic rejuvenation of the drama by translating Shakespeare's *Othello* (1829), and writing an insignificant comedy, *Quitte pour la peur*, an historic drama, *La maréchale d'Ancre* (1830), and *Chatterton* (1835), his strongest drama, in spite of its pessimistic gloom. But Vigny saw the limitations of romanticism in drama and never pursued his success. Indeed, he published no more, though the posthumously gathered *Destinées* (1864) and the *Journal d'un poète* (1867) show him at the height of his lyric power.

Vigny's *Works* were collected in 1863-66, in 1868-70, and in 1883-85. There are *Lives* by A. France (Paris, 1868), Dorison (1892), and Paléologue (1891). Consult: Faguet, *XIX. Siècle* (Paris, 1890); Caro, *Poètes et romanciers* (ib., 1888); Montegut, *Nos morts contemporains*, vol. i. (ib., 1882); Sainte-Beuve, *Portraits contemporains*, vol. ii., *Portraits littéraires*, vol. iii. (ib., 1893); and *Nouveaux lundis*, vol. vi. (ib., 1870).

VIGO, vē′gō. A town of the Province of Pontevedra, Spain, 72 miles north of Oporto, on the bay of the same name (Map: Spain, A 1). It has a good harbor and has had a comparatively rapid growth. The tunny and sardine fisheries give employment to a large element of its population. There are iron foundries, machine shops, paper, flour, and saw mills, petroleum and sugar refineries, chocolate, soap, leather and *pasta* factories, and cognac and alcohol distilleries. The building of small steamers and the manufacture of cordage are also important industries. The chief exports are wines, cattle, sardines, dried fish, *pastas*, and agricultural products. Vigo has a large trade with Spanish America. Population, in 1900, 23,144. The town of Vigo was attacked by Drake in 1585 and 1589; by a combined Anglo-Dutch fleet in 1702; and by Lord Cobham in 1719.

VIHĀRA, vē-hä'rȧ (Skt., recreation, pleasure, walking for diversion). A designation for a pleasure garden in early India, more especially of the temple precincts and monastic grounds of the Buddhist and Jain religions. Originally the word designated the hall or halls where Buddha and the priests by whom he was accompanied used to meet. Adjoining the sanctum there is usually a narrow room, in which are images and paintings; and opposite the entrance there is another door, protected by a screen; and when this is withdrawn, an image of Buddha is seen, which occupies nearly the whole of the apartment, with a table or altar before it, upon which flowers are placed. The walls are covered with paintings, generally illustrating some legend of Buddha's life. In front of the temple stands a sacred bo-tree, regarded as the descendant of the original Bo-tree (q.v.). The best examples of the old Vihara are still to be seen in Ceylon. The finest specimens on the continent of India itself are those at Ajunta, Ellora, Salsette, and Junir. Consult: Hardy, *Eastern Monachism* (London, 1860); Fergusson, *History of Indian and Eastern Architecture* (ib., 1876).

VIJANAGARA, vē'jȧ-nȧ-gä'rȧ, or **BIJAYANAGAR** (Skt., city of victory). A city of Southeastern India, famous for its architectural remains. It was the capital of a dynasty of Hindu rulers that flourished between the fourteenth and sixteenth centuries. The most noted of its architectural remains is the temple built in the style of Southern India c.1529-42 and dedicated to Vitoba, a manifestation of the god Vishnu. The structure is in ruins, but its sculptures, wholly in granite, are carved with great boldness and expression. The finest architectural remains of the Vijanagara dynasty, however, are a hundred miles to the south, at Tarputry, where two temples are situated. Near by are two gopuras (ornamental gateways) belonging to a deserted temple, more exquisitely carved than any others in the Dravidian style. Vijanagara is also interesting because of its importance in connection with Sanskrit literature. Here, in the fourteenth century, Sayana (q.v.), the great Vedic commentator, flourished at the court of King Bukka, whose prime minister Madhava (q.v.) was the learned scholar's brother. See Indian Art.

VIKING, or **WIKING**. See Normans.

VIKRAMA, vĭk'rȧ-mȧ, or Vikramāditya. The name of a famous king or kings of India, after whom the Vikrama, or Samvat (q.v.) era is called. His reign formed the golden age of Sanskrit literature. Unfortunately, much uncertainty prevails with regard to his precise date. Tradition ascribes it to B.C. 57, but later scholarship sought to prove that the Samvat era was established by Vikrama in A.D. 544 and its commencement dated back 600 years to B.C. 57. Additional support for this, besides other grounds, was sought in the accepted date of the Hindu astronomer Varahamihira (q.v.), who is named as one of the 'Nine Gems' of Vikrama's court, together with Kalidasa (q.v.), Amarasinha (q.v.), and others. Recent researches have tended to throw doubt on this theory, and to place the time of Vikrama a century and a half earlier. It has been shown that the Vikrama era was previously called the Malava era, and the coins and inscriptions of Chandragupta II., named Vikramaditya, belong to a period of about A.D. 400. The present tendency, therefore, is to date the reign of Vikrama in the beginning of the fifth instead of in the middle of the sixth century. Consult: Macdonell, *Sanskrit Literature* (New York, 1900); Duff, *Chronology of Ancient India* (Westminster, 1899).

VIKRAMŌRVAŚI, vĭk'rȧ-mōr'vȧ-shē' (from Skt. *vikrama*, heroism + *Urvaśi*, name of a celestial nymph). The title of a Sanskrit drama by Kalidasa (q.v.) in which the nymph Urvasi is rescued and won by the hero, Pururavas (q.v.).

VILÁGOS, vē'lyä'gōsh. A commune of Hungary, in the County of Arad, about 16 miles northeast of the city of Arad, with a population in 1900 of 6694. It is noted as the scene of the surrender of the Hungarian army under Görgey to the Russians, August 13, 1849, marking the collapse of the national Hungarian movement. See Austria-Hungary.

VILAN, vē-län', or Buluan. A Malay people in Southern Mindanao. See Philippine Islands.

VI'LAS, William Freeman (1840—). An American lawyer, soldier, and political leader, born at Chelsea, Vt. In 1851 he removed with his family to Madison, Wis., and in 1858 he graduated at the State University there. He graduated at the Albany Law School in 1860 and for a time practiced his profession, but in 1862 entered the Federal military service, in which he rose to the rank of lieutenant-colonel. He commanded his regiment during the siege of Vicksburg, but in August, 1863, he resigned his commission and returned to Madison. From 1868 to 1885 he was a professor in the law school of the University of Wisconsin. He became interested also in politics and from 1876 to 1886 was a member of the Democratic National Committee. He was a member of the Wisconsin Legislature in 1885, was permanent chairman of the National Democratic Convention in 1884, was United States Postmaster-General from 1885 to 1888, was Secretary of the Interior from January, 1888, to March, 1889, and was United States Senator from 1891 to 1897. When W. J. Bryan was nominated for the Presidency, on a free-silver platform, by the Democratic Party in 1896, Vilas was one of those who helped to organize the National (gold) Democrats. In collaboration with E. E. Bryant, he edited volumes i., ii., iv., vi., and xx. of the *Wisconsin Supreme Court Reports*.

VILAYET (Ar. *vilāyat*, province, government, from *valiya*, to rule, govern), or Eylayet. The largest and most important of the administrative divisions of the Turkish Empire. The vilayets are again divided into *livas* or *sanjaks*, the livas into *kazas* or districts, and the kazas into *nahies* or communes. Each vilayet is administered by a pasha, who is Governor, and the general name for whom is *vali* or viceroy. He is assisted by a provincial council.

VILKOMIR, vēl-y'-kō-mēr' (Polish *Wilkomierz*). A district town in the Government of

Kovno, Western Russia, 43 miles northeast of Kovno (Map: Russia, B 3). Its fourteenth-century church is one of the first Roman Catholic churches founded in Lithuania. The chief manufactures are leather, brick, and pottery. Population, in 1897, 13,509, of whom the Jews constitute over one-half. The town was founded in the tenth century.

VILLA (Lat., country-house, farm). Properly a somewhat extensive country estate, occupied for purposes of rest and pleasure for a part of the year. The term is used to indicate the house and grounds together. It is not used of farms, nor of rural or suburban estates occupied the whole year round. Its meaning is fitly rendered by the French equivalent *maison de plaisance.* The villa originated with the ancient Romans, and received its highest development in Italy in the sixteenth and seventeenth centuries. The villas of the Romans were extensive estates; the buildings for residence covered a large area and provided apartments for eating, sleeping, recreation, study, exercise, and bathing; the whole were set in and combined with grounds laid out with the highest art. Pliny had five villas; Cicero at least as many; and that of Hadrian at Tivoli covered nearly a square mile of territory. The Italian villas of the Renaissance were due in large measure to the splendor of the Papal Court. They were intended as places for brief sojourn and recreation rather than for a season's residence like those of antiquity. They are therefore generally smaller, and the buildings far less important than those of the ancients. The grounds reproduce in little, and with consummate skill, all the most characteristic features of the antique gardens. Some, like that at Castel Gandolfo, are built on the ruins of ancient villa-terraces. The villas Pamfili, Borghese, Albani, Medici, Madama, and Papa Giulio, at Rome, those at Frascati, the Villa d'Este at Tivoli, and the Villa Lante at Bagnaia, near Viterbo, are among the best known. They represent a type of formal landscape gardening and architecture which has nowhere else been brought to the same perfection. The villas of more modern date in Europe and America borrow from the Italian villas many suggestions as to landscape architecture and detail, but, being intended for a season's residence, the dwelling presents more of the character of permanence, and of a regular habitation, than the *casino* of the Italian villas, and is accompanied by dependencies such as stables, gardeners' lodges, tennis courts, and kitchen gardens, which are foreign to the purposes of the Italian villa. See CASINO. Consult: Percier and Fontaine, *Maisons de plaisance de Rome;* Letarouilly, *Edifices de Rome moderne* (Paris, 1860); Reynolds, "Italian Villas," in *Architectural Record* (1896?); Pliny, *Letters.*

VILLA ALBANI, äl-bä'nē. See ALBANI, VILLA.

VILLA ALDOBRANDINI, äl'dō-brän-dē'nē. A handsome villa with extensive grounds, at Frascati, 15 miles from Rome. It was built by Giacomo della Porta, for Cardinal Pietro Aldobrandini, whose uncle was Clement VIII., and was completed toward the end of the sixteenth century. It contains a fine collection of the works of Cavaliere d'Arpino. The grounds are beautified with picturesque artificial waterfalls and ancient oak forests.

VILLA BORGHESE, bôr-gā'zā. See BORGHESE, VILLA.

VILLACH, fēl'läk. A town in Carinthia, Austria, 22 miles west of Klagenfurt, situated, at an altitude of 1665 feet, on the right bank of the Drave and on a line of the Austrian State Railway (Map: Austria, C 3). The manufactures include colors and other chemical products, cement, wood products, and articles of lead and other metals. There are a Gothic church (fifteenth century), gymnasium, and theatre. Just to the southwest are the Villacher Alps (Dobratsch, 7110 feet). In the neighborhood, at Annentreim, there are much frequented warm sulphur springs and a bath establishment. Population, in 1900, 9360. From 1007 to 1759 Villach was under the rule of the bishops of Bamberg. It was the commercial centre of Carinthia and had especial prominence in the trade between Germany and Venice. Here in 1492 the Germans under Khevenhüller defeated the Turks under Ali Pasha. In 1759 Villach went by purchase to Austria. A conflict took place here in 1813 between Frimont and the Viceroy of Italy.

VILLAFRANCA DI VERONA, vĭl'lȧ-fräṉ'kȧ dē vā-rō'nȧ. A town in the Province of Verona, Italy, on the Tione, 14 miles by rail north of Mantua (Map: Italy, E 2). The preliminary treaty of peace between France and Austria, which ended the war of 1859, was signed here July 11, 1859. Population (commune), in 1901, 9461.

VILLAGE COMMUNITY (OF., Fr. *village,* from Lat. *villaticus,* relating to a country house or farm, from *villa,* country house, farm; connected with Gk. *οἶκος, oikos,* Skt. *viś,* house, people, Goth. *weihs,* OHG. *wih,* AS. *wic,* Eng. *wick,* village, town). The name given to the organized agricultural community of primitive times. About the middle of the nineteenth century historians held that the political unit among the early Germans, if we except the family, was a form of village community known as the mark (q.v.). It was also believed that the organization of early Anglo-Saxon society was similar to that existing in Germany. These views were promulgated by men like Waitz, Von Maurer, Nasse, and Kemble; and Maine sought analogies in the village communities of modern India to support this theory. All these views were attacked by Fustel de Coulanges and Seebohm, who held that the village communities of Germany and England were not free communistic organizations, as the mark theory would have them, but that the villages were inhabited by serfs. In recent years many writers, especially Maitland and Vinogradoff, have put forth a modified form of the old view. A primitive form of village community, which is known as the mir (q.v.), still exists in Russia. For a complete bibliography, see SERF.

VILLAGRAN, vēl'yȧ-grän' (or VILLAGRA), FRANCISCO DE (1507-63). A Spanish colonial administrator, born at Astorga, Leon. He served conspicuously with Valdivia in Peru during the conquest of Chile (1540-45), and succeeded him as Governor when Valdivia was killed in the Araucanian revolt (1553-54). In 1557 he was superseded by the new Governor, Mendoza, but replaced him in turn in 1561. Although a second Araucanian uprising took place before Villagra's death in 1563, he succeeded in carrying the Spanish flag beyond the Andes.

VILLALOBOS, vêl'yȧ-lō'Bôs, Francisco Lopez de (c.1473-c.1545). A Spanish physician and author, born in Toledo, of a Jewish family. He studied medicine, became a convert to Christianity, and became physician to Charles V. His works include a translation of Plautus's *Amphitruo*, the didactic books *Problemas* (1515) and *Tratado de los tres grandes vicios*, the poems *Canción* and *El sumario de medecina* (1538).

VILLA LUDOVISI, vē'la lo͞o'dô-vē'zê. See Ludovisi, Villa.

VILLA MEDICI, mä'dê-chê. A villa near the southern gate of the Pincio, Rome. It was built in 1540 by Annibale Lippi, and Cardinal Alessandro de' Medici became its owner about 1600; it then came into the possession of the grand dukes of Tuscany; and in 1801 became the headquarters of the French Academy of Art. The walls of the garden façade are adorned with antique reliefs, and a wing contains a notable collection of casts. From the grounds may be had an impressive view of Saint Peter's. Galileo was imprisoned here between 1630 and 1633 by order of the Inquisition.

VILLA NAZIONALE, nä'tsê-ô-nä'lȧ (It., national villa). An extensive park, formerly the Villa Reale, bordering the Chiaja in Naples and forming the most fashionable promenade of the city. It was laid out in 1780 in the Italian style, and has since been considerably enlarged. Besides statues, cafés, and two small temples, dedicated to Vergil and Thalberg, it contains the celebrated Naples Aquarium and Marine Biological Station.

VIL'LANEL'LA (It., rustic). A rustic Italian part-song, without accompaniment. It was originally a country dance, accompanied by singing, but the singing gradually became so important that it displaced the dance and became a separate art form. As a part-song, the villanella shared the characteristics of the canzonetta and the ballata. At its best, however, it was of loose construction, although the villanelle of the Neopolitan school of the seventeenth century are among the most charming of its lighter compositions. In particular, the composers Kapsperger, Nenna, and Stefano Felis wrote admirable villanelle. The villanella and the villotte, a rustic composition in counterpoint, were the precursors of the madrigal (q.v.), to which they bear the same relation as the folk-song does to the art-song (kunstlied).

VILLANI, vĭl-lä'nê, Giovanni (c.1275-1348). An Italian historian, born in Florence. He held many offices in Florence and wrote a history of Florence, in the vernacular, consisting of 12 books, extending to 1348. His work included the history of other countries, and is sometimes called *Chronicon Universale*. For the history of Villani's own time in Italy it is of great value. A continuation to 1363 in 11 books was written by his brother, Matteo. The eleventh book was continued by Matteo's son, Filippo, to 1364. Giovanni's work is noteworthy for its excellent style. Consult: Balzani, *Early Chronicles of Europe: Italy* (London, 1883); Potthast, *Bibliotheca Historica Medii Ævi*, vol. ii. (Berlin, 1896).

VIL'LANOVA'NUS, Arnoldus (c.1235-c.1312). A Spanish-Italian alchemist, whose real name was Arnoldo Bachuone. He was born at Villanova, Catalonia, and was educated at Barcelona. Afterwards he lived successively in Spain, France, and Italy, and was subjected to ceaseless persecution by the clergy because of his astrological pretensions. In his numerous writings, as the *Tractatus Chemicus*, for example, he calls attention for the first time to the potency of the 'philosopher's stone' and the portion known as '*Aurum Potabile.*' His chief work is the *Rosarius Philosophorum*.

VILLANUEVA, vêl'yȧ-nwä'vȧ, Joaquin Lorenzo (1757-1837). A Spanish author and patriot, born at Jativa, near Valencia. He went into the Church and rose to be Court preacher and royal confessor. He was elected to the Cortes in 1810, and was imprisoned for six years after the restoration of 1814. In 1820 he reëntered the Cortes, was sent in 1822 by the Constitutional Party on a mission to the Pope, and upon the second return of Ferdinand VII. in 1823 fled to Ireland, where he died. His works include: *El año cristiano de España* (19 vols., 1791-1803); *La angélicas fuentes ó el tomista en las Cortes* (1811-13); his autobiography (London, 1825); and *Ibernia Phœniciæ seu Phœnicum in Ibernia Incolatus* (Dublin, 1831; trans. as *Phœnician Ireland*, 1832).

VILLA NUEVA DE LA SERENA, dȧ lȧ sȧ-rȧ'nȧ. A town of the Province of Badajoz, Spain, 150 miles southwest of Madrid, near the southern bank of the Guadiana River (Map: Spain, C 3). The town is clean and well built, with well-paved streets. The surrounding country is a fertile plain with extensive productions of cereals, fruit, wine, hemp, and live stock. Population, in 1900, 13,500.

VILLARD', Henry (1835-1900). An American journalist and financier, born in Speyer, Rhenish Bavaria. His name was originally Hilgard, but he changed it to Villard when he came to the United States in 1853. During the Civil War he won considerable distinction as a war correspondent with the Federal armies, and during the brief Austro-Prussian War of 1866 was correspondent for the New York *Tribune*. After the financial panic of 1873 he was made the representative of several committees of German bondholders in connection with the Pacific Coast railroads. He at once went to the Pacific Northwest, where he eventually bought the interests of various European investors and organized the Oregon Railway and Navigation Company. He formed a syndicate which obtained control of the Northern Pacific Railroad, of which he became president in 1881. Under his direction the main line to the Pacific was completed, but at such an immense expense that the company became financially embarrassed, and Villard was compelled to sacrifice his large private fortune and to retire from the presidency. A few years later, by means of German capital, he again obtained control of the Northern Pacific system, and from 1889 to 1893 was chairman of its board of directors. In 1881 he bought a controlling interest in the New York *Evening Post*. He was also interested in promoting Thomas A. Edison's inventions, and in

1890 effected a combination of electrical interests and organized the Edison General Electric Company, of which he became president.

VILLAREAL, vēl′yȧ-rȧ-äl′. A town in the Province of Castellón, Spain, 33 miles north of Valencia, near the coast, at a short distance from the mouth of the Mijares River (Map: Spain, E 2). Near the town is the famous Canal de Castellón, a magnificent piece of Moorish irrigation engineering, still in good condition after seven centuries of continuous use. The town has distilleries and woolen and paper manufactories. Its decadence dates from the expulsion of the Moriscoes. Population, in 1900, 16,493.

VILLA REALE, vē′lȧ rȧ-ä′lȧ. See VILLA NAZIONALE.

VILLARI, vĭl-lä′rē, PASQUALE (1827—). An Italian historian, born in Naples, October 3, 1827. While studying law at the University of Naples, he became involved in the revolutionary movement of 1848-49, and was forced to leave the country. He resided at Florence for some years, and there published his *Storia di Girolamo Savonarola e de' suoi tempi* (1859-61; corrected ed., 1887-88), which has been translated into English, French, and German. He was made, successively, professor of modern history at Pisa and at Florence. Several years later he became General Secretary of Public Instruction. In 1867 he was chosen a Deputy and in 1884 he became a Senator. In 1891-92 he was Minister of Public Instruction, etc. His works include, in addition to the *Life of Savonarola*, *Niccolò Machiavelli e i suoi tempi* (1877-82; later ed., 1895; trans. by Linda Villari, 1892); *Antiche leggende e tradizioni che illustrano la Divina Commedia* (1865); *Saggi critici, etc.* (1868); *L'insegnamento della storia* (1869); *La scuola e la questione sociale in Italia* (1872); *Le lettere meridionali, etc.* (1878); *I primi due secoli della storia di Firenze* (1893-94; trans. by Linda Villari, as *The Two First Centuries of Florentine History*, 1894). In 1901 he produced *Le invasioni barbariche in Italia* (trans. by Linda Villari, 1902), and in 1902 appeared his *Scritti sulla questione sociale in Italia.*

VILLA RICA, vē′lȧ rē′kȧ. A town of Brazil, known also as Ouro Preto (q.v.).

VILLA RICA, vēl′yȧ rē′kȧ. A town of the seventh district of Paraguay, 70 miles southeast of Asunción, with which it has railway connection (Map: Paraguay, F 9). The largest interior town of the Republic, it has a thriving tobacco trade, and is the centre for the collection of *maté*. Population, about 12,000.

VILLARS, vē′lär′, CLAUDE LOUIS HECTOR, Duke de (1653-1734). A French marshal. He was born in Moulins, Department of Allier, May 8, 1653; became a Court page, and entered the army in Holland as a volunteer in 1672. He served in many important campaigns under Turenne, Condé, and Luxembourg, and in 1686, and again from 1698 to 1701, represented France at the Court of Vienna. In 1702 he was given an independent command and sent to aid the Elector of Bavaria, who had taken up arms on the side of France. He defeated the Imperialists at Friedlingen and in the following year gained the victory of Hochstädt (September 20, 1703). In 1704 he suppressed the insurrection of the Camisards (q.v.). He opposed Marlborough for a time, and, entering Germany, outgeneraled the Imperialists under the Margrave of Baden. In 1708 with a comparatively small force he foiled the attempts of Prince Eugene to penetrate into France from Italy. In the following year he commanded in Flanders and was defeated by Marlborough and Prince Eugene at Malplaquet (q.v.). He was severely wounded at the beginning of the battle, and the reopening of his wound in the autumn of 1710 forced him again to resign the command. But in 1711 he returned to his post, defeated the English and Dutch at Denain, July 24, 1712, and gained a success over Prince Eugene near Landrecy. These victories hastened the conclusion of the Peace of Rastadt, which Villars signed as plenipotentiary, in March, 1714. He was after this the chief adviser of the Court on military and foreign affairs. In 1733 as marshal-general he took command of the French forces in Italy, but, on account of inharmonious relations with the King of Sardinia, the ally of France, he resigned. He died at Turin, June 17, 1734. Villars was the last of the great military leaders of the French monarchy. He was humane, sincere, and as a leader prompt, bold, and skillful. His *Mémoires* were edited by Vogüé and published by the Société de l'Histoire de France (Paris, 1884-91). Consult: Anquetil, *Vie du Maréchal de Villars* (Paris, 1784); Vogüé, *Villars d'après sa correspondance* (Paris, 1888).

VILLARSIA (Neo-Lat., named in honor of Domenique *Villars*, a French botanist of the eighteenth century), or FLOATING HEART. A genus of plants of the natural order Limnanthaceæ. *Villarsia or Limnanthemum peltatum* is a native of Europe, from Denmark to the Mediterranean, and is very abundant in Holland, often covering large tracts of the canals with its beautiful yellow flowers and leaves. It abounds in the south of Siberia. It is easily cultivated. This species has become established in ponds in the District of Columbia. There are two indigenous species in the United States, *Limnanthemum lacunosum* and *Limnanthemum trachyspermum* or *aquatica*.

VILLASIS, vēl-yä′sēs. A town of Luzon, Philippines, in the Province of Pangasinan, situated on the right bank of the Agno River, 24 miles southeast of Lingayén. It is an important junction of highways. Population, in 1900, 11,968.

VILLEFRANCHE-SUR-SAÔNE, vēl′fräNsh′ sụr sōn. The capital of an arrondissement in the Department of Rhône, France, on the left bank of the Saône, 19 miles by rail north-northwest of Lyons (Map: France, L 6). The Church of Notre Dame des Marais (fourteenth to sixteenth century) and the Renaissance Hôtel de Ville are worthy of notice. The value of the cotton-fabric manufactures exceeds $5,000,000 annually. There is a large trade in the famous Beaujolais wine. Population, in 1901, 14,793.

VILLEGAIGNON, vēl′gȧ′nyōN′, or **VILLEGAGNON,** NICOLAS DURAND (1510-71). A French naval officer, born in Provence. He became a member of the Order of Saint John, fought in the disastrous expedition of Charles V. to Algiers in 1541, transported to Scotland the French force destined to assist the Regency, and carried Mary Stuart from Dumbarton to France. He then fought against the Turks, and was afterwards made vice-admiral of Brittany. With the approbation of Admiral Coligny he next attempted to found in South America a colony where French Protestants could find refuge. In 1555 he sailed from France with two ships, and established a colony at Rio de Janeiro. Other colonists arrived, but religious disputes broke out, and after the return of Villegaignon to France in 1559 the weakened colony was conquered by the Portuguese. For having sided with the Catholics in the disputes, Villegaignon was given the name of the 'Cain of America.' Among his numerous published works are *Caroli V. Imperatoris Expeditio in Africam ad Arginam* (1542; republished in 1874) and the controversial work, *Ad Articulos Calvinianæ de Sacramento Eucharistæ Traditionis Responsiones* (1560).

VILLEGAS, vêl-yā'gȧs, Esteban Manuel de (1596-1669). A Spanish poet, born at Nijera, and educated at Madrid and at Salamanca. In 1617 he published his *Eróticas ó amatorias*, in which, in his youthful presumption, he attacked Cervantes. He published in 1665 an excellent translation of Boëthius's *De Consolatione Philosophiæ*. He died at Madrid. Villegas is known not only for the amazing imitations of Anacreon and Catullus contained in his early volume of poems, but also for the good prose and excellent verse of his Boëthius. Consult Ticknor, *History of Spanish Literature* (New York, 1849). His poems are accessible in Rivadeneyra's *Biblioteca de autores españoles*, vol. xlii.

VILLEGAS, José (1848—). A Spanish genre painter, born in Seville. He studied there and at Madrid, and in 1869 at Rome under Fortuny, whose style he copied. His paintings include: "Columbus at La Rabida," "Palm Sunday in Venice," "A Baptism in Seville" (W. H. Vanderbilt Collection, New York City); "The Armorer's Shop" (Metropolitan Museum, ib.); "A Turkish Shoe Shop" (J. P. Morgan Collection, ib.); and "A Cairo Slipper Market" (1872; W. T. Walters Collection, Baltimore, Md.). Villegas took the grand gold medal at the Berlin Exhibition of 1875, and in 1895 was elected to the Academy of that city.

VILLEHARDOUIN, vēl'ȧr'dōō'ăɴ', Geoffroi de (c.1160-c.1213). A French historian. He was born near Bar-sur-Aube, in Champagne. In 1191 he became marshal of Count Thibaut Villehardouin of Champagne, and in 1204 was sent by him to Venice to solicit its aid in fitting out a crusade. He was successful in his mission, and was a leader in subsequent abortive crusades, which ended at Constantinople. His chronicle of the Fourth Crusade, written in the vernacular during his campaigns, covers the events of the years 1198-1207. It is valuable in its statements of fact, and as a piece of literature is one of the few great historical works in Old French. Under the title *Histoire de la conquête de Constantinople* it has been often published, as by Blaise de Vigenère (1585), by Du Cange (1657), by Brial (1822), by Paulin Paris (1838), by Buchon (1840), and by W. de Wailly (1874, 3d ed. 1882).

VILLEIN (OF. *villein*, *villain*, *vilain*, Fr. *vilain*, from ML. *villanus*, farm servant, serf, from Lat. *villa*, country house, farm). Another name for a serf (q.v.). Sometimes, however, historians call all the peasants of the Middle Ages, whether free or unfree, villeins. At times 'villeins' means the free peasants as distinguished from the unfree.

VILLÈLE, vē'lâl', Joseph, Count de (1773-1854). A French statesman. He was born at Toulouse, August 14, 1773. In 1791 he entered the navy, went to the West Indies, remained there until 1803, and accumulated a fortune. Returning to Toulouse, he lived quietly until the Restoration. In 1814 he wrote a pamphlet, *Observations sur le projet de Constitution*, in which he opposed the *Charte* issued by Louis XVIII. He became Mayor of Toulouse, and was elected to the Chamber of Deputies in 1815, and soon became the most influential among the leaders of the Royalist Party. He entered the Richelieu Ministry in 1820, and a year later became Minister of Finance. In 1822 he was given the title of Count and made President of the Council and Minister of Foreign Affairs. During his administration an expedition was sent into Spain to restore Ferdinand VII. (1823) in accordance with the policy of the Holy Alliance. Villèle's ultramontane and extreme royalist policy was very satisfactory to Charles X., but it tended to bring on the revolution which finally overthrew the Bourbons. His reactionary measures, such as the restrictions imposed on the press, and his partiality for the Jesuits led to his retirement from the Ministry in January, 1828. He died in Toulouse March 13, 1854. Consult: *Mémoires et correspondance du Comte de Villèle* (Paris, 1888-90); Neuville, *Notice historique sur M. le Comte de Villèle* (ib., 1855).

VILLEMAIN, vēl'măɴ', Abel François (1790-1870), born in Paris. A French historian and critic. He was professor of rhetoric at the Lycée Charlemagne (1810), the Paris Ecole Normale, and the Sorbonne (1816-26). He won three academic prizes (1812-16), published a *Histoire de Cromwell* (1819), was elected to the Academy (1821), and in 1829 became a Deputy. Under Louis Philippe he was made a peer (1832). From 1840 to 1844 he was Minister of Public Instruction. After the Revolution of 1848 he gave himself entirely to literature. His chief works, revised in later editions, are: *Discours et mélanges* (1823); *Cours de littérature française* (1828-30; 2d ed. 1864); *Etudes de littérature ancienne et étrangère* (1846); *Souvenirs contemporains de l'histoire et de la littérature* (1856); and a *Histoire de Grégoire VII.*, published posthumously. Villemain, though a writer of wide culture, is often shallow, but he is always interesting and sometimes eloquent.

VILLEMESSANT, vēl'me-säɴ', Jean Hippolyte Cartier (1812-79). A French journalist, born at Rouen. He went to Paris in 1840 and revived, in 1854, *Le Figaro* (q.v.) as a weekly, semi-weekly, and, after 1866, a daily newspaper. His methods were original and successful. Consult his *Mémoires d'un journaliste* (Paris, 1867).

VILLENA, vēl-yā'nȧ. A town of the Province of Alicante, Spain, on the right bank of the Vinalopo, 63 miles south of Valencia (Map: Spain, E 3). The town, above which towers an imposing fortress, is irregularly built, with winding streets and buildings of mediæval architecture. East of the town is a great salt lagoon. Silks, brandies, linen, flour, and soap are the chief industrial products. Population, in 1900, 14,028.

VILLENA, Don ENRIQUE DE ARAGON (1384-1434). A Spanish author and scholar. He was connected by blood with the royal houses of Castile and Aragon. By Henry III. of Castile he was made grand master of the Order of Calatrava in 1404, but the appointment was annulled by the Pope three years afterwards. Villena was an enthusiastic student of the sciences, and because of his knowledge was suspected of sorcery. Among his works were *Arte de Trovar, Libro de la ciencia alegre,* and *Doce trobajas de Hércules* (original in Catalan). He also translated Vergil's *Æneid* and other Latin classics, and Dante's *Divine Comedy.*

VILLENEUVE, vēl′nĕv′, PIERRE CHARLES JEAN BAPTISTE SYLVESTRE DE (1763-1806). A vice-admiral of France, born at Valensoles, in Provence. He entered the navy in his fifteenth year. He became a rear-admiral in 1796 and commanded the rear division at the battle of the Nile in 1798. In 1804 he was made vice-admiral, and in the following year was appointed to the command of the Toulon squadron. At the Azores he encountered a British squadron, under Sir Robert Calder, and an indecisive battle ensued (July 22, 1805). The failure of Villeneuve's movement broke up Napoleon's plan for invading England, and the Admiral, blamed unjustly and about to be superseded, sailed out and engaged Nelson in the great sea fight of Trafalgar. (See TRAFALGAR; NELSON.) Villeneuve's own vessel, the *Bucentaure,* was completely dismasted; he was forced to strike his flag, was made prisoner, and was conveyed to England, whence he returned to France in April, 1806. Learning while at Rennes that he would be ill-received by the Emperor, he committed suicide.

VILLENEUVE-SUR-LOT, sụr-lō′. The capital of an arrondissement, Department of Lot-et-Garonne, France, in a charming valley, 22 miles by rail north-northeast of Agen. The river Lot is spanned by a remarkably bold thirteenth-century bridge with a single arch. There are manufactures of paper, cloth, table-linen, and copper wares. Population, in 1901, 13,594.

VILLEROI, vēl′rwä′, FRANÇOIS DE NEUFVILLE, Duke de (1644-1730). A marshal of France. He was born at Lyons, was educated with young Louis XIV., and always had the favor of that monarch. He was in 1693 given command of the French army in the Low Countries, where he vainly attempted to relieve Namur. In the War of the Spanish Succession he was put in command of the Army of Italy in 1701, but was repulsed by Prince Eugene at Chiari, and in the following year was surprised at Cremona and was taken prisoner. In 1706 he was given command of the army opposing Marlborough; but he was utterly defeated at the battle of Ramillies.

VILLERS, vē′lâr′, CHARLES DE (1765-1815). A French soldier and author, born in Boulay (Lorraine). In 1782 he entered the army as an artillery officer, but was compelled to emigrate in 1793. After serving a few months in the army of Condé he lived in various cities of Germany until 1797, when he settled in Lübeck. There he devoted himself to the study of German literature and philosophy, with which he subsequently endeavored to familiarize his countrymen. To that end he published *La philosophie de Kant ou principes fondamentaux de la philosophie transcendentale* (1802). This was the first introduction of Frenchmen to the works of the German philosopher. It was followed by an *Essai sur l'esprit et l'influence de la Réformation de Luther* (1804; 5th ed. 1851; German trans. 1805; abridged ed. 1836); and *Coup d'œil sur les universités de L'Allemagne Protestante* (1808). His sympathy for Germany was not, however, confined to her literature. In 1806 he wrote *Lettre à Madame la comtesse Fanny de Beauharnais sur Lubeck,* in which he related the outrages committed by the French when they took that city. As a result, when the Hanseatic towns were incorporated in the French Empire, de Villers was exiled from Lübeck. He then secured a professorship at Göttingen, but was deprived of his post after the restoration of the Hanoverian dynasty by the French.

VILLETTE, vē-lĕt′. The last completed novel of Charlotte Brontë, finished at the close of 1852 and published in the ensuing spring. It is founded on the incidents of the author's life in a *pensionnat* at Brussels. The character of the diffident Paul Emanuel was undoubtedly suggested by her impressions of Thackeray in his capacity of lecturer.

VILLEURBANNE, vēl′ụr′băn′. A French town in the Department of Rhône, three miles east of Lyons, on the Lyons-Saint-Genix Railway. Its manufactures include silks, hats, wax candles, chemical products, church bronzes, and liquers. Population, in 1901, 27,746.

VILLIERS, vĭl′ẽrz, CHARLES PELHAM (1802-98). An English statesman, born in London. He graduated at Saint John's College, Cambridge, in 1824, and studied law at Lincoln's Inn. In 1833-52 he was examiner of witnesses in the Court of Chancery, and in the latter year he was made Judge-Advocate-General. In 1834 he was returned to Parliament from Wolverhampton, and he continued to represent that constituency down to its division in 1885, after which he sat for South Wolverhampton. Throughout his Parliamentary career he was an ardent free-trader. In 1838 he introduced in Parliament the first of his famous annual motions for the repeal of the Corn Laws. This was before the formation of the Anti-Corn-Law Association (afterwards transformed into the Anti-Corn-Law League) and before either Cobden or Bright had become interested in the subject, hence to Villiers belongs the honor of being the pioneer in the movement. He continued to be one of the leaders in the agitation until the repeal was effected in 1846. With the accomplishment of that end his chief work was done. Some of his speeches, edited by a member of the Cobden Club, were published as *Free-Trade Speeches of the Right Hon. Charles Pelham Villiers, M.P.* (1883).

VILLIERS, FREDERIC (1852—). An English war artist and correspondent, born in London. He was educated at Guines, Pas-de-Calais, France, and studied also in the South Kensington School of Art and at the Royal Academy. In 1876 he acted as war artist for *The Graphic* in the campaign in Servia, and in the two following years was with the Russians in the war with Turkey. He then went to Afghanistan to report the war of 1878, accompanied Lord Beresford on a trip around the world, and was present at the bombardment of Alexandria and at the battle of Tel-el-Kebir in 1882. He saw the operations in the Eastern Sudan in 1884; was with Admiral Hewitt on his mission to Abyssinia; accompanied the expedition sent to relieve Khartum; was with the Servian army in the invasion of Bulgaria in 1886; went to Burma in 1887; crossed Canada with the Governor-General; and then went on a lecture tour through the United States, Canada, and the British Isles. In 1898, as special artist for *Black and White*, the *New York Herald*, and other papers, he accompanied the Japanese army and was present at the battle of Ping Yang and the capture of Port Arthur. In 1897 he represented the *Standard* in the Greco-Turkish War. In the summer of the same year he was with the Egyptian expeditionary force, and in the following year, as the representative of the *Illustrated News* and the *Globe*, was with Kitchener in the operations resulting in the reconquest of the Sudan.

VILLIERS, George, first Duke of Buckingham (1592-1628). The favorite of James I. and Charles I. of England. He was born August 28, 1592, and in 1614 entered the service of the Court, where at first his advance was retarded by the enmity of the powerful Earl of Somerset. After Somerset's fall Villiers rapidly rose in favor. In 1616 he received the Garter, and was created Viscount Villiers and Baron Waddon. In the January following he was created Earl of Buckingham, and was sworn Privy Councilor. Thereafter he became in succession Marquis, Lord Admiral of England, Master of the King's Bench, High Steward of Westminster, and Constable of Windsor Castle. In 1620 Buckingham married Lady Katherine Manners, daughter of the Catholic Earl of Rutland. In 1823, while negotiations were in progress for a marriage of the Spanish Infanta with the Prince of Wales, later Charles I., Buckingham persuaded the latter to go to Madrid and press his suit in person. While on this mission he was created Duke of Buckingham, and on his return was nominated Lord Warden of the Cinque Ports. The negotiations proved an absolute failure, partly no doubt on account of Buckingham's arrogance, and as a result James declared war against Spain and allied himself with France. Buckingham maintained his ascendency after Charles I. came to the throne, and the treaty for the marriage of Charles with the Princess Henrietta of France was concluded by him, but he was never after permitted to return to Paris, in consequence of his audacity in making love to the French Queen, Anne of Austria. For a short time Buckingham enjoyed a passing popularity, but the ill-fated expedition to Cadiz made him odious to the nation, and he was barely saved from impeachment by the King, who dissolved Parliament. The alliance with France proving unsatisfactory, Buckingham prepared to aid the Huguenots. In 1627, with an armament of 100 sail and 7000 soldiers, Buckingham appeared before La Rochelle, then in possession of the Huguenots, but they refused him admission to the harbor. His troops then made a descent on the Isle of Rhé, only to return to England, defeated and disgraced. Buckingham was not discouraged and soon after prepared a second expedition to La Rochelle. He proceeded to Portsmouth for embarkation, and there was assassinated on August 23, 1628, by a discontented subaltern named Felton. Buckingham was an agreeable personality, but he lacked all the qualities that go to make a statesman, and he regulated his policy in accordance with personal pique. Consult Gardiner, *History of England*, vols. ii.-iv. (London and New York, 1889).

VILLIERS, George, second Duke of Buckingham (1628-87). An English politician. He was the second son of the first Duke of Buckingham, and, his elder brother dying while his father was still living, he succeeded to the title on the death of his father. He was educated with the royal princes, in the Civil War naturally served in the royal army, and as a result his immense estates were confiscated. In 1650 Buckingham was given an important command in the projected invasion of Scotland, and fought with Charles II. at Worcester. Later, however, he sought to make his peace with the Protector by returning secretly to England and marrying the daughter of Fairfax, the Parliamentary general. But he was arrested, and only released on the abdication of Richard Cromwell. When Charles II. was placed on the throne Buckingham received various minor offices about the Court, but did not possess much influence until the downfall in 1667 of Clarendon, who had been his enemy. Buckingham now became one of the chief advisers of Charles, and belonged to the so-called Cabal, though he held no official position. He favored the Declaration of Indulgence of 1672, and was an opponent of the Duke of York. Buckingham favored an alliance with France, but was not in the secret of the Treaty of Dover of 1670. His influence rapidly declined, and in 1673 he came to an open rupture with Arlington, who had the support of the King. The result was that he lost the remainder of his influence. Buckingham, who had been one of the most licentious in a licentious age, now changed his mode of living, and courted popular favor. But this proved of little avail, and he soon retired to private life. He died April 16, 1687. Buckingham was a patron of authors, and also wrote himself. His drama *The Rehearsal*, which was first performed in 1671, enjoyed considerable popularity. Consult: Ranke, *History of England* (Oxford, 1875); Burghclere, *George Villiers, Second Duke of Buckingham, 1628-1687* (London, 1903).

VILLIERS, George William Frederick, Earl of Clarendon. An English statesman. See Clarendon, George William Frederick Villiers, Earl of.

VILLIERS DE L'ISLE ADAM, vē'lyâr' de lēl ȧ'däN', Philippe Auguste Mathias, Comte de (1838-89). A French author, born at Saint-Brieuc, in Brittany. To him more than to any other author belongs the honor of having begun the Symbolistic movement in French literature. He was a writer of vivid imagination and remarkable power, and he exercised considerable influence upon the younger school of authors; but his work was never popular with the general public, and he died in poverty in the care of the Frères Saint-Jean-de-Dieu. His first publication was a volume entitled *Premières poésies* (1856-58), and it was followed in 1862 by a romance of the supernatural called *Isis*. Among his other works are: the plays *Elen* (1864), *Morgane* (1865), *La revolte* (1870), *Nouveau monde* (1880), and the remarkable *Axel* (posthumous in 1890); the fine volume of short stories, *Contes cruels* (1883); the satirical romance of modern science, *L'ève future* (1886); and the romances *L'armour suprême* (1886), *Tribulat bonhommet* (1887), and *Secret de l'Echafaud* (1888).

VILLOISON, vē'lwä'zôN', Jean Baptiste Gaspard d'Ansse de (1750-1805). A French philologist, born at Corbeil-sur-Seine, France. He early displayed great ability, and at the age of twenty-three became a member of the Académie des Inscriptions. In 1778 he was commissioned by the French Government to examine the manuscripts of the library of Saint Mark at Venice. The results of his study there were published in his *Anecdota Græca* (1781). The most important of these results was the discovery of the famous *Codex Venetus* of Homer with the scholia. The years from 1785 to 1788 Villoison spent in traveling in Greece. Shortly after his return to Paris the French Revolution broke out, and he retired to Orléans; but in 1800 he was appointed professor at the Collège de France. His other most important publications are: the *Homeric Lexicon* of Apollonius (1773); *Longi Pastoralium Libri IV.* (1788); and his most famous work, the *Iliad*, edited on the basis of the *Codex Venetus* (1788). Consult Dacier, *Notice historique sur Villoison* (1806).

VILLON, vē'lyôN', François (1431-?). The first and one of the greatest of the French lyric poets of the modern school. His real name was François de Montcorbier, and the name Villon, by which he is generally known, he adopted out of gratitude to Maître Guillaume de Villon, who was to him a sort of second father. The known details of his life are but little edifying. The poet's immediate family was very poor and ignorant. Young François early showed a certain vivacity of mind and facility of study, which caused Guillaume de Villon to take an interest in him and to plan to give him an education and make an ecclesiastic of him. Maître Guillaume took him to live with him in the Convent of Saint-Benoît-le-Bétourné, near the Sorbonne. Villon became Bachelor of Arts in 1449, and Master of Arts in 1452. But even the degree of Master was but an inferior one and the students of the Faculty of Arts had many long years of study ahead of them before they could reach in the other faculties the high positions to which they aspired. Villon was well liked by his fellow-students, and led the roistering life that was characteristic of the students of the time. They were always in open conflict with the civil authorities, thanks to the custom by which the university was a recognized law unto itself.

On June 5, 1455, François, apparently in self-defense, fatally stabbed a priest, named Philippe Sermaise, and took refuge in the convent. He then absented himself from Paris, while awaiting a pardon, which was granted in January, 1456, and probably at this time had a disgraceful intrigue with the Abbess of Pourras. In December of that year he took part in the robbery of a large sum of money in the Collège de Navarre at Paris. He fled to Angers, and in 1457 we find him at Blois at the poetic and gallant court of Charles of Orléans. Then he began a nomadic kind of existence that led him into nearly every corner of France. In 1461 he was arrested by order of the Bishop of Orléans and imprisoned at Meung-sur-Loire, but after several months of durance was set free on the strength of an amnesty proclaimed by King Louis XI. in honor of his recent accession. Before the end of 1462 Villon returned to Paris, determined to "settle down" and "become a man." Unfortunately, his good intentions were not fulfilled. In the beginning of November, 1462, we find him imprisoned in the Châtelet on a charge of theft, which, however, could not be proved. In this same month he was engaged in a serious brawl, and, although he seems to have taken no active part therein, he was arrested and condemned to death. After more than a year's imprisonment, on an appeal to the Parlement, the sentence was commuted to banishment from Paris. From this time on Villon disappears from view. He must be judged, not by our standards, but by those of his times, in which, from a moral and social point of view, those who represented the law, and those who held their heads highest, were hardly better in many respects than he. His good points were his piety, intermittent but real, his sincerity, the humility with which he acknowledged his faults and planned to do better, only to fall again at the first temptation, his affection for his mother, his gratitude toward Maître Guillaume, his sympathy for those who were suffering the misery about which he knew so much, and his patriotism. He had seen life in all its phases, and knew everything, as he naïvely puts it, except himself.

Villon's great merit lies in the intense subjectivity of his verse. There is no sham, no hiding of anything he feels, whether it be good or bad. His frankness about himself made him feel that he had a right to be just as frank about others, and every one with whom he comes in contact is put upon the grill. The result is that his writings form a highly colored and generally trustworthy picture of the times in which he lived. They comprise *Le petit testament* (1456), a poem in 40 stanzas; *Le grand testament* (1461), a poem in 173 stanzas, in which about a score of ballads or rondeaux are inserted; a *Codicille*, composed mainly of ballads; *Le jargon*, a collection of ballads in argot; an admirable *Dialogue* between the Seigneurs de Mallepaye and Baillavent; and a *Monologue*, even more excellent, entitled *Le franc archier de Bagnolet*. *Les repues franches*, a curious production, describing the swindling tricks of Villon and his companions, has been wrongly attributed to him.

Bibliography. The first edition of his works was published in 1489. In 1533 they enjoyed the honor of having Marot for their editor. The best of recent editions is that by Longnon (Paris, 1892). For his biography, consult Lognon (ib., 1877), Schwob, in the *Revue des Deux Mondes* (July, 1892), and Gaston Paris (Paris, 1901). Consult also: Byvanck, *Specimen d'un essai critique sur les œuvres de François Villon* (Leyden, 1882); Schwob, *Le jargon des coquillards en 1455* (Paris, 1890); Paris and Schwob, "Villoniana," in *Romania* (ib., 1901); and Payne, *François Villon, Poems; rendered into English verse, in the original forms, with a biographical and critical introduction* (London, 1892).

VILMAR, vĭl′mär, AUGUSTUS FRIEDRICH CHRISTIAN (1800-68). A German theologian and literary historian, born at Solz, Hesse-Cassel. He studied theology and philosophy at the University of Marburg. In 1851 he was elected by the synod superintendent-in-chief of the Church of the Electorate, but as this election was not approved he shortly afterwards accepted the post of professor of theology at the University of Marburg. His theological writings include *Theologische Moral* (1871; edited by Israel) and *Die Theologie der Thatsachen wider die Theologie der Rhetorik* (1856-76), but he is better known as a literary historian, in which field his chief work is *Geschichte der deutschen Nationallitteratur* (1845; 24th ed. 1894), which was continued by Adolf Stern.

VILNA, vĕl′nȧ. A government of Western Russia, lying between the Düna and the Niemen. Area, 16,420 square miles (Map: Russia, C 4). The larger part of the surface is low, and its highest point is only a little above 1000 feet. Marshes and lakes occupy a considerable proportion of the area. The chief rivers are the Niemen, the Vilia, and the Düna—all of them navigable and important for the commerce of the government. The climate is moderate and steady, the precipitation ample. Agriculture is the principal occupation. The population was 1,591,912 in 1897, of whom the Lithuanians formed about one-half and the rest was composed of Russians, Poles, and Jews. The latter numbered about 240,000. The Roman Catholics numbered nearly 1,000,000.

VILNA. The capital of the Government and the Governor-Generalship of Vilna, in Western Russia, situated at the confluence of the Vileika with the Vilia, 436 miles south-southwest of Saint Petersburg (Map: Russia, C 4). It is an old city irregularly built and unsatisfactory in its sanitary arrangements. Its most interesting ecclesiastical edifices are the Roman Catholic Cathedral of Saint Stanislaus with the silver coffin of Saint Casimir, the Greek Catholic Cathedral of Saint Nicholas, and the Greek Orthodox Cathedral of the Holy Virgin. Vilna is well provided with educational institutions which include a Greek Orthodox and a Roman Catholic seminary, an archæological museum with a library, and a municipal theatre, In the suburbs are a number of ancient monasteries and churches and the ruins of the castle of the Jagellons. Vilna manufactures tobacco, knit goods, articles of apparel, artificial flowers, gloves, etc. The extensive commerce in grain and timber is favored by the position of Vilna at the intersection of three important railway lines and on a navigable river. Population, in 1889, 109,329; in 1897, 159,568, nearly 50 per cent. Jewish and the rest Lithuanian, Polish, and Russian.

Vilna was probably founded in the tenth century, but it became prominent only as the capital of Lithuania under Gedimin (about 1323). It obtained Magdeburg rights from Jagellon and had a printing press as early as 1519. During the seventeenth century it was nearly ruined in the struggle between Russia and Poland. It was annexed to Russia in 1795. In 1803 a university was established at Vilna and suppressed for political reasons in 1832. The inhabitants of the city welcomed Napoleon in 1812 and took a prominent part in the Polish uprisings of 1830-31 and 1863.

VILVORDE, vĕl′vōrd′. A town of the Province of Brabant, Belgium, on the river Senne, nine miles north of Brussels (Map: Belgium, C 4). It has manufactures of horse-hair and passementerie. Population, in 1900, 12,992.

VINA, vē′nȧ (Skt. *viṇā*, lute). The principal musical instrument of the ancient Hindus. The instrument consists of a cylindrical pipe of bamboo 3½ feet long with a finger-board a little less than two feet in length. At the ends of the pipe are two hollow gourds acting as resonators, each 15 inches in diameter. Behind one of these resonators are four pegs on which metal strings are fastened tuned in the following order: dominant, leading tone, tonic, subdominant. On the bamboo pipe are 18 movable bridges, somewhat lower than the principal bridge. These movable bridges can be adjusted so that the instrument can be tuned in any of the Hindu scales. Along the finger-board run three sympathetic strings acting as bourdons. (See BOURDON.) The vina has a range of two octaves with all chromatic intervals. The player assumed a kneeling attitude, so that one resonator rested upon the left shoulder, the other upon the right knee. The strings were struck by means of the first and second fingers of the right hand, each having a kind of thimble with a flexible point.

VINCENNES, văɴ′sĕn′. A town of the Department of Seine, France, five miles by tramway east-southeast from the Louvre, Paris, on the northern edge of the Bois de Vincennes (Map: Paris and Vicinity). The town is entirely given over to military purposes. There are immense barracks, a great fortress famous for its arsenal and its school of marksmanship, and depots of military supplies. The château to which the town owes its historical importance is built in the form of a parallelogram. It originally possessed nine towers, of which only one, known as the Donjon de Vincennes, with walls 17 feet thick and 170 feet high, remains. The building was begun by Louis VII. in 1164, and was used as a royal residence until 1740. In 1832 Louis Philippe fortified it and turned it into a military depot. Among its famous prisoners were Henry IV., the Great Condé, Cardinal de Retz, Mirabeau, and the unfortunate Duc d'Enghien, who was executed here in 1804. Population, in 1901, 31,405.

VINCENNES, vĭn-sĕnz′. The county-seat of Knox County, Ind., 117 miles southwest of Indianapolis; on the Wabash River, and on the Cleveland, Cincinnati, Chicago and Saint Louis, the Baltimore and Ohio Southwestern, the Evansville and Terre Haute, and the Indianapolis and Vincennes railroads (Map: Indiana, B 4). It has Vincennes University (non-sectarian), Saint Rose Female Academy, a public library, and the Cathedral Library. Other points of interest are the house occupied by William Henry Harrison, while Territorial Governor, and the old legislative hall, the Catholic Cathedral, the court-house, city hall, Government building, Vincennes Sanatorium, and Harrison Park. In the vicinity are several Indian mounds. Vincennes is in a coal-mining, lumbering, and agricultural region, and manufactures novelties, jewelry, sewer pipe, stoves, glass, paper, furniture, tools, bridge work, spokes, handles, etc. The government, under the charter of 1867, is vested in a mayor chosen every two years, a unicameral council, and subordinate officials, the majority of whom are elected by the council. Population, in 1890, 8853; in 1900, 10,249.

Vincennes is built on the site of the principal village, Chip-kaw-kay, of the Piankashaw Indians. A fort was erected here by the French about 1702, and a regular settlement was established soon afterwards, which was called 'Au-Post' or 'The Post' until about 1736. Subsequently the name 'Vinsenne,' given in honor of François Morgan de Vinsenne, an early commandant, gradually came into use. This name was finally changed to Vincennes. The British occupied the place in 1763; Col. George Rogers Clark captured it for Virginia early in 1779, and Virginia ceded it to the United States in 1783. It was the capital of Indiana Territory from 1801 to 1816, and was chartered as a city in 1856. It is the oldest permanent settlement in the State. Consult: Law, *The Colonial History of Vincennes* (Vincennes, 1858); "The Founding of Post Vincennes," in *Magazine of American History*, vol. xxii.; and Powell, *Historic Towns of the Western States* (New York, 1901).

VINCENNES, văn'sĕn', JEAN BAPTISTE BISSOT, Sieur de (1688-1736). A Canadian explorer, born in Quebec. He became an ensign in 1701 and in 1704 he saw service in the Miami country. There he rescued a number of Iroquois who had been taken prisoners by the Ottawas contrary to treaty stipulations, and thus prevented a general war. In 1712 he defended Detroit against the Fox Indians and subsequently, as the lieutenant of La Mothe Cadillac, was active in the exploration of the country between the Ohio and the Great Lakes. About 1725 he built a fort and trading post on the site of the city in Indiana that now bears his name. In 1736 he participated in an expedition against the Chickasaws, but was taken prisoner and burned at the stake.

VIN'CENT, Sir CHARLES EDWARD HOWARD (1849—). An English author and soldier, born at Slinfold, Sussex. He was educated at Westminster School and at Sandhurst. After serving with other regiments he became colonel commandant of the Queen's Westminster Volunteers in 1884, and served with that body during the South African War. He entered Parliament from Central Sheffield as a Conservative in 1885; founded the United Empire Trade League in 1891; and was chairman of the National Union Conservative Associations in 1895. His published works include: *Russia's Advance Eastward* (1872); *Military Geography, Reconnoitring, and Sketching* (1873); *Law of Extradition* (1880); and *Police Code and Manual of Criminal Law* (1882; 10th ed. 1899).

VINCENT, Sir EDGAR (1857—). An English financier. He was born in Sussex, and in 1881 became assistant to the commissioner for the evacuation of the territory ceded to Greece by Turkey. In 1882 he was appointed British, Belgian, and Dutch representative on the council of the Ottoman public debt, held at Constantinople, and after acting as president of the council (1883), was financial adviser to the Egyptian Government (1883-89). While in that post he reformed the Egyptian currency, and later, as Governor of the Imperial Ottoman Bank (1889-97), freed Turkey from financial embarrassment. In 1899 he became a member of Parliament for Exeter.

VINCENT, FRANK (1848—). An American traveler and author, born in Brooklyn, N. Y., and educated at Yale. He spent many years in traveling in almost all parts of the world, and in 1884 he presented to the New York Metropolitan Museum of Art a valuable collection of Indo-Chinese antiquities and art and industrial objects. Among his published works are: *The Land of the White Elephant* (1874); *Through and Through the Tropics* (1876); *Two Months in Burmah* (1877); *Norsk, Lapp, and Finn* (1881); *The Republics of South America* (1889); *In and Out of Central America* (1891); and *Actual Africa* (1895).

VINCENT, JOHN HEYL (1832—). A Methodist Episcopal bishop. He was born at Tuscaloosa, Ala., and was educated at Lewisburg Academy and at Wesleyan Institute, Newark, N. J. He entered the New Jersey Conference (1853), and was transferred to the Rock River Conference (1857). He was pastor of churches in Chicago and established the *Northwest Sunday-School Quarterly* (1865) and the *Sunday-School Teacher* (1866). He was corresponding secretary of the Sunday-school Union of his denomination and editor of its publications (1868-87). In 1888 he was elected bishop and was appointed resident bishop in Europe in 1900, residing at Zurich, Switzerland. He was one of the founders of the Chautauqua Assembly (1874), and chancellor of the Chautauqua University from its organization (1878-1900). He published a course of graded lessons for the Sunday-school, among them *The Illustrated Lesson Notes, A Commentary on the International Sunday-School Lessons* (1876-87); *Little Footprints in Bible Lands* (1861); *The Chautauqua Movement* (1886); *The Church School and Its Officers* (1886); *The Modern Sunday-School* (1887); *Studies in Young Life* (1890); *A Study in Pedagogy* (1890); *In Search of His Grave* (1893); *Unto Him* (1899); and others.

VINCENT, MARVIN RICHARDSON (1834—). An American Presbyterian scholar, born at Poughkeepsie, N. Y. He was educated at Columbia, graduating in 1854, and becoming the first classical instructor in the grammar school connected with the college. He was professor of Latin in Troy University from 1858 to 1862; held two Presbyterian pastorates, in Troy and New York, from 1863 to 1888, in which year he became professor of New Testament exegesis and criticism in Union Theological Seminary. Among his published works are: *Faith and Character* (1880); *The Expositor in the Pulpit* (1884); *Word-Studies in the New Testament* (1887-1900); *Biblical Inspiration and Christ* (1895); *The Age of Hildebrand* (1896); and *History of the Textual Criticism of the New Testament* (1899).

VINCENT DE PAUL, văn'săn' de pōl, SAINT (1576-1660). A distinguished French priest, founder of the missionary Order of the Lazarists. He was born at Ranquines, near Pouy, in Gascony, April 24, 1576, and was sent to school at Toulouse. He became an ecclesiastical student, and was admitted to priest's orders in 1600. On a voyage which he was making from Marseilles to Narbonne his ship was captured by corsairs, and he with his companions sold into slavery at Tunis, where he passed through the hands of three different masters. The last of these, who was a renegade Savoyard, yielded to the exhortations of Vincent, resolved to return to the Christian faith, and, with Vincent, made his escape from Barbary. They landed in France in 1607. Having gone thence to Rome, he was intrusted with an important mission to the French Court in 1608, and continued for some time to reside in Paris as the almoner of Marguerite de Valois. The accident of his becoming preceptor of the children of M. de Gondy, the commandant of the galleys at Marseilles, led to his being appointed almoner-general of the galleys in 1619. For the foundation of the Congregation of Priests of the Mission, which occupied a large part of his time from 1624, see Lazarists. His life was devoted to the organization of works of charity and benevolence. To him Paris owes the establishment of the foundling hospital, and the first systematic efforts for the preservation of the lives and the due education of a class theretofore neglected or left to the operation of chance charity. The Sisters of Charity (see Brothers and Sisters of Charity) were founded under his direction, and he was intrusted by Saint Francis of Sales with the direction of the newly founded Order of Sisters of the Visitation. He left nothing behind him but the *Constitutions of the Congregation of the Mission*, *Conferences* on these constitutions, and a considerable number of letters, chiefly on spiritual subjects. He died at Saint Lazare, September 27, 1660, and was canonized by Clement XII. in 1737. His festival is July 19th, the day of his canonization. Consult his *Life* by Adderley (London, 1901), Jones (ib., 1873), and in French by Loth (Paris, 1880), Morel (1884), De Broglie (Eng. trans., London, 1899), and Bougaud (Eng. trans., New York, 1900).

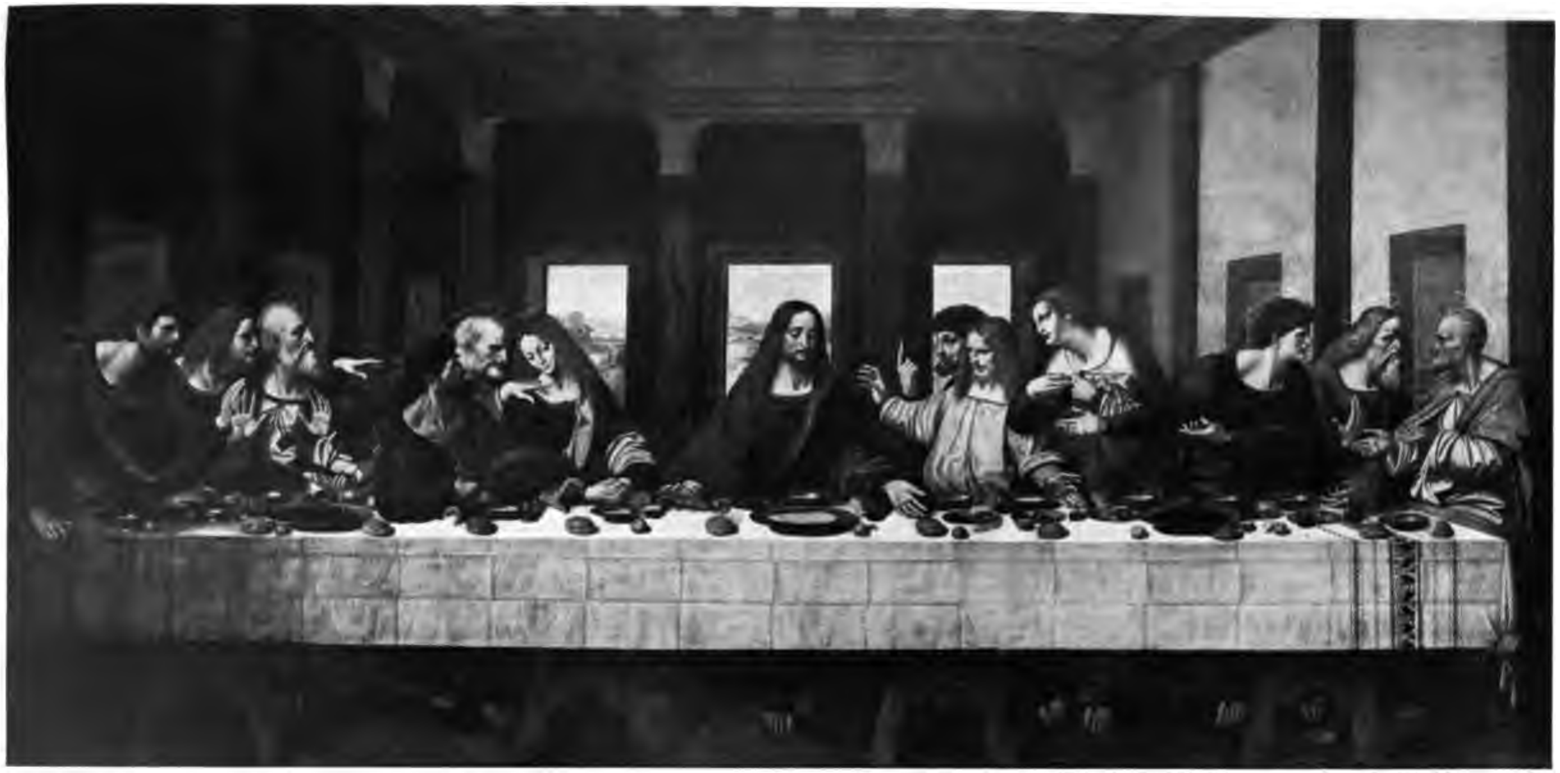
VINCENT OF BEAUVAIS, bō'vā' (c.1190-1264). A French historian. He belonged to the Dominican monastery of Beauvais, and was in high favor with Louis IX. of France, who invited him to his Court. Here he composed his famous encyclopædia called the *Speculum Majus*. This vast summary of the knowledge of the times is in all printed editions divided into four parts: *Speculum Naturale*, *Doctrinale*. *Historiale*, and *Morale*. This last, however, is considered by most scholars to be an addition by a different hand. The *Speculum Naturale* contains all that was known at that time of natural history. The *Speculum Doctrinale* is a compendium of the scholastic learning of the day. The *Speculum Historiale* begins with the creation and gives the history of the world down to 1244; this book has no intrinsic value. Consult Potthast, *Bibliotheca Historica Medii Ævi*, vol. ii. (Berlin, 1896), for editions and secondary works relating to Vincent.

VINCI, vĭn'chā, Leonardo da (1452-1519). A Florentine painter, one of the greatest masters of the High Renaissance, also celebrated as a sculptor, architect, engineer, and scientist. He was born at Vinci, a Tuscan mountain town near Empoli, the illegitimate son of Ser Piero da Vinci, a Florentine notary, and Catarina, a peasant woman. His boyhood was spent under the care of his paternal grandparents at Vinci. Afterwards he lived in his father's house at Florence, and if not actually adopted, he was at least treated as a legitimate son, on the same footing with Ser Piero's younger children. His father's wealth enabled him to enjoy the very best education Florence, at that time the intellectual and artistic centre of Italy, could afford, and he speedily became the embodiment of every social and intellectual charm. He was singularly handsome in person, powerful in physique, persuasive in conversation, a fine musician and improvisatore; and his mind was possessed of a profound and insatiable love of knowledge and research, which proved the controlling factor of his life. Before taking up painting he began the studies in mechanics and in the natural sciences which went hand in hand with his artistic activity throughout life.

At what time he became the pupil of his father's friend Andrea del Verrocchio is not known. In 1472 he was entered into the painters' guild of Florence, and in 1476 he is still mentioned as Verrocchio's assistant, but in 1478 he was working as an independent master. From Verrocchio Leonardo learned modeling, as well as painting; but the reliefs which he executed during his apprenticeship are lost. The attribution to him of the wax bust of a girl at Lille is at least doubtful. According to the well-known legend he painted an angel in Verrocchio's "Baptism of Christ" (Academy, Florence) with such skill that his master resolved to cease painting. The statement concerning Verrocchio is wrong, but there are excellent critics who maintain that the angel in question is by Leonardo. The account of the terrifying shield upon which the artist painted all manner of monstrosities acquired from his studies of lizards, serpents, worms, etc., may have some basis of fact; but the "Head of Medusa" in the Uffizi is certainly a forgery based on Vasari's description. The "Annunciation," too, in the same gallery is not by Leonardo; the specimen referred to by Vasari is in the Louvre.

In 1478 he was commissioned by the Signoria of Florence to paint a picture for the Chapel of Saint Bernard in the Palazzo Pubblico: it is sometimes supposed this is the "Adoration of the Kings," which in an unfinished state survives in the Uffizi. The figures have not, for the most part, advanced further than the grounding; but they reveal a fine scheme of composition and dramatic action. The Madonna sits in the midst of a great classic ruin; and in the intense, dramatic action of the worshipers and the crowds endeavoring to approach, the artist has far surpassed the highest achievements of the Early Renaissance. Of the other works ascribed to this youthful period, none seem genuine, except his unfinished "Saint Jerome" (Vatican), a fine anatomical study. Berenson also attributes to him an unfinished profile of a girl, in possession of Donna Laura Minghetti at Rome.

Leonardo first visited Milan in 1482 as the bearer of a present from Lorenzo de' Medici to Lodovico il Moro, who ruled the city as guardian of his young nephew. This present was a strange musical instrument sounding like a lute, and in-



LEONARDO DA VINCI

"THE LAST SUPPER," AFTER THE PAINTING IN THE MONASTERY S. MARIA DELLE GRAZIE, MILAN

FROM COPY IN THE LOUVRE, PARIS

vented by Leonardo himself, who thus sang his way into the Duke's favor. Among the artist's papers is the brief of a curious letter which he wrote to the Duke after his return to Florence, announcing the manner in which he could be of service to him. Nine of the ten divisions of the letter are devoted to his abilities as a military and naval engineer; in the last he states his prowess in architecture and in sculpture: "In painting, also, I can do what may be done, as well as any other, be he who he may." As the earliest documentary evidences of Leonardo's presence in Milan dates from 1487, it has been supposed, from certain parts of his writings, that he passed at least part of the time in the mountains of Armenia and elsewhere in the service of the Sultan of Cairo. But in the fantastic letters in question, taken in part from accounts of travelers, Leonardo seems merely to have indulged in rhetorical exercises. He probably removed to Milan about 1483 and remained there until his patron was driven from the city by the French in 1499. This was the most fruitful period of Leonardo's activity.

His work at Milan was important and varied. As a sort of general factotum for the ruler, he was principal engineer in his numerous military enterprises, constructed the Martesana Canal, and directed great festivities, as when Lodovico married his niece to the Emperor Maximilian. He was also active as an architect, being one of those employed upon the Cathedral of Milan, and he probably designed other public buildings. He found time to prosecute his studies in anatomy, especially of animals, with Marco della Torre, and to assist Luca Pacioli in one of his mathematical works. At the same time he was at the head of a large and important band of pupils, whether or not they then constituted the supposed Milanese Academy: for them he probably wrote his *Treatise on Painting;* and it is certain he designed paintings which they carried out. The artistic task in which Leonardo took chief interest, and indeed the dearest plan of his life, was a colossal bronze monument to Francesco Sforza, the father of Lodovico. On it he worked constantly till his departure from Milan in 1499, without having brought it to completion. His interest is attested by the numerous studies of horses, in all manner of positions (Ambrosiana, Milan, and Windsor), in sketches for the monument and reliefs in wax and clay. The horse, 26½ feet high, was complete when the French occupied Milan in 1500, and formed a mark for the Gascon archers. Had Leonardo been permitted to cast it, this monument would probably have been the greatest equestrian statue of the Renaissance, surpassing Verrocchio's Colleone as far as the latter did Donatello's Gattemelata.

During the last years of the fifteenth century Leonardo executed for the Duke his masterpiece of painting, the "Last Supper," a wall decoration in the refectory in the Monastery of Santa Maria delle Grazie, Milan. Owing chiefly to his use of oil colors directly upon the wall, to neglect, and to the vandalism of monks and soldiers, only a ruin of the grand original remains. But while for purposes of study it is necessary to refer to the many copies by Leonardo's pupils, the best of which are those by Marco d'Oggiono in Saint Petersburg and in the Royal Academy, London (see illustration), and to Raffaello Morghen's excellent print, the original alone gives the true, though faint, idea of the wonderful lighting and melting color. The painting was in every respect epoch-making, no less in pictorial qualities than in the remarkable composition. Unlike all previous representations, the Apostles are represented upon one side of a table, their faces to the spectator. They are divided into four groups of three, each complete in itself, but subordinated to the principal action emanating from the central figure of Christ. He is just pronouncing the words, "One of you shall betray me," and the painting represents the psychological effect of this announcement upon the Apostles. This effect is shown not only in the face, the ineffable sadness of Christ, the wrath of Peter, the villainy of Judas, but also in the hands, which are treated with a subtle mastery of pantomime, never before attempted or since equaled. Were the heads gone, the hands alone might tell the story. The figures are twice life size and everything is subordinated to architectural effect and sculpturesque composition—the effect of perspective being gained by open windows with Lombard scenery in the distance.

Most of the other pictures painted by Leonardo during this period have been lost. His portraits of the Duke, his wife and two children on the wall opposite the "Last Supper," have disappeared. The supposed portraits of the Duke and his wife in the Ambrosiana (Milan) are now attributed to pupils, the latter to Ambrogio de Predis. Of the portraits of Lodovico's two mistresses by Leonardo, Lucrezia Crivelli perhaps survives in the so-called "Belle Féronnière" in the Louvre, which, judging from its plastic character, and the absence of sfumato and of the hands, belongs to the early Milanese period. The small "Holy Family" in Saint Petersburg and the large "Resurrection" in the Berlin Museum are the work of pupils.

In December, 1499, consequent to the troubles following the expulsion of Duke Lodovico, Leonardo left Milan for Venice. To a brief sojourn at Mantua we owe two beautiful drawings of Isabella d'Este (Louvre and Uffizi), though he never painted for her the desired portrait. He remained at Venice till the end of 1500, and in 1501 we find him again in Florence, assiduously devoted to the study of mathematics. Having received a commission for an altar-piece from the Servite monks, he designed a cartoon which set all Florence into commotion. Not only was it frequently copied, but motives and entire figures were adopted by other artists, as by Raphael in his "Madonna with the Lamb" (Madrid). Leonardo did not himself carry out the oil painting, now in the Louvre, of which it was the model, until a later period. In this the Madonna, seated in the lap of Saint Catharine, is represented in the act of lifting up the Christ child, who plays with a lamb. Contemporaries were particularly impressed by the position of the Christ child, the beautiful studies for which survive in the Academy of Venice and at Windsor. The cartoon of the same subject, in possession of the Royal Academy, though undoubtedly by Leonardo, is not, as is commonly supposed, the original, but a variation of the same theme.

In 1502 Leonardo entered the service of Cesare Borgia as a military engineer, rendering important services in different parts of Central Italy.

In January, 1503, he was again in Florence, where he served on the commission of artists to decide upon the proper location for Michelangelo's "David," and served as an engineer in the war against Pisa. Toward the end of the year he entered upon his famous contest with Michelangelo (q.v.) in a design for the decoration of the great hall of the Palazzo Vecchio. The contest was of national importance, designed, by a glorification of past valor, to encourage the Florentines in their struggle with Pisa. Each prepared a cartoon for one of the long walls, Leonardo's subject being the "Battle of Anghiari." The centre of the cartoon was a cavalry struggle upon a bridge over a standard in which the fierce passion of battle was portrayed, as never before nor since. To judge from Leonardo's report to the Signoria, based upon profound historical studies, it seems that on the left the Patriarch of Aquileja, leader of the Florentines, watched the battle, praying for success, and on the right the Milanese troops were in full fight. The execution of the painting upon the wall does not seem to have progressed beyond the central group about the standard, which survives in the "Battle of the Standard," a drawing in the Louvre ascribed to Rubens, and in the well-known engraving by Edelinck.

During this second Florentine period (1503-06) Leonardo painted two fine portraits, that of Ginevra Benci, which is lost, and "Mona Lisa," the pride of the Louvre, perhaps the most celebrated portrait in the world. She was the third wife of the Florentine Francesco del Giocondo, whence the name "La Joconde," by which the portrait is known in France. The face has sadly suffered at the restorer's hand, Mr. Pater to the contrary notwithstanding. The redness of the lips and the carnation of the face have disappeared, as have the subtle gradations of blue and red about the eyes, which Vasari praises so highly. But the eyes still have their dewy shimmer, as in life, a subtle smile plays about the mouth, and the wonderful hands are almost unspoiled. Leonardo is said to have employed musicians and jesters to produce the subtle and mysterious expression of her countenance, an effect heightened by the strange, rocky landscape in which she appears. After four years' labor on the work, he pronounced it unfinished; but to other eyes it seems one of the most highly finished works in modern art.

In 1506 Leonardo went to Milan on a three months' leave of absence from Florence. The powerful intercession of Chaumont, the French Governor of Milan, at length induced the gonfalonier of Florence to release him from his contract in the Palazzo Vecchio. Leonardo was named Court painter to the King, Louis XII., and for the next few years he divided his time between the two cities. He was kept at Florence by a long drawn-out, though ultimately successful, lawsuit against one of his brothers, who refused to carry out the provision of his father's will that Leonardo share equally with the other children. At Milan he continued his engineering projects, and he had studios both there and at Florence. At this period, especially, he executed many designs for paintings carried out by his Milanese pupils. It has been the service of Morelli to distinguish these from his genuine works, and to rewrite the history of the Milanese school. Among such paintings no longer attributed to Leonardo are the "Holy Family with Saint Catharine" and a half nude female figure recalling "Mona Lisa" at Saint Petersburg; "Madonna with the Scales," "Madonna with the Child and Saint John Baptist," the "Youthful Bacchus," and a "Youthful Saint John Baptist"—all in the Louvre; and the fresco of a "Virgin with Donor" in Sant' Onofrio, Rome. Even the beautiful "Madonna Litta" (Saint Petersburg), a work worthy of Leonardo, is now generally assigned to Bernardino de' Conti. A free copy of Leonardo's "Leda and the Swan," which we know he painted during the second Milanese period, survives in Sodoma's version in the Borghese Collection at Rome. The only genuine surviving painting of this second Milanese period—some indeed give it an earlier date—is the "Madonna in the Grotto." There has been much dispute as to whether the original is in the Louvre or in the National Gallery. Some careful critics consider both genuine, but the best opinion favors the Louvre. In this remarkable work Leonardo has finally solved the problem of chiaroscuro, in the striking contrast of the faces of the Virgin and the two children with the darkness of the grotto.

When the French temporarily abandoned Milan in 1513 Leonardo paid a visit to Rome; but neither this nor his previous brief visit seems to have exercised any influence upon his art. In 1515 he returned to Milan, and was in charge of the festivities when Francis I. of France triumphantly entered. He was made Court painter at a salary of 700 gold scudi annually, besides being confirmed in his previous possessions. By order of Francis I. he bought up all of his own pictures that could be had, whence the collection in the Louvre, and in 1516 he accompanied the King to France. He passed the remainder of his days in the residence assigned him in Castle Cloux, devoted to scientific research, and died there soon after the date of his testament, May 2, 1519. He did not die in the arms of Francis I., as is often supposed on the evidence of Vasari, but in the presence of his friend Melzi, a young Milanese nobleman who had been his constant companion during the latter part of his life, and to whom he left most of his property and his invaluable manuscripts.

Leonardo was the most universal genius of that age of geniuses, the Renaissance. As a man of science he towered above all contemporaries, and had his views been known and generally published, they must have revolutionized the science of his day. That they were not is perhaps due to the fact that his manuscripts were almost undecipherable, being written with the left hand, back-handed, and from right to left. With an almost inspired glance he divined the secrets of nature, making discoveries which it has been reserved for our own time to perfect. A consummate master of anatomy, he even divined the circulation of the blood and the action of the eye in vision. He made astounding observations in meteorology, knew the earth's annual motion and the effect of the moon upon the tides, foreshadowed the hypothesis of the elevation of continents, and discovered the nature of fossil shells. He originated the science of hydraulics, and probably invented the hydrometer; his scheme for the canalization of rivers is still of practical value. He also invented a large number of labor-saving machines, very remarkable for his day.

In the art of painting he wielded the greatest influence. He was the pioneer of the High Renaissance, the first to achieve that complete mastery of form and technique which admitted of a new freedom of handling, a new truth to nature and life. He was the first to attain a sound and complete mastery of anatomy and to introduce color, in the higher sense, into Florentine painting. By the use of 'sfumato'—a smoky, hazy quality—he achieved a remarkable melting tone and blending of color; he was the first great master of light and shade, which he made witching and lovely. His drawings reveal the consummate draughtsman seeking rather after finesse than general effect; they may be found in the principal European collections, especially at Windsor. Among the principal are the beautiful head of Christ in the Ambrosiana (this attribution is disputed), the magnificent head of Leonardo in old age (Royal Library, Turin), and the large series of caricatures in which he displays a remarkable sense of humor. Especially characteristic of Leonardo's art are his landscape backgrounds, into which he was among the first to introduce atmospheric perspective, that mysterious quality which heightens most admirably the effect of the picture, and the subtle mysterious smile, which Vasari has characterized as more than human. The influence which he wielded over Italian art was profound and wholesome. The chief masters of the High Renaissance in Florence—like Raphael, Andrea del Sarto, and Fra Bartolommeo—all learned from him; he completely transformed the school of Milan (see PAINTING, paragraph *History*), and at Parma Correggio carried his art to its logical development.

BIBLIOGRAPHY. Leonardo's copious manuscripts, rich in drawings by his own hand, have been published, for the most part, in facsimile; those in the Paris libraries under the editorship of Ravaisson-Mollien (6 vols., Paris, 1881-91); the Codex Atlanticus in the Ambrosiana (Milan, 1895); and those in the Trivulzio Collection (ib., 1891). His celebrated ***Trattato della pittura***, compiled from the manuscripts by some pupils, has been published many times (London, 1802; Rome, 1890; Vienna, 1882). The best edition of his literary works is by J. P. Richter (London, 1883), with English translation. The first critical biography was by Amoretti (Milan, 1803). Uzzielli, ***Ricerche interno a Leonardo da Vinci*** (2d ed., Turin, 1896 et seq.), has best used the documentary evidence. The most extensively planned biography, that of Müller-Walde (Munich, 1889-90), has remained unfinished. Others are by Houssaye (Paris, 1876), Rosenberg (Bielefeld, 1898), Müntz (Paris, 1899; Eng. trans., London, 1898), and Volynsky (Saint Petersburg, 1900; trans. by Heaton and Black, London, 1874), and Richter (ib., 1880). Of special importance for the criticism of his works are the researches of Morelli (q.v).

VINCK-BOONS, vĭnk'bōns, DAVID (1578-1629). A Flemish painter, born at Mechlin. He studied under his father, Philipp Vinck-Boons, and at Antwerp. He was one of the last of the older Dutch school and was famous for genre paintings as well as landscapes. Among his paintings are "Soldiers Routed by Peasants," "Feeding the Poor," "The Lottery," and "The Village Feast."

VINDHYA (vĭnd'yȧ) **MOUNTAINS.** A range of mountains in British India. In its widest sense the name is applied to the whole northern escarpment of the great triangular plateau forming the southern half of the Indian peninsula, and stretching in an east and west direction from the mouth of the Ganges to the head of the Gulf of Cambay (Map: India, C 4). It is, however, chiefly along the middle course of the Nerbudda River that there is a well-defined ridge. This river has a deeply cut valley, which separates the ridge from the main plateau and gives it a steep southern slope. On the north there is a lower plateau, which falls toward the great Ganges-Indus lowland. The range consists chiefly of Mesozoic sandstone, and has an average altitude of 2000 feet, with a maximum of 5500 feet.

VINE. See GRAPE.

VINE FAMILY. See VITACEÆ.

VINEGAR (OF., Fr. *vinaigre*, from *vin*, from Lat. *vinum*, wine + *aigre*, sour, sharp, keen, from Lat. *acer*, sharp, keen). A sour liquid obtained by acetic fermentation of alcoholic products, usually wine, cider, or malt, used chiefly for culinary purposes and for preserving. The active principle of vinegar is acetic acid, which varies in amount from 2 per cent. to 10 per cent. and even more; the distinctive flavor and aroma are derived from the materials from which it is made or, in artificial products, from added substances. Small amounts of alcohol, and incidental products of fermentation, are usually present, together with extractive matters depending upon the nature of the materials from which it is made. Cider vinegar contains traces of malic acid, the acid of the apple. Formerly some mineral acid, usually sulphuric, was added to vinegar as a preservative and to reinforce it, but this practice is now regarded as an adulteration. In Europe wine and spirit vinegars are most commonly used, that from white wine being most highly esteemed; in Great Britain malt vinegar is extensively used; in the United States cider vinegar is preferred.

There are two methods of making vinegar—the slow or natural fermentation and the "quick process." In both of these the production of acetic acid from the alcohol is effected through oxidation by the agency of micro-organisms, which are supplied in the lees or the 'mother of vinegar.' The latter is a soft, felted mass, commonly forming a scum on the surface of the fermenting liquid. It contains an aggregation of micro-organisms, the essential ones being formerly supposed to belong to one species, known as Mycoderma aceti. They are now known to belong to the general group Bacteria and to include some half dozen or more species. These vary in their growth, some producing their maximum effect more quickly than others. The process as ordinarily carried on in casks or barrels is quite slow, requiring several weeks at a favorable temperature; but in the quick vinegar process the change is accomplished in a few hours.

The quick process consists in bringing the alcoholic liquid into intimate contact with the air by means of beechwood shavings, which are placed in a tall vessel called a generator, and inoculated with warm vinegar to furnish the micro-organisms and to start the process. The generator is usually a tall wooden cask, smaller at the top than at the bottom, and divided into three horizontal sections, one of the dividing disks being near the top, and the other a false bottom. Several glass tubes that serve as air ducts extend through the upper disk, which is also perforated with numerous small holes, through which packthreads extend. The central or main part of the generator is filled with beech-shavings. The alcoholic liquid, first heated to about 50° C. (122° F.), and introduced at the upper part of the apparatus, trickles slowly down the packthreads, diffuses over the chips, coming in contact with the rising current of air, and collects in the bottom of the cask, where it is drawn off by a siphon pipe. It is necessary for the liquid to pass through the cask several times, or through several casks, before acetification is completed, the entire operation requiring from 24 to 36 hours.

In the preparation of wine vinegar full-bodied wines are chosen, and if they contain more than 10 per cent. of alcohol they are usually diluted or mixed with weaker wines. They are then treated by the quick process or fermented in scalded casks filled partly full, for a period of about two weeks, by the slow process, when a portion of the vinegar is drawn off and more wine added, this being repeated periodically. Spirit vinegar is made by distilling a fermented mash of grain so as to obtain a very dilute alcohol, and converting this without rectification into vinegar by the quick method. It is often colored with caramel to simulate cider or wine vinegar. In the preparation of malt vinegar an infusion of malt with a suitable quantity of yeast is fermented briskly for about 40 hours, to change the sugar into alcohol. The extract is then filtered and allowed to settle, after which it may be treated by the quick vinegar process, or acetified in large casks lying on their sides in a room at a temperature of about 25° C. (77° F.). The bung-holes of the casks are left open, and at each end near the top an opening is made so as to permit the circulation of air. The operation is begun in the spring and finished in about three months. Cider vinegar is prepared by allowing fresh cider to ferment in barrels or casks until the proper percentage of alcohol has been formed. It is then acetified, usually by the slow process, in a warm room.

The employment of the quick process in vinegar-making enables a more uniform article to be produced with certainty than by the slow fermentation. The latter is more or less haphazard, depending upon the exact kinds of organisms present, and results in considerable loss of alcohol as well as a smaller yield of acetic acid. This has suggested the use of pure cultures of vinegar bacteria for the fermentation, as is done in beer and wine making; but the difficulties in procuring these pure cultures and in managing the process have been found to outweigh the advantages from their use. In addition to being a condiment, vinegar is used extensively in pickling and preserving various kinds of foods, and has an important action in softening the fibres of hard meats and the cellulose of green vegetables. It is also occasionally employed in medicine as a cooling astringent and as a solvent for various drugs, such as lobelia and opium, which are called vinegar of lobelia, of opium, etc. The term aromatic vinegar is applied to preparations of strong acetic acid holding in solution various aromatic oils, such as bergamot, cloves, lavender, neroli, etc., with camphor, forming a fragrant and volatile perfume. Consult: Gardner, *Acetic Acid, Vinegar, Alum, Ammonia, etc.* (Philadelphia, 1885); Brannt, *A Practical Treatise on the Manufacture of Vinegar and Acetates, etc.* (Philadelphia, 1890). See Acetic Acid.

VINEGAR BIBLE. See Bible, Curious Editions of the.

VINEGAR-EEL, or Paste-Eel. See Eel-Worm.

VINEGAR-FLY. A pomace or wine fly of the genus Drosophila, also called 'fruit-fly,' although it does not attack sound fruit. The majority of the thirty species breed in the juices of decayed and fermenting fruit. Their larvæ are small, white, slender maggots, and are frequently found in canned fruits and pickles which have been imperfectly sealed, occurring mostly near the top of the jars, but living without inconvenience in the briny or vinegary liquid, and transforming within brown puparia around the edges of the jar. Consult Howard and Marlatt, *Household Insects of the United States* (Department of Agriculture, Washington, 1896).

VINEGARONE, vĭn'ê-gȧ-rōn' (from *vinegar*, so called from its odor when alarmed). The local name in Texas for the whip-tailed scorpion (*Thelyphonus giganteus*). See Scorpion.

VINE INSECTS (OF. *vine, vigne*, Fr. *vigne*, from Lat. *vinea*, vine, fem. sg. of *vineus*, relating to wine, from *vinum*, wine). About forty species of insects affecting grapes have been recorded in Europe, and a much greater number occur in the United States. The grapevine phylloxera (see Phylloxera) is the most important of these and has a cosmopolitan distribution. The grapevine fidia (*Fidia viticida*) is a brownish beetle about a quarter of an inch in length, somewhat resembling the rose-chafer, and feeds upon the leaves; the larvæ live at the roots of the vine and check the growth of the plant. Serious damage has been done by this insect in the Central States and in New York State. The yellowish eggs are laid in large batches in crevices in the bark of old wood, usually well above ground, and the larvæ on hatching penetrate the cracks in the soil near the base of the plant. They feed at first upon the fibrous roots near the point of entrance, but soon reach the larger roots and gnaw off the bark, sometimes penetrating to a depth of three feet below the surface of the ground. They reach full growth in August and construct earthen cells, in which they remain until June of the following year, when they change to pupæ. The adult beetles emerge two weeks after pupation. The beetles may be killed by applying an arsenical spray to the vines, while the larvæ are destroyed by the underground injection of bisulphide of carbon or by washing in a strong kerosene emulsion.

The grape cane-borer (*Amphicerus bicaudatus*) is a botrichid beetle, common in the Central United States, which damages grape canes by boring small holes into them. The eggs are laid in May, and the larvæ, which also bore in the canes, develop during summer, transforming to pupæ and beetles in the fall, the beetles remaining in the burrows until the following year. This insect also breeds in other perennial plants. Prompt destruction of all infested wood is recommended.

The grapevine flea-beetle (*Haltica chalybea*) is a stout metallic-blue beetle about one-fifth of an inch long, which has enlarged hind thighs. It appears in the early spring, feeds upon the buds, and later deposits its orange eggs in clusters on the lower surface of the young leaves, upon which the larvæ, which are shining brown, feed, entirely defoliating the plants when numerous. They reach full growth in a month, enter the ground for transformation, and appear in July as beetles, which hibernate and lay eggs in the spring. Spraying with arsenites and jarring the adults upon cloth soaked in kerosene are recommended remedies.

The grape leaf-folder (*Desmia maculatis*) is a widely distributed, small, shining, black moth, with wings bordered with white and marked with white spots. It lays its eggs upon grape leaves, which the active greenish larva folds together with silk, and skeletonizes them. There are two or three generations each summer, the last generation hibernating in the leaves. The destruction of the folded leaves with the early generation is recommended. Probably the larvæ of more than fifty species, including ten hawkmoths (Sphingidæ), feed upon the foliage. Climbing cutworms are frequently destructive to the buds and foliage of vines in northern New York and in the raisin-growing districts of California. See CUTWORM.

The grape-berry moth (*Eudemis polychrosis*) is a European species which has been introduced into the United States. It is a small, slate-colored moth, which lays its eggs on the young berries, into which the whitish larva burrows. Infested berries shrivel, become discolored, and seem to be attacked by the black rot. When full-grown, the larva, then one-third of an inch long, changes to a chrysalis within a folded leaf, where it passes the winter. Bagging of grapes and burning of fallen leaves in the autumn are suggested remedies.

The grapevine leaf-hopper (*Typhlocyba vitifex*), which is also sometimes known as grapevine thrips (see THRIPS), occurs upon the vines in June, frequently in great numbers, increasing through the summer and passing the winter as adults, laying its eggs upon the lower sides of the leaves the following summer. Burning the fallen leaves and other rubbish and spraying with kerosene emulsion are popular remedies. Tarred paper shields carried close to the vines which are jarred are also used; the insects fly against the tarred surface. Consult Marlatt, *The Principal Insect Enemies of the Grape* (Department of Agriculture, Washington, 1898).

VINE'LAND. A borough in Cumberland County, N. J., 34 miles south by east of Philadelphia, Pa.; on the Central Railroad of New Jersey and the West Jersey and Seashore Railroad (Map: New Jersey, B 5). It has the State Training School for Feeble-Minded Children, the State Institution for Feeble-Minded Women, and the State Home for Disabled Soldiers and Sailors. The Vineland Free Public Library has 6000 volumes, and there is also the collection of the Historical and Antiquarian Society, comprising 5500 volumes. The borough is surrounded by a productive fruit-growing region, and is especially known for the manufacture of shoes and grape juice. Other products include window glass, flint glass, rugs, chenille curtains, thermometers, clothing, pearl buttons, paper boxes, sashes, doors, and blinds. The water-works and the electric light plant are owned and operated by the municipality. Population, in 1890, 3822; in 1900, 4370. Consult Nordhoff, *Communistic Societies of the United States* (New York, 1875).

VI'NER, CHARLES (1678-1756). An English jurist, born at Salisbury. He attended Oxford for a time, and then resided at Aldershot, Hampshire. His great work was *A General Abridgment of Law and Equity* (23 vols., 1742-53). To the compilation of this work he devoted half a century of toil. The work was very complete, but was also ill-arranged and very irregular in its execution, hence it was not of much value until a better alphabetical index to it was published in 1758 by Robert Kelham. A second edition of the work and index appeared in London in 24 volumes in 1791-94, and a six-volume supplement was published in 1799-1806. At his death Viner left about £12,000 to the University of Oxford for the establishment of the Vinerian chair of common law and for fellowships and scholarships. The first incumbent of the chair was Sir William Blackstone.

VINES, RICHARD (1585-1651). An Anglo-American colonist. He was born near Bideford, Devonshire; studied medicine; in 1609 visited Maine on an exploring expedition; and about 1615, acting as the agent of Sir Ferdinando Gorges, established a settlement at Saco Bay, Me. In the pestilence of the winter of 1616-17 his medical skill was of great aid to the Indians. In 1617 he ascended the valley of the Saco River as far as Crawford's Notch, and he was the first European to explore the White Mountains (1642). The village of Biddeford was founded on land granted to Vines by the Plymouth Company in 1630. He was chosen deputy governor of the settlement in 1644, but after a visit to England went and settled as a planter and physician in Barbados, where he died.

VINES, SYDNEY HOWARD (1849—). An English naturalist, born in London and educated at Christ's College, Cambridge. In 1888 he was made Sherardian professor of botany in Oxford. His published works include *Lectures on the Physiology of Plants* (1886), and a *Student's Text-Book of Botany* (1895). He assisted in founding the *Annals of Botany* and became its editor.

VINET, vē'nā', ALEXANDER RODOLPHE (1797-1847). A Swiss theologian and literary historian, born at Ouchy, Canton of Vaud. At the age of twenty he became professor of the French language and literature in the gymnasium at Basel. He was professor of theology at Lausanne from 1837 to 1845, when he became a leading advocate of the entire separation of Church and State and aided in organizing the Free Church of Vaud. Of his numerous writings the following may be mentioned: *Sur la séparation de l'église et de l'état* (1842; Eng. trans. 1843); *Etudes sur Blaise Pascal* (1848; Eng. trans.

1859); *Théologie pastorale* (1850; Eng. trans. 1852); *Homilétique* (1853; Eng trans. 1853); *Etudes sur la littérature française au XIXème siècle* (1849-51); *Histoire de la littérature française au XVIIIème siècle* (1853); *Moralistes des XVIème et XVIIème siècles* (1859); *Poètes du siècle de Louis XIV.* (1862). Vinet's letters were edited by Secretan and Rambert (Paris, 1882) and by Pressensé (ib., 1890). There are biographies by Rambert (ib., 1875), Molines (ib., 1890), and Lane (Edinburgh, 1890).

VINEYARD SOUND. A passage 20 miles long and 3½ to 7 miles wide between the Elizabeth Islands, off the southeast coast of Massachusetts, and the island of Martha's Vineyard (Map: Massachusetts, F 5). It is the customary course for coasting vessels.

VINGT ANS APRÈS, văɴ'tăɴ'sȧ'prȧ' (Fr., twenty years after). A romantic novel by Alexandre Dumas (1845). It is a sequel to *Les trois mousquetaires*, the incidents it narrates being supposed to take place after a lapse of twenty years in the lives of D'Artagnan and his companions. It was, in turn, succeeded by *Dix ans plus tard, ou le vicomte de Bragelonne* (1848-50).

VINGT-ET-UN, văɴ'tȧ'ẽɴ' (Fr., twenty-one). A card game of French origin, played with a complete pack of cards and by any number of players. The cards have no rank, but, instead, have a counting value, all the court cards having an equal value of ten points each, and the ace reckoned as eleven or one at the option of the holder. The question of who shall be dealer and banker is determined by dealing the pack to the players one at a time, the first player receiving an ace becoming the dealer. The object of the game is to secure as near 21 as possible in the total pip value of the cards held. Each player deposits an equal stake in the pool, after which two cards are dealt, one at a time, to each player. The cards all dealt, the dealer first examines his hand, and if he has exactly 21 (called a 'Natural') exposes it at once and claims the pool; or, if they are playing for stakes, the players pay him twice the amount of their stake. Should another player also have a Natural, it is declared a stand-off. If, after examination, the dealer has not a Natural, each player in turn, beginning with the eldest hand, examines his hand to see how nearly its total value approaches 21. If he has a Natural he shows it immediately, and the dealer pays him double the amount staked, or he takes the pool or any other winning which may have been determined upon beforehand. When none of the players has a Natural, each player in turn may draw another card or trust his fortunes to the two already in hand, which are not shown under any circumstances. If a player desires to draw a card, the dealer gives it to him face upward, and if the pips on the card drawn, added to those already in his hand, brings his total greater than 21, he is *crevé*, and passes over to the dealer his stake. The only skill required in the game is for the player to know what hand to stand on, and what to draw to.

MACAO is another variety of vingt-et-un, in which but one card is dealt to each player; the ace value is fixed at one, and court cards and tens count nothing. The number to be secured is 9 instead of 21.

VINIEGRA Y LASSO, vē'nė-ā'grȧ ė lăs'sō, SALVADOR (1862—). A Spanish painter, born in Cadiz. He was a pupil of José Perez, and also studied under Hernandez and Villegas in Rome, which he made his home. His first important picture was "Blessing the Fields in 1800" (1887), which, after being exhibited in Madrid and elsewhere, found lodgment in the National Gallery of the Spanish capital. This was followed by several genre pictures of Spanish and Moorish life, brilliant in color and careful in detail, but more appreciated abroad than at home. Viniegra then painted "The Procession of the Dew" (1897), representing an Andalusian religious festival, which reëstablished his popularity in Spain. "Before the Bull-Fight" is in the New Pinakothek at Munich, and "Prayer of the Bull-Fighters" in the collection of the German Emperor.

VINLAND, or **WINELAND**. The name given to that part of the continent of America visited by the Vikings of Norway. This coast was sighted in 986 by Bjarne Herjulfson (q.v.), who, in attempting to reach Greenland from Iceland, was carried out of his course by storms and the Arctic current. The land was not explored and named until 1000, when it was visited by Leif Ericson, who sailed along the coast from Labrador southward and gave the name of Wineland to one portion of the country because of the number of grapes he found growing there. Leif spent the winter felling timber with which to load his ship, and when spring came returned to Iceland. In 1002 Leif's brother Thorvald visited the land and spent the greater part of two years in exploration. He attempted a settlement, but was attacked and killed by the natives, whom the Norsemen called Skrellings. In 1007 a colony of 160 men sailed from Greenland to establish themselves in the new land. They put up houses, but were discouraged by the persistent hostility of the natives, and after one winter returned to their own country. Occasional later voyages to America were made in search of timber or for the purpose of fishing. The last which is recorded was in 1347.

The Icelandic historian, Are the Wise, who wrote in the early part of the twelfth century, mentions the discovery of Vinland, and he is authority for the accounts dating from the three centuries next following. Rafn (q.v.), in his *Antiquitates Americanæ* (1837), sets forth such evidence as exists respecting colonization in America by the Norsemen. This work attracted great attention in America, and to it may be traced the extended popular belief in the statements that the 'Old Mill' at Newport, the 'Dighton Rock,' and other supposed remains can actually be ascribed to the Viking settlements. Professor Horsford, of Harvard, in the last quarter of the nineteenth century, revived interest in these settlements by a series of publications in which he tried to prove that the Norsemen visited the Charles River above Boston. The actual sources of documentary information are best given in Reeves's *Finding of Wineland the Good* (London, 1890). Consult also Anderson, *America Not Discovered by Columbus* (Chicago, 1874); and De Costa, *Pre-Columbian Discovery of America* (Albany, N. Y., 1901).

VINNITZA, vên'nyĕ-tsȧ. A district town in the Government of Podolia, Russia, situated on the Bug, 100 miles northwest of Kamenetz-Podolsk (Map: Russia, C 5). It has a Jesuit college founded in 1649. Population, in 1897, 28,995.

VINSAUF, văN'sôf', GEOFFREY DE (called also ANGLICUS). A poet and rhetorician, who lived in England about 1200. His name, *de Vino Salvo*, seems to have been derived from a work on the vine preserved in a manuscript at Cambridge, and once attributed to him. He was the author of a poem on the art of poetry, variously known as *Poetria Novella*, *Nova Poetria*, and *Ars Poetica*. It is written in Latin hexameters and contains about twenty-one hundred lines. By example, Geoffrey sought to teach the various kinds of writing. His specimen of an elegy, having as subject Richard I., was playfully alluded to by Chaucer in the *Nun's Priest's Tale*. Chaucer there ironically addresses Geoffrey as his 'deere maister souerayn.'

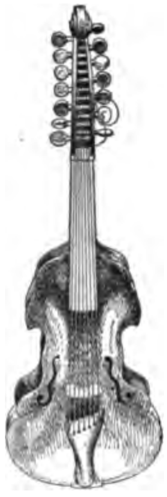
VINSON, văN'sôN', JULIEN (1843—). A French philologist, born in Paris and educated in the Nancy School of Forestry. For some time he was sub-inspector of forests, but devoted himself more and more to linguistic study, became editor of the *Revue de Linguistique*, and in 1879 was made professor of Hindustani in the Ecole des Langues Orientales Vivantes. But his especial study was the languages of the Dravidian stock, especially Basque, and the dialects of Central and Southern America. He wrote *Le Basque et les langues mexicaines* (1875); *Le verbe dans les langues dravidiennes* (1878); *Eléments de la grammaire générale hindoustani* (1883); *Les religions actuelles* (1887); *Essai d'une bibliographie de la langue basque* (1891-96); *Manuel de la langue hindoustani* (1899); and *Légendes bouddhistes et djaines* (1900).

VINTAR, vên-tär'. A town of Luzon, Philippines, in the Province of Ilocos Norte. It lies 5 miles northeast of Laoag, in a well-watered plain, surrounded by mountains (Map: Philippine Islands, E 1). Population, 11,809.

VIN'TON. The county-seat of Benton County, Iowa, 25 miles northwest of Cedar Rapids, on the Red Cedar River, and on the Burlington, Cedar Rapids and Northern Railroad (Map: Iowa, E 2). It is the seat of the Iowa College for the Blind, and of the Tilford Collegiate Academy. There are creameries, canning establishments, and manufactories of pearl buttons, sheet iron, bricks, etc. The surrounding country is engaged in farming and stock-raising. The water-works and the electric light plant are owned by the municipality. Population, in 1890, 2865; in 1900, 3499.

VIOL (OF. *viole*, *violle*, It. *viola*, viol, probably from OHG. *fidula*, Eng. *fiddle*, from ML. *vidula*, *vitula*, fiddle, from Lat. *vitulari*, to keep holiday, originally probably to sacrifice a calf, from *vitulus*, calf; connected with Gk. ἰταλός, *italos*, Skt. *vatsa*, calf, yearling, from *vatsa*, Gk. ἔτος, *etos*, year). A musical instrument, which was the immediate precursor of the violin. It is to be seen represented on monuments as far back as the close of the eleventh century. The belly and back were flat; there were larger bends in the sides than in the violin; and frets, like those of the guitar, were placed on the neck of the instrument. There was great variety in the number of strings: in Germany, 3, 4, and 5 were all common; in Italy there were usually six. The strings were tuned by fourths and thirds. The bridge was but slightly arched, so that in the case of instruments with many strings it was very difficult to play upon the strings in the centre. But, on the other hand, this low-arched bridge was but slightly arched, so that in the were treble, alto, tenor, and bass viols, and they were often played together.

VIOLA (It., viol). The tenor violin. An instrument which in size and compass is midway between the violin and the violoncello. It has four gut strings, the lower two covered with silvered copper wire. It is tuned in fifths, c, g, d^1, a^1, which is exactly an octave above the violoncello. The compass is from c to g^2, or even higher, and the music is written in the alto clef. In the orchestra and string quartet the viola is a fixture, but, in spite of its clear, mellow tone, very little use has been made of it as a solo instrument. The *viola d'amore* is an obsolete stringed instrument which was very popular during the early eighteenth century. It had from five to seven strings of catgut, and below them, passing under the bridge, were an equal number of wire strings, which were tuned in unison and vibrated sympathetically with them. The compass was about three octaves and a half.


VIOLA D'AMORE.

VIOLA. The heroine of Shakespeare's *Twelfth Night*. She is wrecked, with a friendly captain, on the coast of Illyria, secures an introduction into the love-sick Duke's retinue, and is sent by him to plead his cause with Olivia. She is forced to reveal her identity by the appearance of her brother and finally weds her sentimental master, whom she has long since inspired with an unconscious passion.

VIOLACEÆ (Neo-Lat. nom. pl., from Lat. *violaceus*, relating to a violet, from *viola*, violet), or THE VIOLET FAMILY. A natural order of dicotyledonous plants, of which about 15 genera and 300 species are known, natives both of temperate and tropical countries, those belonging to the former being generally herbaceous, those of the latter generally shrubby, the herbaceous species being either annual or perennial. The best known species are the violets. The leaves of the lobolobo (*Alsodeia physiphora*) are used in Brazil as spinach. The chief genera are Viola, Alsodeia, and Ionidium.

VIOLET (OF., Fr. *violette*, diminutive of Lat. *viola*, violet; connected with Gk. ἴον, *ion*, violet), VIOLA. A genus of mostly perennial herbs of the order Violaceæ. The widely distributed and numerous species are confined to temperate climates. Among the extensively cultivated species are *Viola tricolor* and *Viola odorata*. *Viola tricolor*, a native of the Old World, is the wild species from which the common pansy or heart's-ease seems to have been developed. It has innumerable varieties and forms which surpass the natural species in beauty and diversity of color. The pansy runs in strains rather than in varieties, and florists frequently group the varieties according to different arbitrary schemes. This species belongs to the leafy-stemmed violets. The name pansy is derived from the French word *pensée*, thought. A strain of this species known as *Viola tricolor arvensis* has become naturalized in some places in the United States. The sweet violet (*Viola odorata*), one of the stemless species, is common in grassy places in Europe and Northern Asia. The flowers are either deep blue or more rarely white. Under cultivation many varieties have been obtained, including dwarf and double forms with a great diversity in the color of the flowers. The wild plants are not as fragrant as the improved garden varieties. *Viola Canadensis* is an American species of which the cultivated varieties are frequently grown on sloping banks and rockeries. The bird's-foot violet (*Viola pedata*), another American species, is the parent of several handsome cultivated varieties. *Viola altaica*, a species native to Siberia, has been introduced into cultivation, and by itself, or by hybridization with *Viola tricolor*, has become the parent of many garden violets. *Viola biflora* is a pretty species widely distributed in the Northern Hemisphere. It produces small yellow flowers usually in pairs from April to June. Dogtooth violet is the common name of the genus Erythronium (q.v.), a genus unrelated to the violets proper.

SWEET-SCENTED VIOLET (*Viola odorata*).

Violets are of easy cultivation on various soils, but they prefer cool, shady positions, a rich, moist, sandy loam, with good drainage to keep the roots free from water. They are propagated chiefly by cuttings or divisions. Cuttings are made from vigorous shoots in the spring and set in fine sandy soil in a cool greenhouse or frame, and the resulting plants are transplanted to their permanent quarters in the fall. Propagation by division consists in dividing the plants after the flowering period and replanting them immediately. Such plants flower the following spring.

There are several so-called diseases that attack violets. Rust or spot (*Cercospora violæ*) causes the formation of circular grayish spots with dark centres upon the leaves. Mismanagement seems to aid in the spread of this disease. Badly infested plants and affected leaves should be destroyed to prevent the ripening of the spores. A spot disease attributed to Alternaria violæ attacks the parts above ground and is most troublesome upon rapidly growing plants. The spots have light-colored centres surrounded by darker zones, which become lighter in old spots. Care in the selection of plants, careful culture removal of all diseased leaves and plants, and propagation of stocky, vigorous plants are suggested as preventive means. An anthracnose (*Glœosporium violæ*), which is often quite destructive, begins at the edge of the leaf and continues to spread until the whole plant is affected. Many of these diseases can be prevented by proper management of the plants. Fungicides may be used, but they usually discolor the leaves by the deposit of copper. Nematoda (q.v.), which are sometimes troublesome, may be destroyed by steam sterilizing the soil before the plants are set.

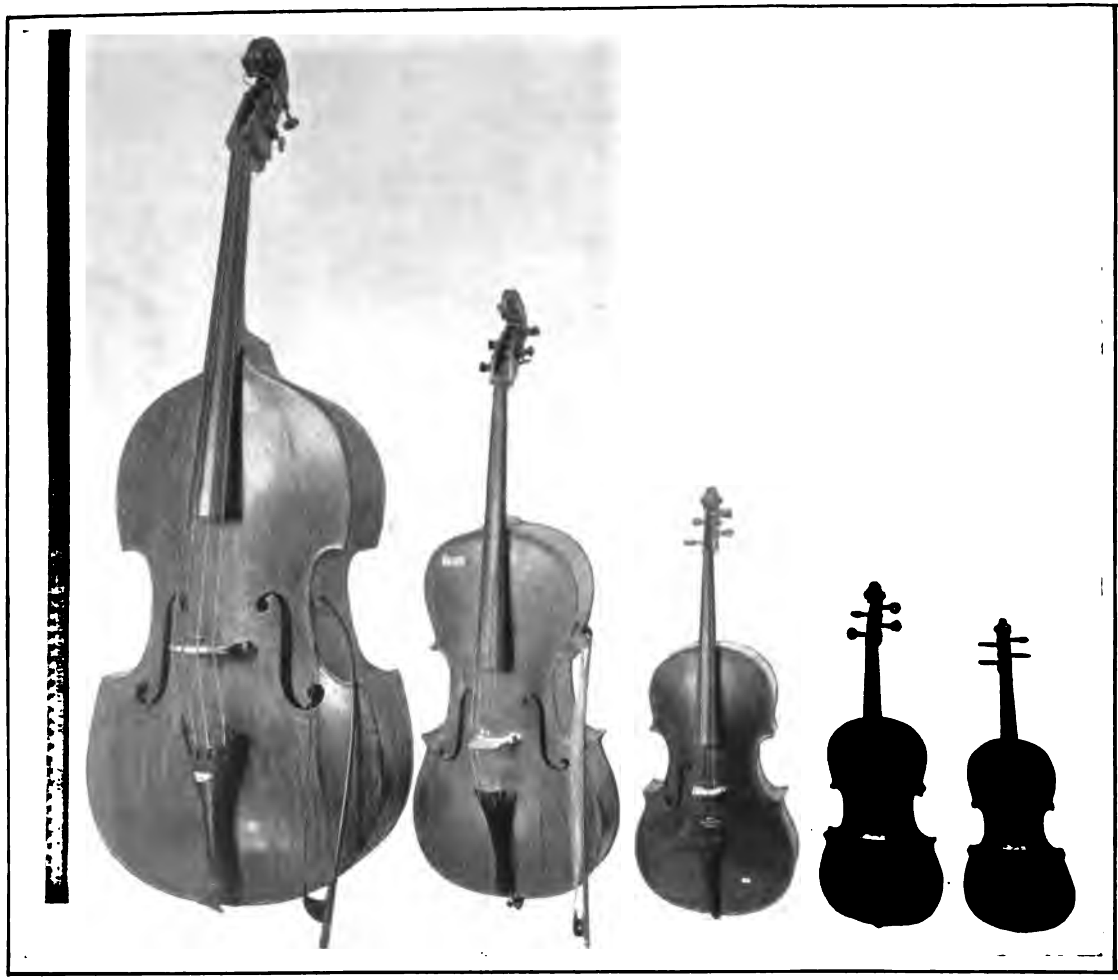
VIOLET FAMILY. See VIOLACEÆ.

VIOLET SNAIL. A small pelagic pectinibranch gastropod mollusk of the genus Janthina, nearly related to the wentletraps (q.v.). Several species are known, all inhabitants of the open sea, where they cling to floating seaweeds and the like. Their shells are fragile, purple in color, and in shape like small turban-shells (q.v.). They are especially interesting from the curious float which they construct to support their egg-capsules. This is a gelatinous raft in which a cluster of eggs is entangled with air bubbles, buoying them up; and thus the collection is dragged about by the mollusk until the young hatch. They occur in shoals and feed upon jelly-fishes.

VIOLET SNAIL.
A Janthina seen from above, showing its bubble raft of eggs.

VIOLIN (It. *violino*, diminutive of *viola*, viol). The most popular of stringed instruments played with the bow. In its primitive form it is a development of the lyre and monochord (qq.v.), the strings from the former, and the principal parts, the elongated resonant-box with its sound-holes, finger-board, and movable bridge, from the latter. The true history of the violin begins with the invention of the bow, which was first applied to the crwth, or crowd (q.v.), some time before the thirteenth century, when the viole, or vielle, of the troubadours made its appearance. The rebic (q.v.), the geige, the fidel, and many kinds of viols and violas underwent various changes until toward the middle of the sixteenth century the true violin model appeared, and superseded all other instruments of the same class, except the viola, the violoncello, and the double bass. The primitive violins had no contour, and it was not until the thirteenth century that the body of the vielle was scooped out at the ribs, forming a kind of waist. The corner blocks were added about the fifteenth century, and it is supposed they originated in Germany. The foundation on which violin-making was to rest was the viol with the double corners. These produced a new constructive feature, the 'bouts,' the ribs which

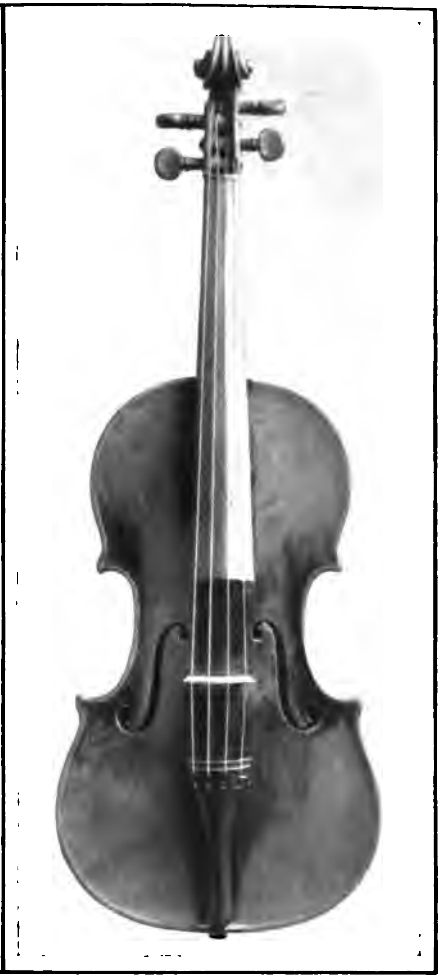
VIOLINS



1. FAMILY OF VIOLINS

Double Bass. Violoncello. Tenor Violoncello. Viola. Violin.

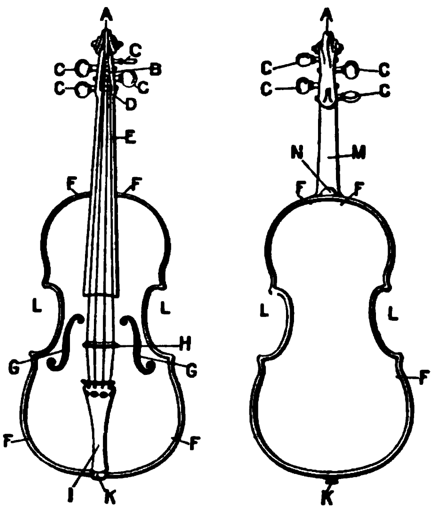
From the Metropolitan Museum of Art, New York.



2. VIOLIN—"THE PAGANINI"

Made by Antonius Stradivarius, Cremona, 1727.
One of the most perfect extant specimens.

curve inward between the two corner blocks. These 'bouts' rendered it possible for the first time for a player to get at the strings. At first they were made of enormous size, but were tapered down at a later date. For nearly a century the sound-holes were shifted all over the violin, sometimes crowding with the bridge near the tailpiece. It was not until the violin model had been in use for some time that they were cut in their proper place and the bridge fixed between them. The bridge was the last point perfected, and that by Stradivarius. Violins may be divided into two classes, those made on the high and those on the flat model. The former is characteristic of the Stainer pattern, the latter of the Stradivarius.



OUTLINE OF VIOLIN, SHOWING ITS COMPOSITE PARTS.

A, scroll; B, peg-box; C, pegs; D, nut; E, finger-board; F, purfling; G, sound-holes; H, bridge; I, tail piece; K, button; L, bouts; M, neck; N, neck-plate.

The violin consists of seventy different parts, all of which, except the strings and loop, are made of wood.

The matter of varnish is a very important consideration; for, aside from external appearances, varnish affects the tone of the instrument. Two kinds of varnish are used, oil and spirit varnishes. The oil completely fills the pores of the wood and thus renders the tone of the instrument somewhat muffled at first; but when the oil in the course of time evaporates the wood remains mellow and very sensitive to the slightest vibration. Spirit varnish dries rapidly. It does not fill the pores completely and leaves the surface incased in a glassy substance which imparts a harsh, penetrating sound to the instrument. The Cremonese violins are especially famous for the superior quality of their varnish, but after 1760 its secret seems to have been lost.

The strings also are an important consideration in the production of tone. The best strings are made in Italy. These are highly finished, very durable, and have a pure, sympathetic tone. Next in rank are those made in Germany (Saxony). Owing to occasional overbleaching, German strings are more frequently found to be false than Italian strings. French strings rank next. Although well made, they are not as durable as either Italian or German strings. English strings are chiefly made in the cheaper grades. They are durable, but lack finish. The material from which all gut strings are made is the intestines of sheep. The following table shows the tension exerted by the various strings. The figures in the first column are for thick, those in the second column for thin strings:

E—	23 pounds	18 pounds
A—	15½ pounds	13⅓ pounds
D—	13¼ pounds	11 pounds
G—	11 pounds	10 pounds
Total	62¾ pounds	52⅓ pounds

The number of strings varied at different times (from only two to six), but since the determination of the true violin model four strings have been universally used. The strings are tuned in fifths, g, d^1, a^1, e^2. In order to reduce the lowest string to a moderate thickness it is wound with silver or copper wire (overspun).

In playing the violin eleven positions are recognized. (See POSITION.) By means of shifting, the compass of the violin is extended to almost four octaves, g-c^4. Skillful players can go even beyond this compass. A peculiar veiled tone is obtained by placing a mute (q.v.) (sordino) upon the bridge to check the vibrations. The quality of tone depends chiefly upon the method of bowing. In many compositions the bowing is specially marked. The up-stroke is marked v, the down stroke ⊓; all the notes under a legato curve are to be played with one continuous stroke. A peculiar effect is obtained by plucking the strings with the finger. (See PIZZICATO.) By playing with the bow close to the bridge the tone becomes very hard and metallic. This effect is called for by the words '*sul ponticello*.' Harmonics are tones of a very ethereal character and are produced not by pressing the string against the finger-board, but by touching it lightly at certain points. (See HARMONICS.) Chords can be played when the different ones are produced on different strings. This is called *double stopping*. In the orchestra the violins are the principal instruments, being divided into *first* and *second*. See ORCHESTRA.

The art of violin-making was at its height in Italy during the eighteenth century. For the sake of convenient arrangement, the principal makers—for such only it is possible to consider—will be grouped into schools.

(1) THE SCHOOL OF BRESCIA. The founder of this school is Gasparo di Bertolotti (1542-1609), commonly known as Gasparo da Salo. He made chiefly viols and violas and very few violins. The latter are of a large pattern with very large sounding holes. The workmanship is clumsy and crude, but the wood and varnish are of excellent quality. His pupil, Giovanni Maggini (1581-1631), greatly improved Da Salo's model, and was among the first, if not the first, to introduce the use of corner blocks. With the rise of the opera, especially after Monteverde's reforms of the orchestra (1608), violins came into great demand. Maggini's instruments show a steady advance. In his later years he was evidently influenced by the beautiful models of Amati. Giambattista Ruggeri (c.1690) was a pupil of

Amati and began his art in Cremona, but later removed to Brescia.

(2) The School of Cremona. The masters of this school have produced the finest instruments known. While Da Salo was making violins in Brescia, Andrea Amati (c.1520-80) independently set up a shop in Cremona, and thus became the founder of Italy's most famous school. His instruments are very graceful, with a sweet but not powerful tone. Andrea's sons, Antonio and Geronimo, worked together from 1575 to 1625. They adopted their father's graceful model, but improved the playing qualities, so that their instruments are very sonorous. Geronimo's son Niccolò (1596-1684) is the most famous representative of the Amati family. Up to about 1650 Niccoló used the model of his father and uncle. But then he gradually introduced those changes which finally led to the model known as the 'Grand Amati,' whose body is fourteen inches long and strengthened throughout. Niccoló exerted a most powerful and lasting influence upon the art of violin-making, for among his pupils we find no less masters than the great Antonio Stradivari, Stainer, Albani, Grancino, G. B. and F. Ruggeri, Guarneri, and Testore. The greatest of all violin-makers was Antonio Stradivari (1644-1737). Being a pupil of Niccoló, it is but natural that his earliest violins should all be after the Amati pattern. In fact, the instruments made between 1670 and 1685 are known as 'Amatesse Stradivaris.' When Amati died in 1684 he bequeathed all his tools, models, and large stock of the choicest wood to Stradivari. It is no wonder, then, that after 1685 a remarkable advance is noticeable in Stradivari's instruments. By 1690 the master had completely given up the Amati model and had established his own, which is a combination of Amati's feminine grace and his own masculine strength. Although Stradivari is not known to have possessed a technical knowledge of acoustics, he attained results for which modern science has established the underlying principles. The period from 1700 to 1720 is known as Stradivari's 'golden period.' The later instruments show, indeed, no falling off in the quality of tone, but are not quite so beautiful in appearance. Carlo Bergonzi (1715-47), a pupil of Stradivari, made instruments remarkable for the brilliancy and mellowness of their tone. His work has been imitated chiefly by French makers. Francesco Ruggeri (1630-1720), a pupil of Amati, occupies a very prominent place. His instruments are mostly modeled after the Amati pattern. Giuseppe Antonio Guarneri (1683-1745) is a master whose instruments are by many experts regarded as equal to those of Stradivari. There were several other members of the Guarneri family who made good violins, but none of them approached in excellence those of Giuseppe Antonio, or 'Guarneri del Gesù,' as he is usually known, on account of his labels, which generally bear the letters I. H. S., surmounted by a cross. Vuillaume divides the work of Guarneri into four periods. The instruments of the second period are small and elegant, those of the third and fourth periods are larger. Lorenzo Guadagnini (1690-1742), a pupil of Stradivari, quickly rose to prominence through the excellent tone of his instruments, although their external finish is not as careful as that of other makers. His model is rather larger than the average. His son, Giovanni Battista (1711-86), surpassed him in the beauty of the wood and varnish. Lorenzo Storioni (1760-1800) is generally regarded as the last of the Cremonese masters. His work is not equal to the best of his predecessors, but still it shows certain characteristics of the school of Cremona.

(3) The School of Venice. This school did not become prominent until after 1700. Matteo Gofriller (c.1670-1724) seldom labeled his instruments, which thus have often been mistaken for Cremonese workmanship. Francesco Gobetti (1680-1720) made instruments on the Stradivari pattern. They are very beautiful in appearance and possess a wonderful tone. Santo Serafino (1687-1748) rivals the best makers in the surpassing beauty of design and varnish; but his instruments, though possessing a very delicate tone, lack power. The greatest of the Venetian masters is Domenico Montagnana (1690-1740). He was a pupil of Stradivari, and from the moment when he settled in Venice occupied the foremost place.

(4) The School of Naples. In the number of instruments made Naples comes next to Cremona. Although, as a rule, all the violins have an excellent tone, they are inferior to those of the other schools in workmanship and beauty of finish. Alessandro Gagliano (1650-1730), a pupil of Stradivari, established himself in Naples. Most of his sons and grandsons devoted themselves to the art of violin-making. Of these Ferdinando (1706-83) is the most famous. He adopted Stradivari's last model.

(5) In addition to the above-mentioned schools fine instruments were also made in Rome, Florence, Milan, Bologna, Padua, and other cities. But nearly all such violins can be classed as belonging to one of the four famous schools, because their makers either came from those cities or learned their craft there. David Tecchler (c.1660-?), a German, established himself at Rome. His 'cellos especially are highly esteemed. Giovanni Pressenda (1777-?), a pupil of Storioni, was undoubtedly the greatest Italian master of the nineteenth century. He worked in Turin. Carlo Testore (1680-1715), a pupil of Amati, established himself at Milan. He employed chiefly Guarneri's model. Giovanni Grancino (1670-1730), also of Milan, shows considerable originality in his work.

(6) The French School. In France the art of violin-making was not practiced generally until the eighteenth century. The French masters are rather skillful imitators of the Italians than original masters. The models imitated are those of Brescia and particularly Cremona (Stradivari). Many of the makers resorted to artificial means to give their instruments the appearance of old violins. Whereas the Italian masters always strove to produce only the best violins, many French makers, in order to supply the demand, made varying qualities of instruments. The most famous French master is Nicolas Lupot (1758-1824), who copied Stradivari almost exclusively. Others worthy of mention are F. Pique (1788-1822), J. B. Vuillaume (1798-1875), P. Silvestre (1801-59), F. Gand (1802-45), G. Chanot (1801-83), S. Bernardel (1802-70), J. Germain (1822-70). At the present day the *art* of violin-making seems to have been driv-

en to the wall by the wholesale factories of Mirecourt.

(7) The German School. Very few of the German violins rose above mediocrity. One of the earliest makers is also the greatest. This is Jacob Stainer (1621-83). As far as his model is concerned it is entirely original, but he did adopt the famous Italian varnish. For a long time his violins were in exclusive demand in Germany; and not only German but also English connoisseurs ranked Stainer above the Italian masters. Among the many imitators of Stainer, Kloz and Widhalm deserve especial mention. Other German makers, notably Eberle, Bachmann, Jauch, Hunger, and Stainer's contemporary, Albani, worked after Italian models. But their work was not appreciated until later.

(8) The English School. Before the removal of duties on foreign violins violin-making flourished also in England. Jacob Rayman, a Tyrolean by birth, settled in London about the middle of the seventeenth century, and thus became the founder of the English school. His model is that of Stainer. Barak Norman (1688-1740) in his later years began to copy Maggini, thus helping to bring the Italian models into favor. Benjamin Banks (1727-95) used the model of Amati, which soon was in greater demand than that of Stainer. William Forster (c.1800) did not attain a great reputation until he had abandoned the Stainer pattern and adopted that of Amati. Bernard Fendt (1775-1823) was perhaps the most famous English imitator of Italian models, particularly of Stradivari.

For a century after the death of Stainer his instruments as well as those of his imitators were in great demand. But about the year 1800 the superiority of the Italian masters began gradually to be appreciated. The Amati instruments were the first to bring high prices. In 1804 an Amati was sold for $150. Stradivari's instruments were the next to be recognized; then those of Guarneri, Maggini, and Bergonzi. As soon as this demand for Italian violins became general the prices rose rapidly. Paris and London became the principal markets for old Italian violins. Private individuals began to collect them. The man who devoted his whole life to discover old instruments, and thus saved scores of valuable violins, was Luigi Tarisio, who died in 1854. After Tarisio's death Vuillaume bought his whole collection. Among these was a Stradivari, now in the possession of a Mr. Crawford of Edinburgh, which is valued at $15,000. The value of an instrument to-day depends upon the state of preservation, as well as the period of its maker. Thus it is that sometimes older instruments are of less value than violins of more recent date. See Quartet; Quintet; Music; Musical Instruments; and for further information consult: Vidal, *Les instruments à archet* (Paris, 1876-78); Rühlmann, *Geschichte der Bogeninstrumente* (Brunswick, 1882); Hart, *The Violin, Famous Makers and Their Imitators* (Boston, 1885).

VIOLLE, vē'ōl', Jules (1841—). A French physicist. He was born at Langres, France, and was educated at the Ecole Normale Supérieure. In 1870 he took the degree of doctor of science at the University of Paris, and his thesis, which was on the "Mechanical Equivalent of Heat," was published both in the *Comptes Rendus* and the *Annales de Chimie*. In 1883 he was appointed professor in the faculty of the University of Lyons, and in 1890 became the head of the department of physics in the Ecole Normale. The following year he was made professor of applied physics in the Conservatoire des Arts et Metiers. Violle became best known for his researches in radiation, heat, and photometry, having proposed the platinum standard of light emitted by a square centimeter of melting platinum at the instant previous to its solidification. This was adopted by the International Electrical Congress of 1883, but never came into extensive use as a standard of light, on account of the experimental difficulties involved in preparing the platinum. His publications include a *Cours de physique* (2d ed. 1883), and contributions to the *Encyclopédie chimique*.

VIOLLET-LE-DUC, vyȯ'lā' le-dụk', Eugene Emmanuel (1814-79). The most prominent architect of the Gothic revival in France, equally well known as an author on architectural subjects. He was born in Paris, and was educated at the Collège Bourbon. After studying architecture with Achille Leclère, he traveled through France studying mediæval monuments, and became proficient in designs of the Gothic style. He was especially skilled in the restoration of works of mediæval architecture, and did more than any other man to rehabilitate the Middle Ages. After some weeks at Vèzelay and Narbonne, he undertook, in association with Lassus, what were perhaps his best works, the restoration of the Sainte-Chapelle in Paris and the important additions and changes in Notre-Dame, Paris. Almost as important was his restoration of civil and military monuments, such as the royal chateau of Pierrefonds and the entire site of Carcassone, the most marvelous relic of Gothic fortifications. In 1863 he was appointed professor of æsthetics at Ecole des Beaux-Arts, but as he could obtain no hearing from the students, who were imbued with the classical traditions of the school, he resigned, publishing his lectures, *Entretiens sur l'architecture*, the following year. At the time of his death he was engaged in restoring the Cathedral of Lausanne.

He wrote a number of important books, admirable in their scholarly text and unrivaled illustrations. Among them are *Dictionnaire raisonné de l'architecture française* (10 vols., 1854-68) and *Dictionnaire raisonné du mobilier français* (6 vols., 1858-75). In his *Histoire d'une forteresse* (1874) and *Histoire d'un hotel de ville et d'une cathédrale* (1878) he draws an imaginary history of these typical mediæval buildings. Consult: Sauvageot, *Viollet-le-Duc et son œuvre* (Paris, 1880); and Saint-Paul, *Viollet-le-Duc, ses travaux d'art, etc.* (ib., 1881).

VI'OLONCEL'LO, *Ital. pron.* vē'ō-lŏn-chĕl'lō (It., diminutive of *violone*, augmentative of *viola*, viol). A large instrument of the violin class, held by the performer between his knees. It has four gut strings, the lowest of them covered with silvered copper wire, and is tuned in fifths: C, G, d, a. Its compass extends from C to a^2, and even higher. Its signature is usually the bass clef, the tenor or treble clef being used for the higher notes. In its present form the instrument dates from the latter half of the sixteenth century. Up to the eighteenth century its quality was little known, but since the time of Haydn the instrument has steadily gained in favor. It soon superseded the *viola da gamba.* The musical literature for the violoncello is exceedingly meagre.

VIONVILLE, vyôN'vêl', BATTLE OF. The most desperately contested battle of the Franco-German War, fought on the plateau of Vionville, some 12 miles west of Metz, between a French army of about 130,000 men under Marshal Bazaine and a German force of 67,000 men under Prince Frederick Charles, August 16, 1870; also known as the battle of Mars-la-Tour. The battle was one of the series of conflicts that prevented the retreat of the French Army on Chalons, being preceded by the battle of Colombey-Nouilly on the 14th and succeeded by that of Gravelotte (q.v.), on the 16th. The battle began at 10 in the morning with an attack by the Third Prussian Corps on the French under Frossard at Vionville. It lasted for nearly twelve hours and was marked by splendid cavalry charges on the part of the Germans and desperate fighting on both sides. Bazaine overestimated the strength of the enemy and held himself on the defensive until the Germans had been reënforced in sufficient strength to repel all attempts on the part of the French to break through their lines. The Germans lost 711 officers and 15,079 men; the French loss was given at 879 officers and 16,128 men.

VIOTTI, vė-ôt'tê, GIOVANNI BATTISTA (1753-1824). An Italian violin-player, born at Fontanetto, in Piedmont, and chiefly educated under Pugnani at Turin. After holding for a short time the appointment of first violinist in the royal chapel at Turin, he relinquished that office (1780) in order to travel in Europe with Pugnani. In Berlin, Saint Petersburg, Paris, and London his playing created a furore. He first visited London in 1782. An attempt to found an Italian opera was frustrated by the Revolution of 1791, and Viotti again went to London as a soloist. A groundless charge raised against him of being a revolutionary agent drove him from England; but after living for a time in retirement at Hamburg he returned to London, where he became manager of the Italian opera, and in 1795 director of the Opera Concerts. Ill success caused him to return to Paris, where he was director of the opera (1819-22). His compositions include violin concerts and quartets for violin, tenor, and violoncello, violin duets and solos, and a few pianoforte compositions. His playing was characterized by a vigor and brilliancy previously unknown. His compositions are valuable and still in general use. Consult Baillot, *Notice sur Viotti* (Paris, 1825).

VIPER (Lat. *vipera*, viper, adder, serpent, for **vivipara*, fem. sg. of *viviparus*, bearing living young, from *vivus*, alive + *parere*, to bear, produce). A venomous snake of the subfamily Viperinæ. (See VIPERIDÆ.) Nine genera and about 40 species are recognized by Gadow, all denizens of the Old World, and many known by other names and elsewhere described. (See ADDER; ASP; DEATH-ADDER; PUFF-ADDER; TREE-VIPER; and RATTLESNAKE.) The real vipers of the genus Vipera are European and Asiatic, and are typically represented by the common 'adder,' 'viper,' or 'kreuzotter' (*Vipera berus*), whose range extends from Great Britain (except Ireland) to Saghalien Island, and which is the only serpent in England except the water-snake (q.v.). It rarely exceeds two feet long, and is very variable—gray, yellowish, olive, brown, red, or black, marked along the back with a zigzag band, most distinct, of course, in the lighter specimens. The head is flat and triangular, the neck small, the body comparatively thick, and the tail short and pointed. Vipers prefer heaths, moors, and stony places, where they can retreat to thickets and rocky crevices. They are fond of sunning themselves on warm days, but do their hunting at night, when they are very likely to creep near camp-fires, as do other nocturnal venomous serpents. They gather into tangled masses when mating in the spring, and the young are born in the following July or August. They hibernate during cold weather in holes, where several will entwine themselves into a ball, varying the degree and length of their dormancy with the place and climate. Their bite is not as a rule fatal to a healthy man, but is followed by great depression and nervousness, and the wound is long and troublesome in healing.

The Mediterranean countries, along both shores, have another species (*Vipera aspis*), the asp (q.v.). From Italy to Armenia occurs the 'sand-viper' (*Vipera ammodytes*), which bears a fleshy 'horn' upon its nose; and a third species (*Vipera latastei*) inhabits Spain and Portugal. It was probably of the first of these southern species that ancient writers told their tales, such as that when vipers entwined together they produced the *ovum anguinum*, and similar statements. A medicinal value was long attributed to the flesh, and other old superstitions cluster about the animal.

The African vipers are such dreadful snakes as the death-adder, puff-adder, and saw-vipers (qq.v.). One, especially characteristic of the Egyptian deserts, but known from Algeria to Palestine, is the 'horned viper' (*Cerastes cornutus*), which burrows in the sand during the day, leaving only its nostrils and eyes exposed, but goes abroad at night in search of the small animals upon which it lives, and then is most likely to approach Bedouin camp-fires. It is a yellowish, faintly spotted snake, about two and a half feet long; and above each eye stands a large, horny, spike-like scale. It is more vicious and aggressive than most vipers, and is greatly feared, for its bite is usually fatal. Another species (*Cerastes vipera*) is hornless.

The largest, most ornate and deadly viper is that scourge of India, Ceylon, Burma, and Siam, Russell's viper (*Vipera* or *Daboia Russelli*), called 'tic-polonga' in Ceylon, 'bora' around Calcutta, 'jessur,' and sometimes 'carpet-snake' or 'chain-viper,' by Anglo-Indians. Its colors and markings are shown on the Plate of FOREIGN VENOMOUS SERPENTS under SNAKE. It reaches a length of five feet, and its poison is swift and sure in its fatal effects. Fortunately, the snake is sluggish, and not easily provoked; and its loud hisses when disturbed serve to warn men away, so that fewer human lives are lost by it than by cobras. For an explanation of the poison-apparatus, effects of poison, and bibliography, see SNAKE.

VIPER, DR. A character in Samuel Foote's play of *The Capucnin*. It depicted, under a thin disguise, an Irish clergyman named Jackson, who replied by fierce attacks in a paper which he edited and by suborning a servant to prefer infamous charges, of which Foote was acquitted in the Court of King's Bench.

VIPER-FISH. See LANTERN-FISH.

VIPER'IDÆ (Neo-Lat. nom. pl., from Lat. *vipera*, viper, adder, serpent). The most specialized and venomous family of snakes, ranked as the highest of ophidians. It is characterized by a wide, angular, depressed head, causing the neck to appear small in comparison; a short thick body; and a tail tapering suddenly to a point. The head is mostly covered with scales, rarely plates (or only a few about the eyes and lips), or with extremely fine plates. The scales are carinated, often rough, even spinous. The ventral shields are broad, and the sub-caudal plates in two rows. The nostrils are large, and in some species they close with a valve. The highly venomous serpents of this family are furnished with a pair of long, curved proteroglyph fangs attached on each side to the upper maxillary, which is movably articulated, and by special muscles swings or rocks to and fro, carrying the fang with it. When at rest, the fang, protected by a membranous sheath, lies supine along the jaw. The fang has a canal in its interior, connected with a poison-gland, the contents of which are ejected into the wound made by the fang in the act of biting. (See illustrations under SNAKE.) Behind the pair of functional fangs, others, in a rudimentary stage, are found, and come forward to take their place when one or both of them are broken or shed. The lower jaw has numerous solid teeth of the ordinary form. All vipers except the African genus Atractaspis are viviparous, and produce comparatively few young. The family includes terrestrial, arboreal, semi-aquatic, and burrowing types, and is almost world-wide in its distribution, but most numerous and highly developed in the tropics; Australia, Madagascar, and cold northern regions are free from these baneful serpents. The family includes two well-marked groups—the *Viperinæ*, or typical vipers (q.v.), which have no external pit between the eyes and the nose, and the maxillary not hollowed out above, and which belong wholly to the Old World; and the American and Asiatic *Crotalinæ*, or pit-vipers, which have a deep cavity between the eye and the nose lodged in the hollowed-out maxillary bone. The last-named are frequently ranked as a separate family. See CROTALIDÆ; RATTLESNAKE.

VIPER'S BUGLOSS, also called BLUE THISTLE (*Echium*). A genus of large, hairy herbs or shrubs of the natural order Boraginaceæ. The flowers are often very beautiful. The common viper bugloss (*Echium vulgare*), a large biennial plant, is a native of most parts of Europe, and introduced and spreading in most parts of the United States. It grows in dry places, not infrequently in grain fields. Its flowers are at first reddish, and afterwards blue. It derives its name, viper's bugloss, from spots on its stem, which somewhat resemble the spots on a viper; and the property of healing viper's bites was, therefore, ascribed to it.

VIQUE, vē'kā. A town in Spain. See VICH.

VIRACOCHA, vē'rā-kō'chā (foam of the sea, in allusion to his white beard). The supreme god of the ancient Quichua (q.v.) of Peru. He is represented as the creator and ruler of the sun, moon, and all other objects in nature, including the human race. In his incarnate form he is said to have issued from Lake Titicaca as a venerable man, with a fair skin and a flowing white beard. He proceeded northward, teaching those who would listen, and visiting swift miraculous destruction upon those who refused to hear. To the chief of Pacari-tampu or Paucartambo, 'The House of the Dawn,' who received him with special hospitality, he gave his staff, which afterwards turned to pure gold on the birth of the chief's next son, the famous Manco-Capac, founder of the Inca dynasty. Having accomplished his mission of organizing the Quichua tribes into a civilized community, he departed by way of the western ocean. In his principal attributes Viracocha appears as the universal Light God, as indicated by his fair complexion, white beard, his appearance in the east, and his journeying to the west. The god Pachacamac (q.v.) appears to be only Viracocha under another form. As the Aztec Emperor saw in Cortez the messenger of the lost Quetzalcoatl (q.v.), so the Peruvians, expecting the return of their great incarnate god, hailed the Spaniards, with their fair-skinned and bearded faces, as the children of Viracocha, and the name continues in common use among the natives to designate those of the white race.

VIRCHOW, vēr'kō, RUDOLF (1821-1902). An eminent German pathologist, anthropologist, and scholar, born at Schivelbein, Prussia. He was graduated in medicine in Berlin and became prosector of anatomy in the faculty, sharing the companionship of Henle, Schwann, Brücke, Helmholtz, Du Bois-Reymond, and other scholars who were destined to become distinguished discoverers of important medical facts. He became, in 1847, lecturer at the University of Berlin. Soon afterwards he was commissioned by the Government to investigate the cause and cure of typhus in Silesia. He founded, at this time, the *Archiv für pathologische Anatomie und Physiologie*, of which he remained editor till his death, and which is celebrated the world over as "Virchow's Archives." The political commotions of 1848 dragged him, in common with many other votaries of science, into the revolutionary vortex. He established a journal entitled the *Medical Reformer*, and also a democratic club, where he soon distinguished himself as an orator. On account of his political opinions, Virchow lost his post in 1849, and, though reinstated afterwards, he accepted in the same year a call to the chair of pathological anatomy in Würzburg. His lectures at that university were widely popular for the novel views which he advanced, particularly in cellular pathology. His reputation grew so great that he was recalled in 1856 to Berlin, where he re-occupied the chair of pathological anatomy, and rendered it the most famous of its kind in Europe. In 1859 he became a member of the Municipal Council of Berlin, where he distinguished himself as a reformer of the arbitrary police system then rampant. In 1862 he was chosen Deputy to the Prussian Diet, and soon rose to the leadership of the opposition, and proved a most effective antagonist of the encroachments made in name of the royal prerogative. He was one of the founders of the *Fortschrittspartei* (Progressists), and both as such and as a subsequent member of the *deutsch-freisinnige* party he was one of the most prominent figures of the German Reichstag from 1880 to 1893.

The first edition of his master-work, *Cellularpathologie*, was published in 1858, and attracted at once the attention and admiration, and later won the acceptance of the medical world, displacing the former pathological systems and theories for all time. (See PATHOLOGY.) His views were so clear, his theory so perfect, and his grasp of the matter so comprehensive that his fame was at once assured. His work upon tumors is of especial value, as it holds the practical and clinical aspects of the matter as of prime importance—a circumstance that is remarkable in view of the fact that Virchow was not a practitioner of medicine. His views combated the pessimistic theories of Rokitansky and the prevailing Vienna school of pathologists. His work in pathology is distinctly a creation, establishing the biologic principle that the laws working in disease are not different from those in operation in health, though subject to different conditions. The cellular theory was finally established in 1858. During the wars of 1866 and 1870-71, Virchow devoted himself to arranging, equipping and drilling hospital corps and ambulance squads, and directed the management of numbers of hospital trains, also taking charge of the immense Berlin military hospital, as well as of the sanitary arrangements of the troops in the field. The Franco-Prussian War ended, Virchow became a member of the Sanitary Bureau of the city of Berlin, with its problem of the disposal of sewage, neither of the two little streams near it being capable of receiving and transporting the refuse. Under his direction immense sewage farms were established after such a plan that they have kept pace in adequateness with the tremendous growth of the city, while the revenue from them is sufficient to meet and defray the expense of their maintenance.

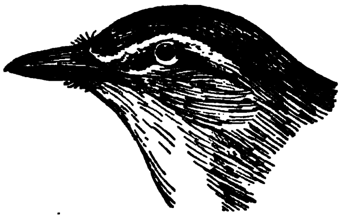
Virchow was also distinguished as an archæologist. His advice and learning were of great advantage to Schliemann in the latter's researches in Hissarlik, and in the plains of ancient Troy. Archæological anthropology gained much from his description of the bones found in the graves at Koban.

On October 13, 1901, upon the celebration of his eightieth anniversary, at a complimentary dinner in Berlin, a *Festschrift* was presented to him by a score of former students. Simultaneously testimonial dinners were given in other cities, notably New York and Chicago, in the United States, at which many physicians vied with each other in recounting the discoveries and sounding their praises of the great scientist, teacher, physician, and legislator.

Perhaps Virchow's greatest material monument is the Pathological Institute and Museum in Berlin, erected by the Government in accordance with his desires. It contained 23,000 specimens at the time of his death, and by far surpasses all similar collections in the world.

He was a very voluminous writer. Among his works are *Mittheilungen über die Typhus-Epidemie* (Berlin, 1848); *Die Cellularpathologie* (ib., 1858; trans., London, 1860); *Handbuch der speciellen Pathologie und Therapie* (ib., 1854-62); *Vorlesungen über Pathologie* (ib., 1862-72); *Die krankhaften Geschwülste* (ib., 1863-67). He also published many works on various topics, such as the gorilla, plague in its relations to public health, Goethe, Johannes Müller, spedalska (a disease peculiar to the Norwegian coasts), etc. Consult his *Life* by Beecher (Berlin, 1891).

VIR′EO (Lat. *vireo*, greenfinch, from *virere*, to be green, vigorous), or GREENLET. The common name of a family of about fifty insectivorous birds, having a plumage more or less tinted with green and olive. In the genus Vireo the bill is short, straight, notched, and hooked at the tip; wings long and pointed; toes of moderate length; tail moderate and even. There are about 30 species, a dozen of which occur in the United States, most of them migrating to and from South America and the West Indies. Many of these birds are singers, and the variety of song in the genus is great. All subsist exclusively upon insects, and are of immense service to the gardener and orchardist. All agree, also, in constructing a very artistic nest in the form of a cup of ribbon-like materials, such as grape-vine bark, ornamented with cobwebs, lichens, and the like; the typical form is shown on the Plate of PENSILE NESTS OF BIRDS, under NIDIFICATION.



RED-EYED VIREO.

The most familiar and widespread species in the United States is the red-eyed vireo (*Vireo olivaceus*), about six inches long; back and tail bright olive green, crown ashy, and a characteristic double line, dusky and white, over the eye, the iris of which is red. The white-eyed vireo (*Viero Noveboracensis*) is very similar, but has a white iris. A more southerly species is *Vireo barbatulus*, called 'Whip-Tom Kelley' in Jamaica after its call-notes. Of the others, the most striking is the yellow-throated (*Viero flavifrons*), which is bright olive green above, pure white beneath, and with the throat and breast bright yellow.

VIRGIL. See VERGIL.

VIRGIL′IA (Neo-Lat., named in honor of the Latin poet *Virgilius*, *Vergilius*, Vergil, in allusion to his agricultural poem, the *Georgica*). A genus of leguminous trees, natives of South Africa. The only species, *Virgilia capensis*, is a handsome tree 15-20 feet tall occurring abundantly along streams in Cape Colony. The wood is light, soft, and easily worked, and is much used for yokes, spars, etc. To this genus Michaux referred a North American tree, the yellow-wood (*Virgilia lutea*), but, from differences in the pods and other parts, Rafinesque made a new genus for it, Cladrastis, which is its present botanical name. See CLADRASTIS.

VIRGIL PRACTICE CLAVIER. See Pianoforte.

VIRGIN. See Mary; Madonna.

VIRGINAL (OF., Fr. *virginal*, from Lat. *virginalis*, maidenly, from *virgo*, maiden; so called probably because played especially by young girls). A keyed instrument, one of the precursors of the pianoforte. It resembled in form a small pianoforte, with a compass of four octaves, furnished with a quill and jack like those of the spinet, and a single string to each note.

VIRGINAL.

VIRGIN'IA. The heroine of a Roman legend of the days of the Republic. See Appius Claudius Crassus.

VIRGINIA (Neo-Lat., named in honor of Queen Elizabeth, the 'Virgin Queen'). A South Atlantic State of the United States, known popularly as the 'Old Dominion.' It lies between latitudes 36° 31′ and 39° 27′ N., longitudes 75° 13′ and 83° 37′ W., and is bounded on the north by West Virginia and Maryland, on the east by the Atlantic Ocean, on the south by North Carolina and Tennessee, and on the west by Kentucky. The southern boundary is a straight line 440 miles long, but the others are extremely irregular, following various Appalachian ridges on the northwest and the Potomac River on the northeast. The greatest breadth from north to south is 192 miles. The State includes the narrow peninsula lying between lower Chesapeake Bay and the ocean. The total area of Virginia is 42,450 square miles, including 2325 square miles of water. It ranks thirtieth in size among the States in total area, and thirty-second in land area.

Topography. The three great topographical regions which rise in broad, low terraces from the Atlantic coast of the United States—the Coastal Plain, the Piedmont Plain, and the Appalachian mountain region—cross the State in parallel bands from southwest to northeast. Two of these are further differentiated, so that six well-marked regions are recognized. The first is the tidewater country, which includes the region traversed by the four estuaries of the Potomac, Rappahannock, York, and James rivers, and the peninsula east of Chesapeake Bay. This is a low, level, and marshy region, watered by a multitude of tidal inlets, creeks, and rivers. On the west the land rises by a low, rocky escarpment to the Piedmont Plain, whose eastern portion is known as the middle country. The latter has an elevation of 100 to 500 feet, and is drier and more undulating than tidewater Virginia. It terminates on the west at a broken line of hills known as the Coast Mountains, from which the Piedmont section proper extends westward to the foot of the Blue Ridge. The Piedmont section has an elevation of from 500 to 1000 feet, and is rugged compared with eastern Virginia, having isolated knobs and ridges rising 100 to 600 feet above the general level. The Blue Ridge is considered as a region by itself, being the most prominent topographical feature of the State. It rises abruptly from the Piedmont Plain to a height of 1500 feet above it, or 2500 to over 3000 feet above the sea. The ridge is broken in places, notably by the Potomac on the northern State boundary and by the James River farther south. In the southwest it widens out into a triangular plateau, which on its western border bears the highest elevations in the State—Rogers Mountain, 5719 feet, and White Top, 5530 feet above the sea. North of this plateau the ridge is rather narrow and falls steeply on the west into the magnificent Great Valley, known in the north as the Shenandoah, and farther north, in Pennsylvania, as the Cumberland Valley. This is a continuous longitudinal depression about 20 miles wide, with its floor about 1200 feet above the sea. West of the valley lies the Appalachian section, a succession of numerous narrow and broken but parallel ridges running from southwest to northeast, and inclosing equally narrow longitudinal valleys. The ridges are generally about 3500 feet in elevation, and are known under a multitude of local names, though collectively they form the Alleghany Mountains in the northeast and the Cumberland Mountains in the southwest.

Hydrography. The greater part of the State's surface is drained directly into the Atlantic or its great arm, Chesapeake Bay. The largest river within the State is the James, which rises on the western boundary, breaks through the Blue Ridge, and enters the foot of Chesapeake Bay through a large tidal estuary. All of the rivers flowing into Chesapeake Bay enter it through estuaries which are very large for the size of the stream, such as the York River, the common estuary of the Pamunkey and Mattapony, the estuary of the Rappahannock, and, greatest of all, that of the Potomac on the northeastern boundary. All the rivers east of the Blue Ridge flow in parallel southeastward courses, and those traversing the southern part of the Piedmont Plain, chief of which is the Staunton, flow across the boundary into North Carolina. The Great Valley and Appalachian region are drained by several river systems. Through the northern part of the valley flows the Shenandoah to join the Potomac, while the central valley and mountain region are watered by the upper course of the James and its tributaries. Farther south the New River or Great Kanawha traverses the mountain belt and passes into West Virginia on its way to the Ohio, while the southwestern part of the State gives rise to the headstreams of the Tennessee River. The deep and wide estuaries of the eastern rivers admit large vessels to the heart of the State, but a short distance above the heads of the estuaries navigation is blocked on all the rivers at the Fall Line, where the streams fall over the escarpment of the Piedmont Plain. The only lake in Virginia is Drummond Lake, situated in the centre of the Dismal Swamp (q.v.), in the southeastern corner of the State.

CLIMATE. East of the Blue Ridge the climate is mild or temperately warm, with a mean temperature of 37° for January and 77° for July. The minimum here rarely falls below 10°, while the maximum may reach 110°, though it is generally about 100°. In the uplands the climate is dry and healthful, but malarial diseases are endemic in the tidewater section. West of the Blue Ridge the summers are cool and very pleasant, while the winters, especially on the mountains, are cold. The mean temperature at Staunton, in the Great Valley, is 33.4° for January and 74.6° for July. The minimum in this section may reach 8° below zero. The rainfall is sufficient throughout the State, and favorably distributed for agriculture. It is greatest in the central portion near Richmond, where the average is 48 inches. In the Great Valley it is 38 inches.

SOIL AND VEGETATION. The soils of eastern Virginia are in general light and sandy, except in the bottom lands and in the marsh regions, where a deep layer of vegetable mold has accumulated. In the Piedmont upland the soil is generally more fertile, having been enriched by decayed greenstone material. The most fertile portion of the State, however, is the Great Valley, where the underlying rocks are ancient limestones, whose decomposed materials are admirably adapted for wheat and other grain. The forests are still of considerable extent, and consist in the coastal plain chiefly of yellow pine and cedar, with cypress in the swamps and some oak, hickory, locust, and persimmon. In the western uplands there are large forests of deciduous trees, with white pine on the mountains, and with the general characters of the Appalachian floral region. See paragraph *Flora* under UNITED STATES.

GEOLOGY AND MINERAL RESOURCES. As in the other Atlantic States, the principal geological formations run in parallel bands from southwest to northeast, and correspond closely to the topographical regions, whose characteristics, in fact, are dependent upon the underlying rock formations. The coastal plain or tidewater section is overlaid by unconsolidated strata of sand, gravel, clay, and marl of Tertiary and later origin. The western boundary of the coastal plain formation runs from the neighborhood of Washington due south, passing west of Richmond. Between this line and the Blue Ridge the country is of Archæan origin, consisting of granite, gneiss, syenites, and slates, with intrusions of greenstone in the west. The central part of the region, however, was submerged in early Mesozoic times, and several large patches of rock belonging to the Jura-Trias system still remain. The Blue Ridge consists mainly of Potsdam sandstone of the Cambrian system, and the valleys and ridges to the west of it are of Lower Paleozoic age, Silurian limestone predominating in the valleys, and Devonian rocks on the ridges. A peculiar feature of the limestone region in the Great Valley is the formation of great caverns which rank among the foremost natural curiosities in the country, such as Weyer's Cave in Augusta County, and the arched remnant of a cave, famous as the 'Natural Bridge,' in Rockbridge County.

Virginia has a great and varied mineral wealth. Iron is found as magnetite along the eastern base of the Blue Ridge, limonite on its western slope and in various other localities, and red hematite in the western Alleghanies. Other metals found in the mountain region are zinc, lead, tin, and copper, and manganese is widely distributed. Through the Archæan rocks of middle Virginia runs an auriferous quartz reef, and silver is also found in small quantities. Building stones, granite, limestones, and sandstones are found of great beauty and variety, and in inexhaustible quantities. Hydraulic limestone is also abundant, and in the southwestern corner of the State there are immense ledges of gypsum and rock salt. Even the tidewater section contains valuable minerals in the form of greensand marl.

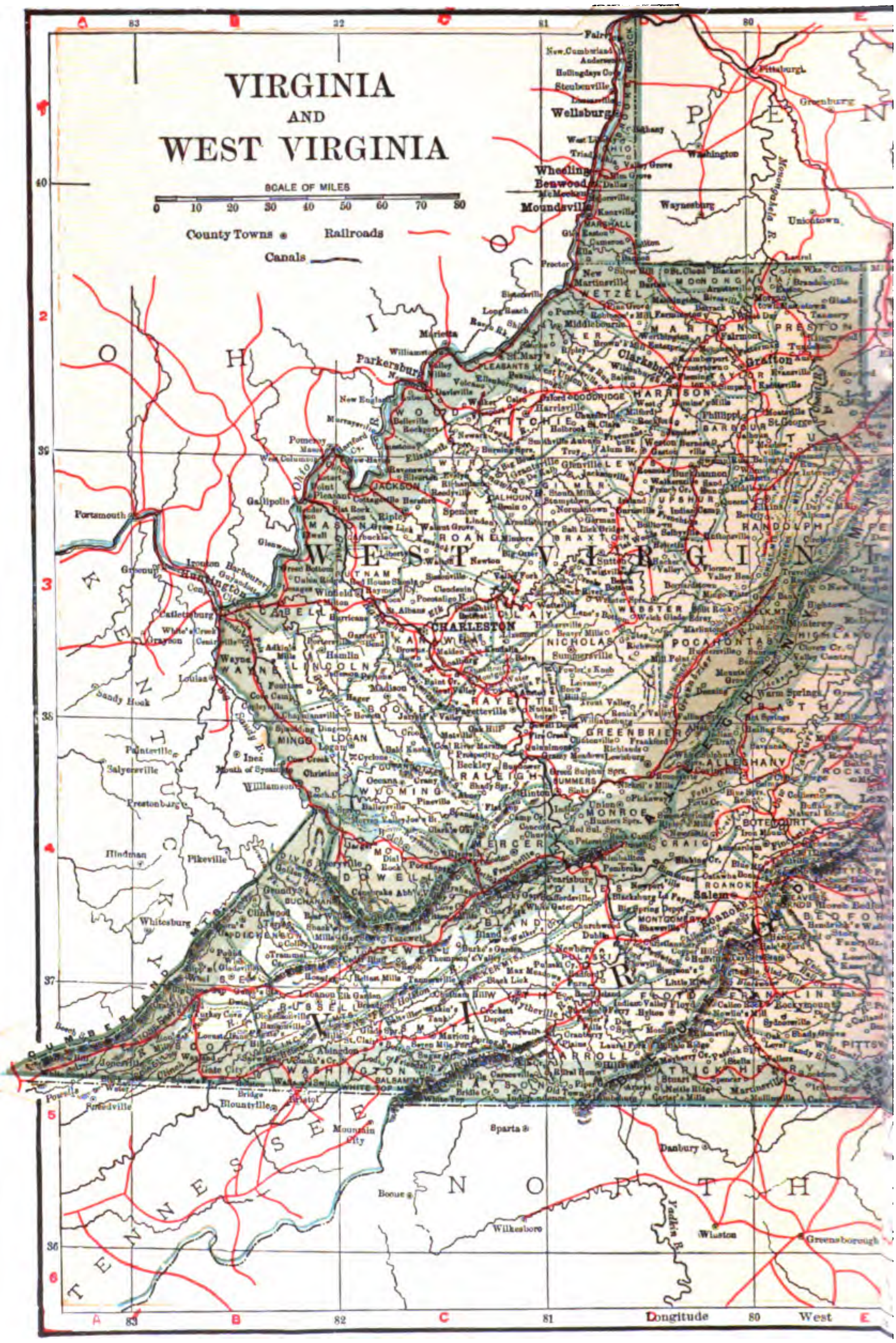
MINING. The mining industry has never reached any great development, but it has, nevertheless, for a long time been an important factor in the industrial history of the State. Coal (mostly bituminous) is mined in the Appalachian region. The total product of the State, as reported for the year 1882, was 112,000 tons, and increased to over a million tons for 1888. There was then a steady decrease of product until 1892, when it fell to 675,205 tons. Subsequently, however, extensive developments in Wise County brought up the annual output again to more than 1,000,000 tons. Some of this product is used in the making of coke. The output of iron rose in 1900 to 490,000 short tons. Almost all of this was brown hematite, constituting one-half of the country's output of that ore. Considerable quantities of stone, principally granite, limestone, and slate, are quarried in the central and Piedmont districts. The annual value for the last decade approximated $500,000; in 1900 it was $670,000. Virginia is one of the important mineral-water States; the product of 39 springs aggregated $320,000 in value in 1899. Gold, silver, and some other minerals have been mined for a long time, but are at present of very little importance.

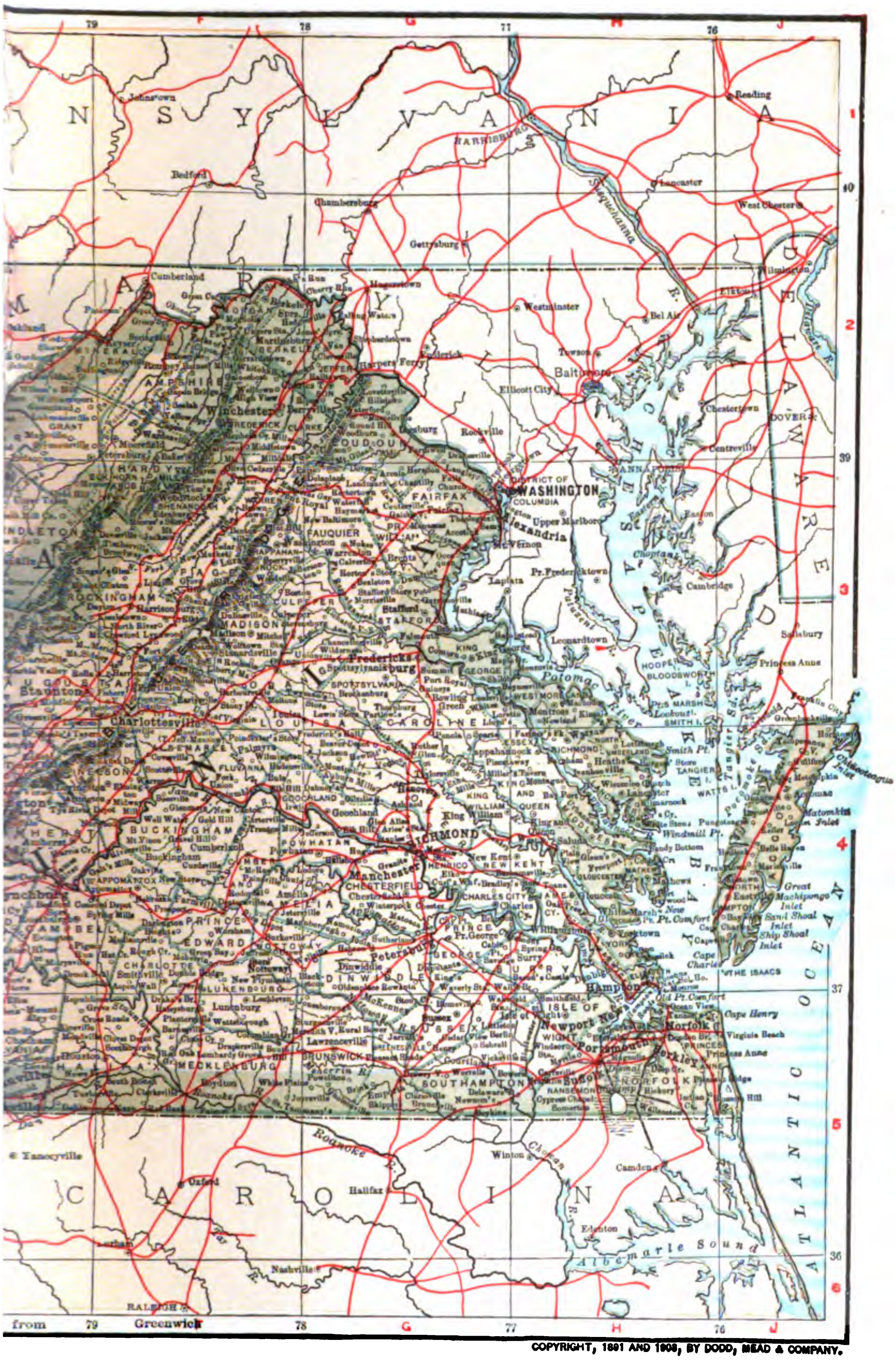
FISHERIES. Virginia ranks close to Massachusetts, New York, New Jersey, and Maryland in the importance of sea fisheries. In 1897 there were 28,000 men employed in the industry, this being a decided increase over the beginning of the decade. There was also an increase in the total product, but the value ($3,179,000) was much less, owing to the decline in prices. About two-thirds of the total product represented oysters, and it was in these that the decrease in price was greatest. Among other varieties, shad, menhaden, clams, and alewives are most important, the first three showing an increase in value during the period 1890-1900.

AGRICULTURE. The short mild winters and the long summers, with plentiful rains, are conducive to farming. The soil, however, is generally much inferior to the soils of the Mississippi Valley, and the yield per acre very much less. There is a great variation of soil in the different physical divisions. The region of greatest fertility is the Shenandoah Valley, while the Piedmont district, extending across the State in a southwesterly direction par-

AREA AND POPULATION OF VIRGINIA BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles	Population.	
				1890.	1900.
Accomac	J 3	Accomac	478	27,277	32,570
Albemarle	F 4	Charlottesville	755	26,788	28,473
Alexandria	H 3	Fort Myer	32	4,258	6,430
Alleghany	D 4	Covington	452	9,283	16,330
Amelia	F 4	Amelia	355	9,068	9,037
Amherst	E 4	Amherst	464	17,551	17,864
Appomattox	F 4	West Appomattox	342	9,589	9,662
Augusta	E 3	Staunton	1,012	30,030	32,370
Bath	E 3	Warm Springs	548	4,587	5,595
Bedford	E 4	Bedford City	729	31,213	30,356
Bland	C 4	Bland	352	5,129	5,497
Botetourt	E 4	Fincastle	548	14,854	17,161
Brunswick	G 5	Lawrenceville	529	17,245	18,217
Buchanan	B 4	Grundy	492	5,867	9,692
Buckingham	F 4	Buckingham	552	14,383	15,266
Campbell	E 4	Rustburg	554	21,378	23,256
Caroline	G 3	Bowling Green	562	16,681	16,709
Carroll	D 5	Hillsville	445	15,497	19,303
Charles City	G 4	Charles City	183	5,066	5,040
Charlotte	F 4	Smithville	479	15,077	15,343
Chesterfield	G 4	Chesterfield	484	16,965	18,804
Clarke	F 2	Berryville	189	8,071	7,927
Craig	D 4	Newcastle	351	3,835	4,293
Culpeper	F 3	Culpeper	399	13,233	14,123
Cumberland	F 4	Cumberland	297	9,482	8,996
Dickenson	B 4	Clintwood	324	5,077	7,747
Dinwiddie	G 4	Dinwiddie	521	13,515	15,374
Elizabeth City	H 4	Hampton	50	16,168	19,460
Essex	H 4	Tappahannock	277	10,047	9,701
Fairfax	G 3	Fairfax	433	16,655	18,580
Fauquier	G 3	Warrenton	676	22,590	23,374
Floyd	D 5	Floyd	383	14,405	15,388
Fluvanna	F 4	Palmyra	289	9,508	9,050
Franklin	D 5	Rockymount	690	24,985	25,953
Frederick	F 2	Winchester	425	12,684	13,239
Giles	D 4	Pearisburg	349	9,090	10,793
Gloucester	H 4	Gloucester	253	11,653	12,832
Goochland	F 4	Goochland	296	9,958	9,519
Grayson	C 5	Independence	438	14,394	16,853
Greene	F 3	Stanardsville	150	5,622	6,214
Greenesville	G 5	Emporia	288	8,230	9,758
Halifax	E 5	Houston	806	34,424	37,197
Hanover	G 4	Hanover	478	17,402	17,618
Henrico	G 4	Richmond	273	22,006	30,062
Henry	E 4	Martinsville	425	18,208	19,265
Highland	E 3	Monterey	407	5,352	5,647
Isle of Wight	H 5	Isle of Wight	352	11,313	13,102
James City	H 4	Williamsburg	159	3,812	3,688
King and Queen	G 4	King and Queen	336	9,669	9,265
King George	G 3	King George	183	6.641	6,918
King William	G 4	King William	246	9,605	8,380
Lancaster	H 4	Lancaster	137	7,191	8,949
Lee	A 5	Jonesville	433	18,216	19,856
Loudoun	G 2	Leesburg	519	23,274	21,948
Louisa	F 3	Louisa	529	16.997	16,517
Lunenburg	F 4	Lunenburg	471	11,372	11,705
Madison	F 3	Madison	336	10,225	10,216
Mathews	H 4	Mathews	92	7,584	8,239
Mecklenburg	F 5	Boydton	640	25,359	26,551
Middlesex	H 4	Saluda	156	7,458	8,220
Montgomery	D 4	Christiansburg	394	15,682	15,852
Nansemond	H 5	Suffolk	393	19,692	23,078
Nelson	E 4	Lovingston	472	15,336	16,075
New Kent	G 4	New Kent	233	5,511	4,865
Norfolk	H 5	Portsmouth	425	28,899	50,780
Northampton	J 4	Eastville	232	10,313	13,770
Northumberland	H 4	Heathsville	235	7,885	9,846
Nottoway	F 4	Nottoway	304	11,582	12,366
Orange	F 3	Orange	349	12,814	12,571
Page	F 3	Luray	317	13,092	13,794
Patrick	D 5	Stuart	489	14,147	15,403
Pittsylvania	E 5	Chatham	986	49,636	46,894
Powhatan	G 4	Powhatan	284	6,791	6,824
Prince Edward	F 4	Farmville	345	14,694	15,045
Prince George	G 4	Prince George	302	7,872	7,752
Princess Anne	H 5	Princess Anne	285	9,510	11,192
Prince William	G 3	Manassas	353	9,805	11,112
Pulaski	D 4	Pulaski City	338	12,790	14,609
Rappahannock	F 3	Washington	264	8,678	8,843
Richmond	H 4	Warsaw	188	7,146	7,088
Roanoke	D 4	Salem	297	13,942	15.837
Rockbridge	E 4	Lexington	598	22,018	21,799
Rockingham	E 3	Harrisonburg	870	31,299	33.527
Russell	B 5	Lebanon	503	16,126	18,031
Scott	B 5	Gate City	535	21,694	22,694
Shenandoah	F 3	Woodstock	486	19,671	20,253
Smyth	C 5	Marion	444	13,360	17,121
Southampton	G 5	Courtland	609	20,078	22,848
Spottsylvania	G 3	Spottsylvania	401	9,705	9,239
Stafford	G 3	Stafford	285	7,362	8,097
Surry	H 4	Surry	292	8,256	8,469
Sussex	G 5	Sussex	490	11,100	12,082
Tazewell	C 4	Tazewell	557	19,899	23,384
Warren	F 3	Front Royal	226	8,280	8,837


VIRGINIA
AND
WEST VIRGINIA
SCALE OF MILES
0 10 20 30 40 50 60 70 80
County Towns
Railroads
Canals
A 83 B 82 C 81 80 E
1
2
3
4
5
6
40
39
38
37
36
Longitude 80 West
OHIO
KENTUCKY
TENNESSEE
NORTH
WEST VIRGINIA
VIRGINIA
PENN
Pittsburgh
Steubenville
Wellsburg
Wheeling
Benwood
Moundsville
Washington
Waynesburg
Uniontown
Marietta
Parkersburg
Pomeroy
Gallipolis
Portsmouth
Ironton
Huntington
Catlettsburg
Greenup
Louisa
Sandy Hook
Paintsville
Salyersville
Prestonburg
Hindman
Pikeville
Whitesburg
Williamson
Logan
CHARLESTON
Clarksburg
Fairmont
Grafton
Spencer
Ripley
Beckley
Salem
Roanoke
Bristol
Blountville
Mountain City
Sparta
Boone
Wilkesboro
Danbury
Winston
Greensborough



COPYRIGHT, 1891 AND 1903, BY DODD, MEAD & COMPANY.

AREA AND POPULATION OF VIRGINIA BY COUNTIES.

(*Continued.*)

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Warwick	H 4	Denbigh	85	2,201	4,888
Washington	B 5	Abingdon	605	26,118	28,995
Westmoreland	H 3	Montross	245	8,399	9,243
Wise	B 4	Wise	413	9,345	19,653
Wythe	C 5	Wytheville	474	18,019	20,437
York	H 4	Yorktown	124	7,596	7,482
City of Alexandria	G 3		...	14,339	14,528
City of Bristol	B 5		...	2,902	4,579
City of Buena Vista	E 4		...	1,044	2,388
City of Charlottesville	F 3		...	5,591	6,449
City of Danville	E 5		...	10,305	16,520
City of Fredericksburg	G 3		...	4,528	5,068
City of Lynchburg	E 4		...	19,709	18,891
City of Manchester	G 4		...	9,246	9,715
City of Newport News	H 5		...	4,449	19,635
City of Norfolk	H 5		...	34,871	46,624
City of Petersburg	G 4		...	22,680	21,810
City of Portsmouth	H 5		...	13,268	17,427
City of Radford	D 4		...	2,060	3,344
City of Richmond	G 4		...	81,388	85,050
City of Roanoke	E 4		...	16,159	21,495
City of Staunton	E 3		...	6,975	7,289
City of Williamsburg	H 4		...	1,831	2,044
City of Winchester	F 2		...	5,196	5,161

AREA AND POPULATION OF WEST VIRGINIA BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Barbour	D 2	Philippi	393	12,702	14,198
Berkeley	C 4	Martinsburg	257	18,702	19,469
Boone	C 3	Madison	512	6,885	8,194
Braxton	D 3	Sutton	541	13,928	18,904
Brooke	D 1	Wellsburg	97	6,660	7,219
Cabell	B 3	Huntington	261	23,595	29,252
Calhoun	C 3	Grantsville	276	8,155	10,266
Clay	C 3	Clay	348	4,659	8,248
Doddridge	D 2	West Union	344	12,183	13,689
Fayette	C 3	Fayetteville	775	20,542	31,987
Gilmer	D 3	Glenville	367	9,746	11,762
Grant	E 2	Petersburg	483	6,802	7,275
Greenbrier	D 4	Lewisburg	1,051	18,034	20,683
Hampshire	F 2	Romney	662	11,419	11,806
Hancock	D 1	New Cumberland	86	6,414	6,693
Hardy	F 3	Moorefield	594	7,567	8,449
Harrison	D 2	Clarksburg	431	21,919	27,690
Jackson	C 3	Ripley	455	19,021	22,987
Jefferson	G 2	Charlestown	213	15,553	15,935
Kanawha	C 3	Charleston	872	42,756	54,696
Lewis	D 3	Waston	414	15,895	16,980
Lincoln	B 3	Hamlin	441	11,246	15,434
Logan	C 4	Logan	494	11,101	6,955
McDowell	C 4	Welch	538	7,300	18,747
Marion	D 2	Fairmont	357	20,721	32,430
Marshall	D 2	Moundsville	311	20,735	26,444
Mason	B 3	Point Pleasant	457	22,863	24,142
Mercer	C 4	Princeton	437	16,002	23,023
Mineral	E 2	Keyser	332	12,085	12,883
Mingo	B 4	Williamson	424	......	11,359
Monongalia	D 2	Morgantown	368	15,705	19,049
Monroe	E 4	Union	464	12,429	13,130
Morgan	F 2	Berkeley Springs	235	6,744	7,294
Nicholas	D 3	Summersville	691	9,309	11,403
Ohio	D 1	Wheeling	111	41,557	48,024
Pendleton	E 3	Franklin	1,707	8,711	9,167
Pleasants	C 2	Saint Marys	142	7,539	9,345
Pocahontas	B 3	Marlinton	858	6,814	8,572
Preston	E 2	Kingwood	671	20,355	22,727
Putnam	C 3	Winfield	353	14,842	17,330
Raleigh	C 4	Beckley	560	9,597	12,436
Randolph	D 3	Elkins	1,086	11,633	17,670
Ritchie	C 2	Harrisville	457	16,621	18,901
Roane	C 3	Spencer	547	15,303	19,852
Summers	D 4	Hinton	368	13,117	16,265
Taylor	D 2	Grafton	182	12,147	14,978
Tucker	E 2	Parsons	440	6,459	13,433
Tyler	D 2	Middlebourne	269	11,962	18,252
Upshur	D 3	Buckhannon	326	12,714	14,696
Wayne	B 3	Wayne	545	18,652	23,619
Webster	D 3	Addison	590	4,783	8,862
Wetzel	D 2	New Martinsville	365	16,841	22,880
Wirt	C 3	Elizabeth	254	9,411	10,284
Wood	C 2	Parkersburg	357	28,612	34,452
Wyoming	C 4	Oceana	526	6,247	8,380

allel to the Blue Ridge range of mountains, is also well adapted for general agriculture. Greater productivity is now being secured through the increased use of fertilizers, the amount in 1894 having averaged $22 per farm. The agricultural interests of the State suffered vastly from the Civil War, and important changes have been made in the agricultural system since that time. In 1860 the farms averaged 336 acres in size; in 1900 the average was 118.6 acres. In 1900, 19,907,883 acres, or 77.5 per cent. of the area of the State, were included in farms, and 10,094,805 acres were improved. The improved area increased nearly 1,000,000 acres between 1890 and 1900. Since 1880 there has not been any marked tendency toward an increase in the tenant-operated farms, as against the farms operated by owners. In 1900 the latter class included 69.3 per cent. of the farms, and of the remainder two-thirds were rented on the share system. About one-fourth of the farms are operated by negroes, but such farms include only 11.2 per cent. of the total farm acreage. By far the most common and most valuable crop is corn, the acreage of which has grown in recent years. Wheat, the next most important cereal, has also increased its area since 1890. Oats, the only other crop of much importance, has declined in rank since the Civil War. Strawberries and other small fruits are extensively grown. Between 1890 and 1900 there was an increase of 88.5 per cent. in the total number of fruit trees. In the latter year there were 8,190,025 apple trees, which was 75.6 per cent. of the total number of fruit trees. The acreage of peanuts almost doubled between 1890 and 1900, and the State ranks first in the cultivation of this product. Their production is largely confined to the southeastern counties. Some of the southern counties raise cotton, but the industry is declining. The following table shows the acreage of the leading crops for the census years indicated:

CROP	1900	1890
Corn	1,910,085	1,600,690
Wheat	927,266	737,510
Oats	275,394	495,508
Rye	31,534	52,063
Buckwheat	19,251	5,170
Hay	612,962	....
Tobacco	184,334	....
Peanuts	116,914	....
Cotton	25,724	39,213
Dry peas	22,206	....
Potatoes	51,021	....
Sweet potatoes	40,681	....

From the beginning of the State's history tobacco has been one of its most important economic products, and prior to the Civil War the State had always ranked first in its production. There is a great fluctuation in the area devoted to it from year to year, the increase from 1889 to 1899 amounting to 66.7 per cent. The crop is grown most extensively in the south central counties. The tidewater and midland sections have developed into one of the leading truck-farm regions in the United States. The freight steamers trading between the coast towns and the large Northern centres provide special accommodations for the marketing of truck. In 1899 97,285 acres were reported in miscellaneous vegetables, of which the most important were cabbages, tomatoes, and watermelons. Both Irish and sweet potatoes are important products.

Stock-Raising. Stock-raising is growing in importance in the north central and western parts, where the blue grass flourishes. The number of dairy cows and of other cattle, horses, and mules has increased every decade since 1870, while sheep and swine were each more numerous in 1900 than in 1870. In the last census decade there was an increase of 34.5 per cent. in the production of milk. The following table shows the number of domestic animals on farms:

ANIMALS	1900	1890
Dairy cows	281,876	273,634
Other cattle	543,636	473,700
Horses	298,522	242,512
Mules and asses	47,886	37,533
Sheep	392,123	495,313
Swine	946,443	796,691

Forests and Forest Products. In 1900 the woodland included about 23,400 square miles, or 58 per cent. of the land area. The pine forests which were formerly common in the mountain region have been generally removed. The greatest cut in late years consists of the yellow pine found in the region below the Fall Line, and these forests also have become largely depleted. The Piedmont forests consist largely of oak and other hard wood, and from this region likewise the better has been cut. The value of the timber cut in 1900 was more than twice as great as that in 1890. See table in the following paragraph.

Manufactures. Like most other Southern States, Virginia has, since 1880, had a noteworthy industrial growth. The value of manufactured products increased from $51,780,992 in 1880 to $132,172,910 in 1900. The aggregate capital invested in the latter year was $103,670,988, and there were 72,702 persons engaged as wage-earners. The varied and extensive resources of the State can well supply raw materials for an extensive manufacturing industry. The culture and manufacture of tobacco has always played a leading part in the economic life of the State. The second most important branch of industry, flour and grist milling, also draws upon the State's agricultural products. The State produces sufficient quantities of flour to allow of exportations to foreign countries. Virginia's production of iron ore and coal has made the manufacture of iron one of the leading industries. This industry is carried on chiefly in the western part of the State. The closely allied foundry and machine-shop industry made decided gains between 1890 and 1900. Among its principal products are tobacconists' tools and machinery. One of the most rapidly developing industries is tanning, which has the special advantage of the oak bark which the timber of the State affords. The manufacture of cotton goods, although still small, is a growing industry. The abundant water power of the Piedmont district is being utilized in this connection. Between 1890 and 1900 there was a large increase in the railroad car and shop construction business. Since the Civil War the manufacture of fertilizers has become a leading industry. Richmond is the principal manufacturing centre, but Norfolk is the most rapidly growing centre. The following table shows the relative importance of the leading industries:

INDUSTRIES	Year	Number of establishments	Wage-earners, average number	Value of products, including custom work and repairing
Cars and general shop construction and repairs by steam railroad companies	1900	28	4,922	$6,277,279
	1890	8	1,643	1,504,995
Fertilizers	1900	39	1,171	3,415,850
	1890	28	600	2,475,638
Flouring and grist mill products	1900	1,726	790	12,687,267
	1890	1,179	1,475	11,716,356
Foundry and machine shop products	1900	80	2,912	4,833,137
	1890	59	1,971	2,739,695
Iron and steel	1900	20	3,097	8,341,888
	1890	21	3,010	6,326,084
Leather, tanned, curried, and finished	1900	65	889	4,716,920
	1890	82	401	1,224,800
Lumber and timber products	1900	1,341	7,611	12,137,177
	1890	663	5,973	5,630,600
Lumber, planing mill products, including sash, doors, and blinds	1900	88	1,333	2,686,898
	1890	65	1,136	2,350,281
Textiles:				
Total	1900	35	3,293	3,282,583
	1890	44	2,389	2,342,457
Cotton goods	1900	7	2,931	2,655,002
	1890	9	1,990	1,732,648
Woolen goods	1900	28	362	627,581
	1890	35	399	609,809
Tobacco:				
Total	1900	212	11,815	21,278,266
	1890	296	13,658	22,020,298
Tobacco, chewing, smoking, and snuff	1900	69	6,061	10,707,766
	1890	93	9,769	11,804,813
Tobacco, cigars and cigarettes	1900	89	2,595	4,843,641
	1890	102	2,259	3,727,842
Tobacco, stemming and rehandling	1900	54	3,159	5,726,859
	1890	101	1,630	6,487,643
Total for selected industries for State.	1900	3,634	37,833	$79,657,265
	1890	2,445	32,256	58,331,204
Increase, 1890 to 1900		1,189	5,577	$21,326,061
Per cent. of increase		48.6	17.3	36.6
Per cent. of total of all industries in State	1900	44.1	52.0	59.9
	1890	41.3	60.2	66.0

Transportation. The numerous bays and arms of the sea afford a number of excellent harbors, and, together with the rivers, form an extensive system of navigable waterways. The James River is navigable for small ocean steamers as far as Richmond, while Norfolk and other coast ports afford an excellent harbor for larger vessels. The Rappahannock and other streams are navigable for river boats. Virginia took an early interest in the construction of railroads. In 1840 there were 147 miles; in 1860, 1379 miles; in 1880, 1893 miles; in 1890, 3359 miles; and in 1899, 3721 miles. The principal railway systems are the Atlantic Coast Line, which is a combination of routes on various connecting lines, by which travel is possible the entire length of the Atlantic coast without change of cars; the Norfolk and Western and its divisions; the Southern, and the Chesapeake and Ohio. Other facilities are the James River and Kanawha Canal, from Richmond to Buchanan, 198 miles; the Albemarle and Chesapeake Canal, from Norfolk to Albemarle Sound; and the Dismal Swamp Canal, which makes the same connections by another route.

Commerce. For the year ending June 30, 1900, the imports exceeded $3,000,000, and the exports were nearly $48,000,000. This was an increase of $19,000,000 over the exports of 1894. Newport News is the most flourishing port; the exports from this customs district alone amounted to $34,900,000, making it fifth in importance among the Atlantic coast ports. Nearly all of the balance of the exports was from the customs district of Norfolk and Portsmouth. Only a very small percentage of the total was foreign trade. The principal exports were flour, oats, corn, cattle, tobacco, lumber, and lard.

Banks. Though there are no records of organized banks in Virginia before 1792, the banking business was known in the State for a century before, and was conducted by private individuals. The special act of 1777 prohibiting the issue of currency by private persons shows how common a practice it was. Lack of instruments of exchange forced the State to issue notes, and the necessities of the Revolutionary War increased their number, but the rapid depreciation of these notes left the State without a stable currency. In 1792 the banks of Alexandria and of Richmond were established. In 1795 branches of the Bank of the United States were organized. In the first two decades of the nineteenth century there developed half a dozen large banking institutions with a great number of branches all over the State—altogether over 40 branches. The issue was strictly limited to three times their capital, and directors were made liable to loss. Because of the branch system, these banks were very strong and did a profitable business. This called forth a large number of private or unchartered banks of issue, but they were all prohibited by the law of 1816. In 1837 a free banking law was passed and a large number of banks of issue organized under it, and a still larger number of banks of deposit and discount. In 1860 there were 24 banks of issue with 41 branches, and between 150 and 200 banks of deposit and discount. Not a bank survived the war. The national bank, however, soon appeared. State banks began to reappear in 1869, after the new Constitution was adopted. There was no regulation at all of the State banks until 1885, when a law was passed requiring reports to the State Auditor. Not only the Legislature, but circuit courts are empowered to issue banking charters. After 1885 the number of State banks greatly increased.

The condition of the banks in 1902 is shown in the following table:

	National banks	State banks
Number	59	120
Capital	$6,542,000	$6,587,000
Surplus	2,717,000	1,996,000
Cash, etc	2,291,000	1,824,000
Deposits	29,035,000	27,478,000
Loans	30,634,000	27,052,000

Finances. During the colonial days the financial needs were very small, and for almost a century the budget increased hardly 50 per cent., being £4200 in 1660, £4500 in 1700, and £6500 in 1754. The main sources of income were a poll tax and an export duty on tobacco. The Revolutionary War necessitated expenses for which there was no provision in the system of taxation, and thus a debt of about $2,000,000 was created. The debt was assumed by the Federal Government in 1790, and until 1820 the debt of Virginia consisted only of $343,139, borrowed only for purposes of the War of 1812. Several small issues of bonds were made between 1820 and 1835.

The idea of public improvements, which developed in the thirties, found enthusiastic supporters in the State. In 1835 the debt hardly amounted to $2,500,000, but during the short period 1835-38 $4,132,700 was loaned, the main purpose being the construction of canals and railroads. Although the debt had grown to $12,000,000 in 1857, an act was passed in that year authorizing the Board of Public Works to borrow the necessary sums for the continuation of the works and the refunding of old debts. Within the ten years 1851-61 debts to the amount of $24,538,716 were incurred, and at the beginning of the Civil War Virginia had a debt of more than $35,000,000, created for the purpose of constructing railroads, canals, and roads. During the war the interest could not be paid and many more loans were made; and although these loans for war purposes were repudiated by order of President Johnson, the overdue interest payments swelled the debt considerably. This interest was funded by special act in 1867, and for a year Virginia met her obligations, but, passing under military control, was again forced to stop payment of interest. By 1870 the debt had grown to $45,872,778. A complicating circumstance was the organization of the western counties into a new State—West Virginia. Virginia, holding that the new State was responsible for part of the debt, was willing to pay only two-thirds of the interest, namely, 4 per cent. An effort was made in 1871 to settle the question by a process of refunding the whole debt. One-third of it was designated as the part of West Virginia, and refunding of this part was made dependent upon settlement with that State. This settlement was never brought about and a third of the debt was thus absolutely repudiated. The rest of the debt was to be refunded at its full value and old rate of interest, with the coupons made receivable for taxes. This clause is mentioned because it was the main political question in Virginia for the following twenty years. In the following year the 'readjusters,' i.e. those who advocated the necessity of reducing the debt of the State, were victorious and they began an attack upon the coupons. Repudiation was impossible as long as the coupons were receivable for taxes, and this clause became the object of attacks. Dozens of 'coupon-killing' acts were passed in 1872, 1873, 1876, and until 1885; most of them were declared unconstitutional by the United States Supreme Court, which held that the objectionable clause was a contract and therefore inviolable. Every new decision of the Supreme Court called forth efforts of the Virginia Legislature at some new way of evading the obligations. The struggle lasted for twenty years, and, though the State never accomplished its purpose fully, it succeeded in putting so many difficulties in the way of receiving coupons for taxes that the amount received sank very low. Meanwhile an effort was made to settle the question by the act of Riddleberger, which was vetoed by the Governor in 1880, but passed in 1882. The basis of this act was repudiation of the unpaid interest since 1861, and the total just debt was calculated at $19,665,196. Most of the bondholders refused to avail themselves of this offer. The final adjustment came only in 1892, after long negotiations between the State and a committee of English bondholders, when the total debt of the State which was not yet refunded, estimated at $28,000,000, was refunded at the rate of 19 to 28 by 100 years' bonds, bearing 2 per cent. for ten years and 3 per cent. for the rest of the time. Since then Virginia has met her obligations. About $24,000,000 of bonds were funded under this act for 16. Her present total debt cannot definitely be stated, but amounts probably to about $25,000,000. A great part of the Government income is as yet derived from a poll tax (8 per cent.), a real estate tax (30 per cent.), and a personal property tax (11 per cent.), but many other sources have been added since the Civil War, as liquor and other licenses (18 per cent.), an inheritance tax, taxes on insurance companies, railroads, oyster grounds, etc. A considerable sum is received for hire of criminals. The main items of expenditures are interest on the public debt (22 per cent.), schools (20 per cent.), and hospitals (10 per cent.). The total receipts in the fiscal year 1901-02 amounted to $3,795,093 and the total expenditures to $3,910,191. The balance in the treasury on October 1, 1902, was $739,392.

Government. According to the Constitution adopted in 1902, the privilege of voting is limited to male citizens of the United States, 21 years of age, who have resided in the State two years, in the county, city, or town one year, and in the precinct 30 days, and have registered and paid their poll tax. Registration is limited to male citizens of the United States, of qualified age and residence, who, first, have personally paid to the proper officer the State poll taxes for the preceding three years; second, who make application for registration in their own handwriting; and, third, who answer questions affecting their qualifications as electors. If the individual has served in the Civil War in the army or navy of the United States or Confederate States, he is not required to pay poll tax in order to be allowed to register.

Legislative. The Constitution provides that the Senate shall consist of not less than 33 or more than 40 members and the House of Delegates of not less than 90 or more than 100. The Senators are elected for four years and the Delegates for two years, elections being held on the Tuesday after the first Monday in November. The legislative sessions are held once in two years, beginning on the second Wednesday in January, and continuing not longer than 60 days, unless with concurrence of three-fifths of the members, in which case the extra time is limited to thirty days. Salary cannot be received for more than 60 days at any regular session, or 30 days at any extra session.

Executive. The Governor, Lieutenant-Governor, Secretary, Treasurer, and Auditor are each elected for a term of four years, beginning on the first day of February. The Governor is ineligible for reëlection for the next succeeding term. A two-thirds majority of the members elected to each House overrides the Governor's veto. The Governor may veto any item of an appropriation bill, in which case the bill is returned to the Legislature for reconsideration, and after action thereon is sent again to the Governor as in the first instance.

Judicial. The Supreme Court of Appeals consists of five judges who are chosen by a joint vote of both Houses to serve for terms of twelve years. The General Assembly may, for special reasons, provide for a special Court of Appeals. The State is divided into twenty-four judicial circuits, subject to change after 1906. A judge is chosen for each circuit by the joint vote of the two Houses to serve for terms of eight years. Cities having more than 10,000 inhabitants have in addition to the Circuit Court a Corporation Court. Cities with less than 10,000 inhabitants may continue such Corporation or Hustings Court as may be in existence or may abolish it by a vote of the electors. Judges of the City Court of Records are chosen by the joint vote of both Houses for terms of eight years. Judges may be removed by the concurrent vote of both Houses. There is an Attorney-General elected by the voters to serve for four years. The Legislature provides for the appointment or election of justices of the peace.

LOCAL GOVERNMENT. In magisterial districts one supervisor is elected—the supervisors of all the districts constituting a Board of Supervisors for the county and having power to lay the county and district levies, etc. County and district officers are elected on the Tuesday after the first Monday in November. The Legislature provides by general laws for the organization and government of cities and towns.

Virginia sends ten members to the National House of Representatives. The capital is Richmond.

POPULATION. The population of Virginia increased from 747,610 in 1790 to 1,065,116 in 1820; to 1,596,318 in 1860; in consequence of the Civil War and the division of the State it decreased to 1,225,163 in 1870. The figure then advanced to 1,512,565 in 1880, to 1,655,980 in 1890, and to 1,854,180 in 1900. The per cent. of gain in the last decade was 12, as against 20.7 for the nation. In the first four census decades Virginia ranked first in population, in 1870 tenth, and in 1900 seventeenth. There were in 1900 46.2 inhabitants to the square mile. The negroes numbered 660,722. For a number of years the percentage which the negro population constitutes of the total has been rapidly decreasing. There has been a large migration of negroes both to the North and to the South. The foreign born numbered only 19,461. The females (928,287) slightly outnumbered the males (925,897). Richmond, the capital and largest city, had a population in 1900 of 85,050. Other cities with more than 10,000 inhabitants are: Norfolk, 46,624; Petersburg, 21,810; Roanoke, 21,495; Newport News, 19,635; Lynchburg, 18,891; Portsmouth, 17,427; Danville, 16,520; and Alexandria, 14,528.

MILITIA. In 1900 the State had a population of militia age numbering 346,030. The organized militia in 1901 numbered 2331 men.

RELIGION. The different branches of the Methodist and the Baptist churches include the large majority of the church members in the State. Numerous other denominations are represented, the strongest being the Presbyterian, Episcopal, Disciples of Christ, Roman Catholic, Lutheran, and Dunkards.

EDUCATION. The present public school system of Virginia was inaugurated in 1870, and as a result the school attendance, which had been very low in the preceding years, rapidly increased. In 1870 the attendance was 59,000, while in 1871, after the new law went into operation, it reached 158,000. The system is under the control of a Superintendent of Public Instruction, elected for four years by a joint ballot of the General Assembly, and a Board of Education, composed of the Governor, Superintendent of Public Instruction, and Attorney-General. This board has general supervision of the State school fund and with the consent of the State Senate can remove county and city superintendents. The school fund is augmented by a tax of not less than 1 and not more than 5 mills on the dollar, apportioned among the various school districts according to the number of children of school age. All schools, excepting primary, must be in session at least five months, fifteen pupils being the minimum number required to constitute a school. Both white and colored pupils have equal educational privileges, although separate schools are maintained. The total population of school age in the census year 1900 was 704,771, consisting of 212,440 whites and 88,726 colored. Of the total number 301,330, or 42.2 per cent., were in attendance. Of the whites of school age 48.1 per cent. were in attendance, as against 32.6 per cent. of the colored of school age. Of the population ten years of age and upward, 22.9 per cent. were illiterate. The white illiterates formed 11.1 per cent. of the total white population, and the colored illiterates 44.6 of the total colored population.

The leading educational institutions are the College of William and Mary (q.v.), at Williamsburg; the University of Virginia (q.v.), at Charlottesville; Washington and Lee University (q.v.), at Lexington; Richmond College, at Richmond; Randolph-Macon College, at Ashland; Roanoke College, at Salem; Virginia Union University, at Richmond; Emory and Henry College, at Emory; Bridgewater College, at Bridgewater; Hampden-Sidney College, at Hampden-Sidney; and Fredericksburg College, at Fredericksburg. Normal courses are given at the College of William and Mary, the Hampton Normal and Agricultural Institute, the Virginia Normal and Collegiate Institute, at Petersburg, and the State Female Normal School, at Farmville.

CHARITABLE AND PENAL INSTITUTIONS. There is an asylum for the deaf, dumb, and blind at Staunton, and an industrial reform school for white boys at Laurel. There are insane asylums for whites at Staunton, Williamsburg, and Marion, the number of inmates in September, 1900, aggregating 1918. An insane asylum for negroes at Petersburg had 868 inmates at the same date. There is a soldiers' home near Richmond. The State penitentiary, at Richmond, on October 1, 1899, had 224 white and 1039 colored convicts. There were also 56 white and 197 colored convicts on the State farm. The expense on account of the convicts is more than balanced by their earnings.

HISTORY. The name Virginia was given by Queen Elizabeth to the country explored by the expedition under Amadas and Barlow, sent out by Sir Walter Ralegh in 1584. (See NORTH CAROLINA.) Virginia in history proper begins, however, with the grant by James I. on April 10, 1606, of territory two hundred miles wide, between 34° and 45° north latitude to two companies, usually called, from the residences of their chief incorporators, the London and the Plymouth companies. (See MASSACHUSETTS.) By this charter the London Company could colonize between 34° and 41° and the Plymouth between 38° and 45°, provided the colonies were 100 miles apart. The government was vested in a Royal Council of Virginia in London, superior to resident councils nominated by the Crown and governing by royal instructions. Sealed instructions provided for a local constitution and an annual president in the colony. The land was to be held in free and common socage, and the settlers and their children were "forever to enjoy all liberties, franchises, and immunities enjoyed by Englishmen in England." The Virginia Company of London, holding the southern grant, was organized under Sir Thomas Smith, treasurer. With its colony, 120 emigrants in three ships, Christopher Newport cleared England, December-February, 1607, reaching Cape Henry April 26, 1607. Having explored Chesapeake Bay, they entered James River and founded on a peninsula forty miles up the river Jamestown (Jamesfort), May 14, 1607, the first permanent English settlement in America. Malaria, Indian hostility, unaccustomed labor, and insufficient provisions left on Newport's return to England, reduced the colony to half by September. Dissensions arose, and when Captain Newport returned, January 12, 1608, bringing 'near 100' more men, only 38 were left, Wingfield was a prisoner, Smith condemned, and Archer's 'parliament' summoned. In the latter part of 1608 the Indians refused to sell corn, and but for the energy and tact of Captain John Smith (q.v.) as president the colony must have perished. In 1609 a new charter strictly incorporated the London Company, enlarged its territory, and vested the colony's government in the company's Treasurer and Council in London, endowed with sovereign powers. On June 1, 1609, large reinforcements were sent consisting of nine ships carrying 500 persons, including women and children. One ship sank, and one was wrecked on the Bermudas, now discovered by Somers. Seven ships with 300 persons reached Jamestown, and Smith returned to England on one of these ships. The winter was known as the 'starving time,' and the colony was reduced from 500 to 60 within six months. Though 140 arrived in the "Sea-Venture," Lieutenant-Governor Gates abandoned Jamestown, June 7, 1610, and was halted only by the opportune arrival of Lord Delaware, the Governor. Delaware left George Percy as Deputy Governor in 1611 with some 150 colonists. Percy was succeeded by Sir Thomas Dale and Sir Thomas Gates.

Dale and Gates brought 500 colonists with cattle, built new towns (Henrico, Bermuda, Charles City), and by Dale's harsh martial rule effectually quelled lawlessness. Communism remained, but favored classes (officers, tenants, farmers, artisans) in 1613 and 1616 received conditional freedom for self-maintenance. A new charter in 1612 had added the Bermudas, established elective and legislative courts in the company, exempted it from duties, and authorized lotteries. John Rolfe established tobacco culture and his marriage (1613) to Pocahontas, daughter of the powerful Indian Sachem Powhatan, won that chief and further brightened colonial prospects. Mismanagement by Sir Thomas Smith and the court party produced dissensions in the company; Sir Edwin Sandys (q.v.) and the popular party gained control in 1618 and commissioned Sir George Yeardley governor to replace the rapacious Argall and establish personal freedom. On July 30, 1619, the first representative assembly in America (a council elected by the company and a House of Burgesses chosen by the free colonists) met. The same year twenty-one negro servants (see SERVITUDE) were introduced by Dutch and English privateers. Women were sent as wives to the Virginia settlers, the husband paying 120 pounds of tobacco for his wife. The laws of 1619 were approved by the company, and in 1621 a written constitution, the work of Sir Edwin Sandys, was granted. By 1620 the population of the colony had reached 4000, including apprentices, indented servants, and some petty convicts sent over by the King, who was becoming bitterly hostile to the company. In the midst of this prosperity the Indians rose and massacred 'about 400' of the settlers, March 22, 1622. The King's hostility to democracy in the company led to *quo warranto* proceedings in 1624. The charter was revoked June 26th, and Virginia became a royal colony.

Charles I. (1625) reëstablished the government under two councils, depriving the Virginians of control over public officials and expenditures; but their acquiescence in his ecclesiastical and civil policy, and royal revenues from tobacco, won his favor. His reign was marked also by the settlement of some Puritans in northeast Virginia, and by the grant of a part of the territory to Lord Baltimore in 1632. William Claiborne seized and claimed disputed territory, Kent Island, for Virginia, having settled it in 1631. Maryland by force and diplomacy from 1634 to 1654 vindicated her claims. A popular insurrection deposed Governor Harvey, who was arbitrary and supported Maryland. Though reinstated, he was soon (1639) succeeded by Sir Francis Wyatt. With the coming of Sir William Berkeley as Governor in 1642, a strong figure appears. The divine right of the King and the maintenance of the Established Church were his creed. He captured Opechancanough, who in his second massacre (1644) had killed 300 colonists, and drove many Puritans into Maryland and New England. On the execution of Charles I. thousands of Cavaliers flocked to Virginia. Its Assembly alone resisted Parliament, and declared guilty of treason all persons refusing to acknowledge the 'King that now is.' In retaliation, Parliament in 1650 forbade all trade with Virginia, and appointed (1651) four commissioners (two in Virginia) to force the surrender of the colony. Virginia surrendered (1652) to Commissioners Bennett and Claiborne, stipulating that the act be regarded as 'voluntary,' not a 'conquest;' that full indemnity be granted; a year without oath be allowed for dissatisfied persons to remove; the use of the Prayer Book be permitted for a year; and that Virginia enjoy her ancient boundaries. In reality during the whole period of the Commonwealth the Assembly elected the Governors, and there was entire religious and political toleration. The circumstance of acknowledging Charles II. sooner than any other part of the kingdom gave to Virginia the name of the 'Old Dominion.' On the collapse of the Commonwealth, the loyal Assembly elected Berkeley Governor before Charles II. was crowned. Charles encouraged the servant and slave traffic, burdened the colony with navigation acts (1663-72), and granted it in part to Court favorites and wholly in 1673 for thirty-one years to Lords Arlington and Culpeper. These acts, restriction of the suffrage to freeholders, and Berkeley's refusal to protect the frontier from Indians precipitated a popular rebellion. Nathaniel Bacon (q.v.) asked for a commission to go against the savages in 1676, and when it was refused, made a successful campaign without authority. Berkeley evasively answered a second popular demand for Bacon's commission, and upon his advance against the Indians proclaimed him and his forces rebels. A contest for the possession of Jamestown ensued. Bacon won, established a government, burned Jamestown to defeat Berkeley, and, preparing to pursue him to Accomac, suddenly died from previous hardships. Rumors of his poisoning are discredited. Berkeley regained power, and took severe measures against his opponents, of whom 23 were executed, eliciting from Charles II. the remark, "That old fool has hanged more men in that naked country than I have done for the murder of my father."

After this war on Berkeley and the Crown, and reconstruction by English commissioners, royal Governors (Jeffreys, Chicheley, and Culpeper) by incompetence or rapacity increased popular dissatisfaction. In 1677 a lasting Indian peace was secured, and in 1692 William and Mary College, the second oldest college in America, was chartered. A striking exception among royal Governors was Alexander Spotswood (1710-22). He led the 'Knights of the Golden Horseshoe' over the Blue Ridge in 1716, established iron manufactures, aided the Carolina colonists in their struggle with the Tuscarora Indians, and sent out an expedition which killed the notorious pirate John Theach ('Blackbeard') and captured his men. The first newspaper in the colony (the *Virginia Gazette*) was established in 1736, and Postmaster-General Spotswood organized a postal system in 1738. The population had steadily increased, and by 1700 was fully 70,000, chiefly of English descent. In 1699 the Huguenot immigration was large, and under Queen Anne a number of German Palatines came over. After 1732 large numbers of sturdy Scotch-Irish and Germans from Pennsylvania filled the Valley and Piedmont Virginia with dissenters, liberty-loving freehold farmers, restive under British oppression. Colonel William Byrd's project (1733) for founding Richmond and Petersburg instances expanding English settlement. The great article of export from the colony was tobacco, the returns from its sale enabling the wealthier planters to surround themselves with luxuries of every kind and the refinements of European civilization.

The charter of 1609 had fixed the limits of the colony at 200 miles north and 200 miles south of Point Comfort and west and northwest from sea to sea. Under this vague description Virginia claimed that the northwest line was the upper one, and hence her territory increased as it went westward. Maryland and Pennsylvania had included territory that she claimed, but her title to the northwest was undisputed until French colonization expanded. Toward the middle of the eighteenth century English occupation of the territory began. The Ohio Company (chiefly Marylanders and Virginians) was formed in 1749, for the exploration of the territory which the French also claimed by Marquette's discovery. (See OHIO.) George Washington was sent by Governor Dinwiddie in 1753 to ask the removal of the French forts, but to no purpose. The French and Indian War (q.v.) followed. The Virginians saved Braddock's army from utter annihilation, and the pioneers organized by Washington held the Virginia frontier against the Indians and the French. Settlements were constantly made beyond the Alleghanies in spite of the King's proclamation in 1763. From 1750 to 1769 Walker, Gist, and Boone explored here. Kentucky was made a separate county of Virginia through the influence of George Rogers Clark in 1776.

On the announcement of the policy of Parliamentary taxation of America Virginia became a leader in resistance. The colonists' claim of the rights of Englishmen and full representation, and pride in the colony's relative position, made her taxation without representation impossible. Patrick Henry (q.v.) and the jury in the 'Parsons' Cause' defied the King. Henry's famous speech in opposition to the Stamp Act, delivered (1765) in the House of Burgesses at Williamsburg, was quoted everywhere, and three of his five resolutions were adopted denying Parliament's right to tax. They were heralded as the first important protest against this tax. "Virginia gave the signal to the continent," said General Gage. The Burgesses memorialized King and Parliament against the tax act of 1767, and in 1769 passed resolutions against this Parliamentary 'tyranny' and transportation of offenders to England for trial. They proposed colonial correspondence, and circulated an invitation for colonial concurrence. Dissolved by Governor Botetourt, they met in revolutionary convention at the Raleigh Tavern and signed and circulated Mason's nonimportation agreement. After the rude and unscrupulous Lord Dunmore succeeded Botetourt, the Assembly in 1773 appointed a standing legislative Committee of Correspondence (Jefferson, Lee, Carr, and others) for colonial concert. When the news of the Boston Port Bill arrived the Assembly passed sympathetic resolutions and was promptly dissolved (1774) by Dunmore. Its members met at the Raleigh Tavern, and proposed a Virginia convention for August and a general congress of the colonies. Committees of safety were organized and forces raised in every county. Dunmore attempted disarmament by seizing the magazine and removing the gunpowder, but was driven by a mob (June, 1775) to take refuge on shipboard. George Washington was elected commander-in-chief of the Continental armies, Patrick Henry of the Virginia forces, and in the colony a remarkable group of leaders was developed, Jefferson, Henry, Richard Henry Lee, George Mason, Edmund Pendleton, and others, who pushed Virginia toward independence. Colonel Woodford defeated the British at Great Bridge, and Dunmore burned Norfolk, but was driven from Virginia by Andrew Lewis (1776). A State convention met in May, 1776, and passed resolutions asking Congress for a Declaration of Independence, afterwards moved by R. H. Lee and drafted by Jefferson. On June 15th the convention adopted Mason's famous Virginia Declaration of Rights. This was followed by the adoption of a constitution on the 29th. Patrick Henry became Governor, and Jefferson afterwards secured acts for religious freedom and the abolition of entails. Virginia troops won distinction in the battles of Brandywine and Saratoga, and George Rogers Clark captured (1778 and 1779) the Northwest Territory for Virginia, furnishing the United States its title by conquest against British claims. Virginia was invaded in 1781. Benedict Arnold burned Richmond, and Tarleton's cavalry devastated the James River region and nearly captured Governor Jefferson and the Assembly at Charlottesville. Finally Cornwallis was penned in at Yorktown and surrendered. The conflicting claims of other colonies and land companies, and the refusal of Maryland otherwise to join the Confederation, led Virginia (1781-83) to cede her Northwest Territory to the Union, reserving only a small portion for her veterans. The transfer was conditioned on the erection therein of new States and was formally executed March, 1784.

Virginia was prominent in advocating a general convention to make necessary changes in the Articles of Confederation. When that body produced the Constitution of the United States, many able patriots, Lee, Mason, Monroe, and particularly Patrick Henry, bitterly opposed its ratification as destructive to State rights. Finally, after long debate, it was ratified, June 25, 1788, but by only ten majority, and chiefly through the ardent championship of James Madison. The addition of a Bill of Rights and 20 amendments was recommended. Lee, Grayson, and Madison helped to secure the first ten amendments to the Constitution. The State was jealous of its rights, and on account of the passage of the Alien and Sedition Acts (q.v.) in 1798, put forward Madison's Virginia Resolutions (see VIRGINIA AND KENTUCKY RESOLUTIONS) which declared for a strict construction of the Constitution. Priority of settlement, character and amount of population, valuable staples, and distinguished men made the colony powerful and kept the State prominent in the early years of the Republic. During the first thirty-six years of the nation a Virginian was President for thirty-two, and the proportion of her citizens in other high offices was very large. The title 'Mother of Presidents' as well as 'Mother of States and Statesmen' seems deserved. The famous trials of John T. Callender and Aaron Burr at Richmond in 1806 intensified issues between Federalists and Republicans and brought into prominence John Marshall and John Randolph of Roanoke. The burning of the Richmond theatre marked 1811 with public mourning. In 1813 Admiral Cockburn was repulsed at Craney Island and Norfolk saved from the British. The University of Virginia, planned by Thomas Jefferson and founded in 1819, was the first American university for advanced work. Slavery had been recognized by statute in 1661, but Virginia's first Assembly had prohibited the slave trade (1778), and Jefferson in his joint revision of the Virginia Code with Wythe and Pendleton in 1779 proposed emancipation and colonization of slaves. Saint George Tucker in 1796 offered another plan for the abolition of slavery, while Monroe, Randolph, and the Legislature promoted the African Colonization Society (1800-16). A slave, Gabriel, futilely plotted (1800) to massacre the whites of Richmond. In 1831 an insurrection (see TURNER, NAT) by 40 negroes in Southampton County killed 60 persons, alarming Virginia and the South. Thomas Jefferson Randolph's bill for emancipation was fully and freely discussed with other plans and lost by a mere majority. In the Federal convention Virginia had fought for the immediate prohibition of the slave trade against a combination of New England and the extreme South demanding extension. A new or amended Constitution, adopted by the State convention (1830), extended the suffrage, and its work was continued by a similar convention in 1850. This emphasized the opposition between eastern and western Virginia on the question of a *mixed basis* or *white basis* for representation, and, reagitated by the Legislature (1845-46), hastened their separation in 1862. During Nullification Virginia opposed the coercion of South Carolina, but endeavored to act as a pacificator.

In spite of the capture of Harper's Ferry in 1859 by John Brown (q.v.), and his plan to raise a general slave insurrection, the State opposed secession. It suggested the peace convention of the States and sent commissioners to Washington to endeavor to prevent hostilities. The State convention met February 13, 1861, and as late as April 1st it voted (89 to 45) against secession. Two days after President Lincoln's call for troops to coerce the seceding States, an ordinance of secession and adhesion to the Confederacy was voted (88 to 45), April 17th, which was ratified by a popular majority of 16,241. Meanwhile a 'temporary convention' was formed with the Confederate Government in July, 1861. Robert E. Lee followed his State and became commander-in-chief of the Confederate Army. Richmond became the strategic capital, and Virginia a great battleground of the Confederacy. Western Virginia had little sympathy with secession, and on May 13th delegates from 25 counties met at Wheeling, declared the ordinance of secession null and void, and called a convention to meet June 11th, which elected Francis H. Pierpont (q.v.) Governor. Later the Restored Government of Virginia was established. Pierpont continued to exercise his office until the establishment of West Virginia (q.v.) as a separate State. In 1863 he moved his government to Alexandria under the guns of Washington and asserted authority over those counties within the Federal lines, and in 1864 a new Constitution was adopted by these counties. At the close of the war Pierpont was recognized by the Federal authorities as the lawful Governor, and moved to Richmond; he put the Constitution of 1864 into limited effect, military authority still being paramount.

The Reconstruction Acts gave negroes the right to vote for convention delegates and a new Constitution was adopted in 1868 embodying negro suffrage and other new features, but so great was the popular feeling against it that it was not submitted to the people until a new act of Congress allowed a separate vote on the disfranchising clauses. These were rejected, but the State was readmitted January 26, 1870, and at once came under control of the native born whites. Trouble began, however, with legislation regarding the State debt. In 1871 a bill was passed funding two-thirds of the State debt into bonds, the coupons of which should be receivable for taxes. The other third of the debt was considered to be the share of West Virginia, which share that State refused to acknowledge. The Legislature of 1872 repealed the tax coupon feature, but it was held by the courts that as $17,000,000 had already been funded in these bonds, the State was bound to receive them, even if their receipts kept the State treasury in chronic bankruptcy. Many offers of compromise were made, and many attempts to prevent the presentation of the coupons for taxes, leading to conflicts of jurisdiction between the State and the United States courts. Certain State officers in exercise of the duties ordered by the Legislature were punished for contempt of court by the United States judge. In 1890 the decisions handed down by the United States Supreme Court favored the State on the whole, and in 1891-92 a final settlement was made with the bondholders, chiefly English, who received $19,000,000 in new century bonds for bonds and unpaid coupons amounting to $23,000,000. The question entered politics and Governors, Congressmen, and Senators were elected on the issue of the readjustment of the State debt. William Mahone became a leading figure in Virginia politics. The Readjuster Party, however, coöperated with the Republicans, and its major adherents were finally absorbed by them. The question, while a vital issue, had the effect of dividing the negro vote. In 1901-02 a constitutional convention was held, having for its chief objects retrenchment and suffrage restriction. The new Constitution was proclaimed without submission to the people, May 19, 1902. One result was largely to suppress the negro vote. From the beginning the State has been Democratic in national politics. The hold was never broken until 1860, when the vote was cast for the Constitutional Union candidate, John Bell. Since its readmission the vote has been steadily cast for the Democratic national candidates, with the exception of 1872, when the Republican candidate, Grant, was preferred to his opponent, Greeley, an old abolitionist.

GOVERNORS OF VIRGINIA

UNDER THE COMPANY

Edward Maria Wingfield, President	1607
John Ratcliffe, President	1607-08
Capt. John Smith, President	1608-09
Capt. George Percy, President	1609-10
Sir Thos. Gates, Deputy Governor	1610
Lord Delaware, Lord Governor	1610-18
Capt. George Percy, Deputy Governor	1611
Sir Thomas Dale, High Marshal, Deputy Governor	1611
Sir Thomas Gates, Lieut. Governor	1611-14
Sir Thomas Dale, Marshal and Deputy Governor	1614-16
George Yeardley, Deputy Governor	1616-17
Capt. Samuel Argall, Admiral and Deputy Governor	1617-19
Nathaniel Powell, President of Council, Acting Deputy Governor	1619
Sir George Yeardley, Governor	1619-21
Sir Francis Wyatt, Governor	1621-24

UNDER THE CROWN

Sir Francis Wyatt, Governor	1624-26
Sir George Yeardley, Governor	1626-27
Francis West, (acting)	1627-28
John Pott, (acting)	1628-30
Sir John Harvey, Governor	1630-35
John West, (acting)	1635-36
Sir John Harvey, Governor	1636-39
Sir Francis Wyatt, Governor	1639-42
Sir William Berkeley, Governor	1642-44
Richard Kemp, President of Council	1644-45
Sir William Berkeley, Governor	1645-52

UNDER THE COMMONWEALTH

Richard Bennett	1652-53
Edward Digges	1655-58
Samuel Matthews	1658-59
Interregnum	1859-60

UNDER THE CROWN

Sir William Berkeley	1660-61
Sir Francis Morrison or Moryson (acting)	1661-62
Sir William Berkeley	1662-77
Sir Herbert Jeffries, Lieut. Governor	1677-78
Sir Henry Chichelly, Lieut. Governor	1678-80
Thomas, Lord Culpeper, Governor	1680-83
Nicholas Spencer, (acting)	1683-84
Lord Howard of Effingham, Governor	1684-88
Nathaniel Bacon, Sr., (acting)	1688-90
Sir Francis Nicholson, Lieut. Governor	1690-93
Sir Edmund Andros, Governor	1693-98
Geo. Hamilton Douglas, Earl of Orkney, Governor	1697-1737
Sir Francis Nicholson, Lieut. Governor	1698-1705
Edward Nott, Lieut. Governor	1705-06
Edmund Jenings, President of Council	1706-10
Robert Hunter, Lieut. Governor (appointed but captured by the French)	1708
Alexander Spotswood, Lieut. Governor	1710-22
Hugh Drysdale, Lieut. Governor	1722-26
Robert Carter, President of Council	1726-27
William Gooch, Lieut. Governor	1727-40
William, Earl of Albemarle, Governor	1740-54
James Blair, President of Council	1740-41
Sir William Gooch, Lieut. Governor	1741-49
John Robinson, President of Council	1749
Thomas Lee, President of Council	1749-51
Lewis Burwell, President of Council	1751
Robert Dinwiddie, Lieut. Governor	1751-58
John Campbell, Earl of London, Governor	1756-68
John Blair, President of Council	1758
Francis Fauquier, Lieut. Governor	1758-68
Sir Jeoffry Amherst, Governor	1763-68
John Blair, President of Council	1768
Lord Botetourt, Governor	1768-70
William Nelson, President of Council	1770-71
John, Lord Dunmore	1771-75
Interregnum	1775-76

STATE

Patrick Henry		1776-79
Thomas Jefferson		1779-81
Thomas Nelson, Jr.		1781
Benjamin Harrison		1781-84
Patrick Henry		1784-86
Edmund Randolph		1786-88
Beverly Randolph		1788-91
Henry Lee		1791-94
Robert Brooke		1794-96
James Wood	Democratic-Republican	1796-99
James Monroe	" "	1799-1802
John Page	" "	1802-05
William H. Cabell	" "	1805-08
John Tyler, Sr.	" "	1808-11
James Monroe	" "	1811
George William Smith	" "	1811
Peyton Randolph, (acting)		1811-12
James Barbour		1812-14
Wilson Cary Nicholas	Republican	1814-16
James Patton Preston	"	1816-19
Thomas Mann Randolph	"	1819-22
James Pleasant, Jr	"	1822-25
John Tyler		1825-27
William B. Giles		1827-30
John Floyd	Democrat	1830-34
Littleton Waller Tazewell	"	1834-36
Windham Robertson, (acting)		1836-37
David Campbell		1837-40
Thomas Walker Gilmer, Whig		1840-41
John M. Patton,	(acting)	1841
John Rutherford	"	1841-42
John P. Gregory	"	1842-43
James McDowell	"	1843-46
William Smith	Democrat	1846-49
John Buchanan Floyd	"	1849-52
Joseph Johnson	"	1852-56
Henry Alexander Wise	"	1856-60
John Letcher	"	1860-64
William Smith	"	1864-65
Francis Pierpont, Provisional (Republican)		1865-68
Henry H. Wells, Provisional		1868-69
Gilbert C. Walker, Republican		1869-74
James Lawson Kemper, Conservative		1874-78
Frederick W. M. Holliday		1878-82
William E. Cameron, Readjuster		1882-6

Fitzhugh Lee	Democrat	1886-90
Philip W. McKinney	"	1890-94
Charles F. O'Farrel	"	1894-98
J. Hoge Tyler	"	1898-1902
Andrew J. Montague	"	1902

Bibliography. *Calendar of Virginia State Papers* (Richmond, 1875-90); Virginia Historical Society, *Collections* (ib., 1882-92); Brown, *Genesis of the United States* (Boston, 1890); id., *The First Republic in America* (ib., 1898); Cooke, *Virginia* (ib., 1884); Fiske, *Old Virginia and Her Neighbors* (New York, 1897); Neill, *History of the Virginia Company of London* (Albany, 1869); id., *Virginia Carolorum* (ib., 1886); Stith, *History of the First Discovery and Settlement of Virginia* (1747; 3d ed., New York, 1865); Arber, ed., *Works of Captain John Smith* (ib., 1884); Foote, *Sketches of Virginia* (Philadelphia, 1850-55); Bruce, *Economic History of Virginia in the Seventeenth Century* (New York, 1896); Johnson and Buel, eds., *Battles and Leaders of the Civil War* (ib., 1887); Doyle, *English Colonies in America* (ib., 1882); Campbell, *History of Virginia* (Philadelphia, 1860); Howison, *A History of Virginia* (Richmond, 1848); Burk, *History of Virginia* (Petersburg, 1804-16); Howe, *Historical Collections of Virginia* (Charleston, 1845); Ballagh, *History of Slavery in Virginia* (Baltimore, 1902); id., *Servitude in Virginia* (ib., 1895).

VIRGINIA, University of. An undenominational institution of higher learning at Charlottesville, Va., four miles from Monticello, the home of Thomas Jefferson, its founder. It was chartered in 1819 and opened in 1825. The group of college buildings, planned by Jefferson and erected under his personal supervision, together with the recent additions made to harmonize with and complete his designs, constitute one of the most characteristic and artistic pieces of academic architecture in America. The quadrangle is about 1000 feet long and 300 feet wide. The dominant structure is the Rotunda, set centrally at the northern end, and modeled from the Roman Pantheon. It is now devoted to the university library. The courses of instruction are comprised in five departments: academic, engineering, law, medicine, and agriculture, comprising in all 22 schools, of which each affords an independent course under professors who are responsible only to the board of visitors, appointed by the Governor. The courses are purely elective. The degrees of bachelor of arts, law, and science, master of arts, doctor of philosophy, medicine, and law, civil, mechanical, mining, and electrical engineer are conferred only upon examination after residence. No honorary degrees are given. Qualified persons may be licensed by the faculty to form classes for private instruction in any school of the university. The university had in 1903 a student attendance of 619, 57 instructors, and a library of 48,500 volumes. In the same year its endowment was $378,850, with an income of $154,845, and its grounds and buildings were valued at $1,250,000.

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE. An institution founded in 1871 on the land grant of 1862. It offers courses in agriculture, horticulture, applied chemistry, general science, civil, mechanical, and electrical engineering, and shorter courses in practical agriculture and practical mechanics. The sciences hold the foremost place in the curriculum, but every course includes a certain element of general culture. The courses are so arranged as to give the student an approximately equal amount of class work and of laboratory, shop, or field practice. The degrees conferred are bachelor and master of science and civil, mechanical, and electrical engineer. Military drill is required of the students. The total enrollment in 1903 was 627, with 40 instructors. The library contained 3600 volumes. The gross income was $117,066 and the total valuation of the college property was about $700,000. The institution has about 50 buildings and 1200 acres of land, owned or leased, valued at $250,000.

VIRGINIA AND KENTUCKY RESOLUTIONS. Two series of resolutions adopted in 1798 and 1799 by the Legislatures of Kentucky and Virginia in protest against legislation by Congress and in support of the strict constructionist view of the Constitution. The resolutions were called forth by the steady extension of the powers of the Federal Government at the expense of the States as a result of the liberal interpretation which the Federalist authorities were placing upon the Constitution, and in particular by the enactment of the Alien and Sedition Acts (q.v.) in 1798. The Kentucky Resolutions were nine in number, were drafted by Thomas Jefferson, then Vice-President, and were adopted by the Legislature in November, 1798. They affirmed that the Union was a compact; that whenever the Federal Government assumed undelegated powers its acts were unauthoritative, void, and of no force; that the Government was not the exclusive or final judge of the extent of the powers delegated to itself, since its discretion and not the Constitution would then be the measure of its powers; but that, as in all other cases of compact among parties having no common judge, each party had an equal right to judge for itself as well of infractions as of the mode and measure of redress. The resolutions then formally denied the power of Congress to pass the Alien and Sedition Acts, and declared that these acts were void and of no force. In the following year the Kentucky Legislature further resolved that "the several States, being sovereign and independent, have the unquestionable right to judge of the infractions of the Constitution; and that a nullification by those sovereignties of all unauthorized acts done under color of that instrument is the rightful remedy."

The Virginia Resolutions, passed in December, 1798, were eight in number, were drafted by Madison, and were much milder in tone. They described the Union, however, as a compact, and declared that in case of a deliberate, palpable, and dangerous exercise of powers not granted by the said compact, the States, as parties thereto, had the right, and were in duty bound, to interpose for arresting the progress of the evil and for maintaining the rights and liberties appertaining to them. The resolutions of the two States were transmitted to the executives of the other States to be laid before their respective Legislatures. Responses were made by Delaware, Rhode Island, Massachusetts, New York, Connecticut, New Hampshire, and Vermont, but none of them were sympathetic, that of Massachusetts expressly denying the right of the State Legislature "to judge of the acts and measures of the Federal Government." The replies of the various States were referred to a committee of the Virginia Legislature of which Madison was chairman, and on January 7, 1800, this committee made an elaborate report. The texts of the resolutions may be found in Macdonald, *Select Documents of United States History, 1776-1861* (New York, 1898); Jefferson's draft of the Kentucky Resolutions may be found in Jefferson's *Works*, vol. ix. (ed. 1856); and the answers of the State Legislatures and the text of Madison's report of 1800 are given in Elliot's *Debates*, vol. iv. (ed. 1836). Consult: Warfield, *Kentucky Resolutions of 1798* (New York, 1887); Von Holst, *Constitutional History of the United States*, vol. i. (Chicago; new ed. 1899).

VIRGINIA CITY. The county-seat of Storey County, Nev., 52 miles southeast of Reno; on the Virginia and Truckee Railroad. It is situated at an elevation of over 6000 feet in a region noted for its extensive mineral deposits (Map: Nevada, D 2). The most important of the mines here is the Comstock Lode (q.v.). It was discovered in 1859, and the value of the output from 1860 to 1890 was $340,000,000. Since 1890, however, the production has materially decreased. The court-house and the Miners' Union Library are noteworthy features of the town. Under the charter of 1881 the government is vested in a board of three county commissioners. Virginia City grew up around the Comstock Lode, and was called successively Ophir and Silver City. It received its present name from James Fenimore, an early settler who was familiarly known as 'Old Virginia.' It was incorporated in 1864. Population, in 1890, 8511; in 1900, 2695.

VIRGINIA CREEPER. See Ivy.

VIRGINIA MILITARY INSTITUTE. A State institution at Lexington, Va., established in 1839, when the General Assembly, in place of the company of soldiers hitherto stationed at the western arsenal at Lexington, authorized the creation of a company of cadets, who, in addition to the duties of an armed guard, should pursue a course of scientific and military studies. In 1860 the cadets marched for Richmond and were employed in drilling the recruits at Camp Lee. The school was reopened in 1862 on the demand of the Confederate military authorities, but was burned by order of General David Hunter in 1864. After the close of the war the buildings were restored and the course of instruction was enlarged and extended. The courses are partly prescribed and partly elective. A cadet who attains the prescribed proficiency in one of the elective courses, in addition to the degree of graduate, may receive the degree of bachelor of science. Nearly the whole body of graduates prior to 1860 were officers in the Confederate Army. Since 1898 about 170 alumni of the institute have been officers in the United States armies. Stonewall Jackson was professor of physics and artillery instruction from 1851 to 1861. The institute in 1903 had 275 cadets, 20 instructors, and a library of 12,000 volumes. Its grounds and buildings were valued at $500,000. It has no endowment, being supported by the State.

VIRGINIANS, The. An historical novel by Thackeray, a sequel to *Henry Esmond*. It was published first in monthly parts (October 31, 1857-October 1, 1859), and then in book form (1858-59), with illustrations by the author himself. The scene is laid in the eighteenth century in England and the colonies. The two brothers who are its heroes are descendants of the Warrington family (see Pendennis), and Martha Washington is among the characters described.

VIRGINIA RAIL. See Rail.

VIRGINIA SNAKE-ROOT. See Aristolochia.

VIRGINIA THEOLOGICAL SEMINARY. An important seminary of the Protestant Episcopal Church, at Alexandria, Va. It had its origin in the theological class established at the College of William and Mary in 1821 and transferred to Alexandria in 1823. In 1827 the Seminary was removed to its present location, 2½ miles west of Alexandria. In 1854 it received from the Legislature a charter the provisions of which were enlarged in 1884. Since 1899 it has granted the degree B.D. to graduating students who have attained a certain high standing. In 1903 the faculty numbered 9, the students 45, and the alumni 1014, of whom 532 were living. The endowment fund amounted to $391,196, exclusive of a library fund, and the library comprised about 25,000 volumes. The entrance requirements are relatively high and the course of study occupies three years. The Seminary has had a considerable influence in missionary work, and of its alumni 27, in 1903, had been advanced to the episcopate, including Phillips Brooks, Bishop of Massachusetts, and Henry C. Potter, Bishop of New York.

VIRGIN ISLANDS. A group of the Leeward Islands, consisting of upward of 100 islands, situated immediately east of Porto Rico (Map: Antilles, P 5). They are mostly unproductive and uninhabited. Scarcely one-third of the area is in cultivation and occupied—about 270 square miles being inhabited by nearly 40,000 persons. The climate is comparatively healthful. There are two wet and two dry seasons. Hurricanes and earthquakes are somewhat frequent. In the geological formation figure chalk-limestone, serpentine, and eruptive stone. The coasts afford good fishing; nut trees abound in the forests; and there is fine pasturage. Among the exports are sugar, indigo, cotton, and salt. Saint Croix, Saint Thomas, and Saint John belong to Denmark; Culebra, Culebrita, and Vieques to the United States (formerly to Spain); and the rest of the group, Tortola, Virgin, Gorda, and Anegada, to Great Britain. The Virgin Islands were discovered by Columbus in 1494. See West Indies, Danish; West Indies, British.

VIRGIN'IUS. A tragedy by James Sheridan Knowles, produced first at Glasgow, and then at Covent Garden, May 17, 1820, with Macready as Virginius, Miss Foote as Virginia, and Charles Kemble as Icilius. The author received a poem of congratulation from Charles Lamb. The subject had been suggested to Knowles by Kean; but when the drama was completed, Kean found himself unable to produce it.

VIRGIN'IUS, Lucius. A Roman centurion, who killed his daughter to prevent her falling into the hands of the decemvir Appius Claudius

Crassus. The story has been a favorite theme for literary treatment. Besides the versions referred to under APPIUS AND VIRGINIA, it was the subject of tragedies by the French authors Mairet, Leclerc, and Campistron in the seventeenth century, and the movement for political freedom from the middle of the eighteenth revived it once more. Lessing in 1772 threw it with this intention into a modern Italian setting: and it was also treated by Alfieri in Italy (1773), by Miss Brooke in England (1760), and in France by La Beaumelle (1760), Chabanon (1769), Laharpe (1786), Guiraud (1827), and Latour Saint-Ybars (1845). The rôle of Virginius in James Sheridan Knowles's tragedy (1820) was created by Macready.

VIRGINIUS MASSACRE. On October 31, 1873, the *Virginius*, a vessel flying the United States flag, owned by an American, and commanded by Captain Fry, an American citizen, which was carrying arms and men to the aid of the Cuban insurgents, was captured on the high seas off Jamaica by the Spanish man-of-war *Tornado*, and was taken into the port of Santiago de Cuba, where on November 4th four leaders of the Cuban patriots, Céspedes, Ryan, Varona, and Del Sal, who had been captured on board, were executed in pursuance, it was claimed, of prior sentences. The remainder of the passengers and the crew were then hastily tried on a charge of piracy, and on November 7th and 8th Captain Fry, 36 of the crew, and 16 of the passengers were summarily executed, some of the victims being American citizens. Further executions were prevented by the timely arrival of the British sloop *Niobe*, whose commander, Sir Lampton Lorraine, forced the Spanish officer, General Buriel, to reprieve the remainder of the prisoners. The affair caused widespread excitement in the United States, where the feeling against Spain was already strong by reason of the latter's course in Cuba, and for a time war seemed imminent; but, after protracted negotiations, a peaceful settlement was agreed upon, and Spain surrendered to the United States, conditionally, the *Virginius* and the survivors of her passengers and crew. The vessel was overtaken by a storm on its voyage to New York, was abandoned by her crew, and sank off Cape Fear. England exacted and received pecuniary reparation for those of her subjects who were executed. Consult *Message of the President Relating to the Steamer 'Virginius,' with Accompanying Documents* (Washington, 1874).

VIRGIN MARTYR, THE. A tragedy by Massinger and Dekker, founded on the story of the martyr Dorothea. It was licensed in 1620, printed in quarto in 1621, revived at the Drury Lane in 1668, and adapted in 1715 by Griffin. Massinger is judged, from internal evidence, to be responsible for the first act, the first two scenes of the third act, the third scene of the fourth act, and the second scene of the fifth act.

VIRGIN QUEEN. A popular and affectionate name given to Queen Elizabeth, suggested by her resolute refusal to marry. The popular conception was adopted by Spenser in the *Faerie Queene*, in his conception of *Belphœbe*.

VIRGIN'S BOWER. See CLEMATIS.

VIRI'ATHUS. A Lusitanian patriot, who lived in the second century B.C. Originally a shepherd, he afterwards became a guerrilla chief, and appears to have supported himself by predatory excursions into the neighboring Spanish territory. This mode of life brought him into collision with Rome, and in the year B.C. 151 the proprætor, Servius Galba, was ordered to invade the country and reduce the Lusitanians to subjection. At first Viriathus kept mainly to the mountains, and contented himself with harassing the enemy by sudden and fierce descents, but in 147 he gave battle to Vetilius, the Roman proprætor, near Tribola, south of the Tagus, and inflicted on him a severe defeat. In the course of the next two years he repeatedly came off victorious, but in 144 the consul, Q. Fabius Æmilianus, encountered him in Andalusia with a large army and Viriathus was driven back into his native fastnesses. The proprætor, Q. Pompeius, was then sent against Viriathus, but the Roman force was crushed at the 'hill of Venus,' and forced to take refuge at Corduba, while the conqueror wasted all the country round the Guadalquivir. In 142 the Romans were more fortunate. Q. Fabius Servilianus, the consul, conducted the war, and succeeded in driving Viriathus once more out of Spain and in annihilating several guerrilla bands; but in 141 the whole of his army was surrounded in a mountain pass and forced to surrender. Viriathus released his captives on condition that Servilianus would allow the Lusitanians to retain their independence. In 140 the consul, Q. Servilius Cæpio (brother of Servilianus), having received the command in Farther Spain, resumed the war against Viriathus, and bribed some Lusitanian envoys to murder their master, which they did while he lay sleeping in his tent. His death was practically the end of Lusitanian independence.

VI'RI RO'MÆ (Lat., Men of Rome). A popular Latin schoolbook compiled in the eighteenth century by Charles François Lhomond, a professor of the University of Paris. The material is taken from the works of various authors, chiefly Livy and Eutropius, simplified in language and construction wherever necessary to fit it for the requirements of beginners. It deals with the early stories of Rome and has proved a favorite textbook.

VIRUS (Lat., poison, venom, slime). The term used in medicine to denote a palpable morbid product causative of a contagious disease. If the contagium be fixed it is called a *virus*. If volatile, the term formerly used was *miasm*. Since the discovery of the hæmatozoön which causes malaria, the old term miasm has been restricted or abandoned. The term virus is still used of any one of the infective agents which cause respectively typhus fever, relapsing fever, scarlet fever, smallpox, or measles. But it is confidently expected that a bacterium or a protozoön will be discovered to be the causative agent in each of these diseases.

Virus is also used as a synonym of lymph, in speaking of vaccine material. We also speak of the virus of syphilis, glanders, hydrophobia, etc., meaning the morbific fluid which contains the germs of these diseases and is capable of propagating them if inoculated into the human body. In this way a culture of any bacteria may loosely be called a virus. The active principle of a virus has the tendency to reproduce itself after a period of variable length, called the period of incubation, which elapses between the time of exposure and inoculation and the day when symptoms of the disease are first noted. In measles the period of incubation is about ten days, though it may be protracted to thirty days; the virus being carried in blood from an exanthematous patch or the secretion from the eyes or nostrils, and later from the scales that separate from the skin. In smallpox the period of incubation is about twelve days, though it varies from five days to three weeks. See Bacteria; Disease, Germ Theory of.

VIŚĀKHADATTA, vê-shäk'hȧ-dŭt'tȧ. The name of a Sanskrit dramatist, the author of the *Mudrā-rākṣasa*, or Signet Ring of the Minister. His date was presumably not later than A.D. 800. The plot of his elaborate drama turns on a political intrigue in the time of Chandragupta, or Sandracottus (q.v.), and it is one of the best Sanskrit plays. The text has been edited by Telang (Bombay, 1893), and the play was translated into English by Wilson in his *Hindu Theatre*, vol. ii. (London, 1871). Consult: Lévi, *Le Théatre Indien* (Paris, 1890); Macdonell, *Sanskrit Literature* (New York, 1900).

VISA'LIA. The county-seat of Tulare County, Cal., 250 miles southeast of San Francisco; on the Santa Fe Railroad and a branch of the Southern Pacific (Map: California, D 3). It is in a farming, fruit-growing, stock-raising, and lumbering region, and has important fruit packing and canning interests. Population, in 1890, 2885; in 1900, 3085.

VISAYA, vê-sä'yȧ. A numerous Malay people in the middle Philippines and Northern Mindanao. They have separate speech and culture and a peculiar kind of writing. See Philippine Islands; Philippine Languages.

VISAYAS, vê-sä'yȧs, or **BISAYAS**. The central group of the Philippine Islands, lying between Luzon and Mindanao (Map: Philippine Islands, H 8). It constitutes one of the four main insular groups or territorial divisions of the archipelago, the other three being Luzon with Mindoro, Mindanao with the Sulu Islands, and the Palawan group. The name is derived from the Visayans, the predominating race inhabiting the group. For details, see articles on the separate islands, the chief of which are Sámar, Bohol, Cebú, Negros, Panay, Romblón, and Masbate.

VISCACHA, or **VIZCACHA**, vĭs-kä'chȧ (Sp., probably of Quichua origin). A curious and pretty burrowing rodent (*Lagostomus trichodactylus*) of the chinchilla family, found on the pampas in South America. It is nearly two feet long. The colors are varied and on the face are so arranged in masses of light and dark as to give it a very peculiar appearance. The burrows of the viscacha are so numerous and so deep that they constitute a dangerous feature of the pampas to horseback riders; and in general the habits and economy of these animals are like those of the prairie-dogs (q.v.). Their fur has some commercial value. Interesting and detailed accounts of them may be found in Darwin, *A Naturalist's Voyage* (London, 1860), and in Hudson. *The Naturalist on the La Plata* (ib., 1892). See Plate of Cavies.

VIS'CELLI'NUS, Spurius Cassius. See Cassius Viscellinus, Spurius.

VISCHER, fĭsh'ĕr, Friedrich Theodor von (1807-87). A German critic, born at Ludwigsburg, Württemberg. He was educated at Tübingen, after which he was for a year vicar of the country church of Horrheim, near Vaihingen. He then spent the years 1832 and 1833 in developing his æsthetic taste in the art centres of Germany and Austria. He was successively privat-docent (1836-37) and professor extraordinary (1837-44) in the University of Tübingen, and in 1844 was appointed professor of æsthetics. The too independent tone of his inaugural lecture, however, caused his suspension for two years. In 1848 he was elected to the National Assembly of Frankfort, where he voted with the Left. In 1855 he was called to the polytechnic institute of Zurich, and in 1866 to that of Stuttgart. He resumed at the same time the professorship of æsthetics and German literature at Tübingen, but from 1869 taught only at Stuttgart. As a literary critic and student of æsthetics, Vischer was one of the most distinguished members of the Hegelian school. Among his numerous and valuable publications are *Kritische Gänge* (1844; new series, 1861-73); *Aesthetik oder Wissenschaft des Schönen* (1847-58); *Faust, der Tragödie dritter Teil* (1862; 4th ed. 1889, a satire on the second part of the tragedy); *Epigramme aus Baden-Baden* (1867); *Der deutsche Krieg 1870-71* (1874); *Goethes Faust: neue Beiträge zur Kritik des Gedichts* (1875); *Auch Einer* (1878; novel, 7th ed., 1896); *Mode und Cynicismus* (1878; 3d ed. (1887); *Altes und Neues* (1881-82); new series (1889); *Lyrische Gänge* (1882; 2d ed. 1889); and *Allotria* (1892). Consult the monographs by Günthert (Stuttgart, 1888) and Ziegler (ib., 1893).

VISCHER, Peter, the Elder (c.1455-1529). A German sculptor and brass-founder, one of the greatest masters of the Renaissance. Born at Nuremberg, son of the brazier Hermann Vischer the Elder, who acquired citizenship there in 1453, and died in 1487, Peter was his father's pupil and assistant, and was admitted to the guild as a master in 1489. His productions increased the reputation of the foundry which he had inherited from his father to such a degree that for half a century it was practically without competition in Germany, and also received important orders from other countries. Five sons assisted Peter in his extensive productions—Hermann the Younger (c.1490-1516), Peter the Younger (c.1494-1528); Hans, who inherited the foundry, but removed to Eichstädt in 1549; Paul, who died at Mainz in 1531; and Jakob, about whom information is lacking. While records of his outward life are wanting, we have a picture of the master's artistic development in his numerous works, all marked with his monogram and dated, with the exception of his earliest known work, the statue of "Count Otto von Henneberg" in the church at Römhild (c.1480-90). Of 1490 unquestionably is the statue of a "Kneeling Man" in the National Museum at Munich, probably the fragment of some monument. Of several sepulchral slabs in the cathedrals of Bamberg, Würzburg, and Meissen, that of "Duchess Sidonie," at Meissen, deserves especial mention. Two characteristic works are the stately monuments of "Archbishop Ernst of Saxony" (1495, Magdeburg Cathedral), and of "Bishop Johann Roth" (1496, Breslau Cathedral), in which the master has already abandoned the conventional forms of his father's productions, and yielded to the realism of the Nuremberg school.

During the ten years following the completion of these important works, a change in Vischer's artistic views seems to have freed him from the trammels of the prevailing style and led him to a more elaborate mode of conception, exemplified in beauty in his master creation, the "Tomb of Saint Sebaldus" (1508-19), in the church of that saint, at Nuremberg, the most popular plastic monument of German art. Destined as a shrine for the silver sarcophagus (of 1397) containing the remains of the patron saint of his native city, this superb work, in which he was assisted by his five sons, has perhaps only one counterpart among all the plastic productions of the Christian Era, in Ghiberti's bronze gate at Florence. Other prominent works outside of Nuremberg, are the "Monument to Cardinal Frederick" (1510, Cracow Cathedral); the statues of "King Arthur" and "King Theodoric" (both 1513), in the famous monument of "Emperor Maximilian," at Innsbruck; and the "Epitaph of Margaretha Tucher" (1521, Regensburg Cathedral), representing the meeting of Christ with the sisters of Lazarus and of which there is a faithful reproduction (1543) by Hans Vischer in the National Museum at Munich; finally there are to be noted as highly important the monuments of "Cardinal Albrecht von Brandenburg" (1525, Stiftskirche, Aschaffenburg), and of the "Elector Frederick the Wise" (1527, Schlosskirche, Wittenberg), the last of which, distinguished for its especially delicate and tasteful treatment of detail, is for the greater part to be attributed to Peter the Younger.

After the elder Vischer's death, on January 7, 1529, his foundry continued to receive abundant commissions for about a decade longer, with the execution of which Hans Vischer must be credited. The most noteworthy of these are the double monument of the "Electors Johann Cicero and Joachim I." (1530, Berlin Cathedral), and the monument of "John the Constant" (1534, Schlosskirche, Wittenberg). Consult: Bergau, in Dohme, *Kunst und Künstler*, vol i. (Leipzig, 1878); Bauer, *Peter Vischer und das alte Nürnberg* (Berlin, 1886); Bode, *Geschichte der deutschen Plastik* (ib., 1887); *Weizsäcker*, "Peter Vischer, Vater und Sohn," in *Repertorium für Kunstwissenshaft*, vol. xxiii. (ib., 1900); and Ree, in *Allgemeine deutsche Biographie*, vol. xl. (Leipzig, 1896).

VISCONTI, vēs-kōn'tē. A celebrated family of Lombardy. The first of the name who appears prominently in history is **Ottone**, who became, in 1078, Viscount of the Archbishopric of Milan. In 1263 another **Ottone** (1208-95) was appointed Archbishop of Milan by Pope Urban IV. His appointment was opposed by the popular party, headed by Martino della Torre, but Ottone came off victorious in the struggle with the Torriani, and established his sway in Milan. The contest was continued by his grand-nephew, **Matteo** (1250-1322), who was appointed Imperial vicar in 1295. Matteo proved himself a prudent and temperate ruler. Expelled by the Torriani and their allies in 1302, he was restored in 1311 by the aid of the Emperor Henry VII., and reappointed Imperial vicar in consideration of the payment of 40,000 florins. Pavia, Alessandria, Tortona, Cremona, Bergamo, and Lodi were forced to acknowledge his authority. A quarrel, however, arose with Pope John XXII., regarding the appointment to the Milan archiepiscopate; and Matteo was excommunicated. Matteo died in the same year, having previously abdicated. His son, **Galeazzo** I. (1277-1328), was chosen his successor, and immediately the Pope proclaimed a crusade against the heretical Visconti, and an army under Raymond of Cardona advanced in 1323 on Milan. The Emperor Louis IV. sent aid to the Visconti and the crusaders were totally defeated at Vavrio, on the Adda (1324). Soon after Galeazzo, by the intrigues of his ambitious brother Marco, was exiled, but his eldest son, **Azzo** (1302-39), succeeded him, while the Antipope Nicholas V. confirmed the third son, **Giovanni**, in the archiepiscopate. Azzo was the greatest prince of the race, ruled Milan wisely and well, and extended his sway over almost the whole of Lombardy. The Council-General of Milan elected his two uncles, **Giovanni** (1290-1354) and **Lucchino** (1287-1349), as joint rulers to succeed him; on the latter, who was able, resolute, and unscrupulous, devolved the government. Montferrat was added to the dominions of the Visconti and Pisa became a tributary. Lucchino's tyrannical acts provoked enemies, and he died by poison. From this time Giovanni, who had been since 1342 Archbishop, reigned alone. He bought Bologna in 1350; in 1353 accepted the lordship of Genoa, which had been almost crushed by its rival, Venice; and taking up the quarrel of his new subjects, equipped a fleet which, under Paganino Doria, gained a complete victory over the Venetians. He was the generous patron and friend of Petrarch. His three nephews conjointly succeeded him, but in 1355 the eldest died by poison, and his dominions were shared between the other two, **Galeazzo** II. (died 1378) and **Bernabò** (died 1385). Bologna, which belonged to Bernabò, fell into the hands of the Pope, who excommunicated Bernabò for attempting to recover possession of it. Urban V. proclaimed a crusade against Bernabò which was joined by all the principal Italian princes; and he was ultimately forced to accept a sum of money in place of Bologna. His brother Galeazzo II., who had established his residence at Pavia, was the "Mæcenas" of his time; he steadily befriended Petrarch, founded the University of Pavia, and collected a considerable library.

On Galeazzo's death (1378) his son, **Gian Galeazzo** (c.1347-1402), succeeded him in Pavia and its dependencies; and by treacherously seizing and imprisoning his uncle, Bernabò of Milan, became sole ruler of Lombardy. He had all the great qualities and most of the vices of his race, and openly aspired to the sovereignty of Italy. He conquered Padua, Verona, and Vicenza; extended his dominions to the gates of Florence, which he also attacked; and in 1395 purchased from the Emperor Wenceslas the absolute sovereignty of his dominions, with the title of Duke of Milan. He was a great patron of letters and science, gathered eminent men of all classes around him, reorganized the University of Piacenza, established a magnificent library, constructed the famous bridge over the Ticino at Pavia, and commenced the erection of the Cathedral of Milan. His daughter, Valentina, married Louis, the younger brother of Charles VI. of France, and became the grandmother of Louis XII., who upon this relationship founded his claims to the Milanese. Gian Galeazzo's sons, GIAMMARIA (Giovanni Maria) (1388-1412) and FILIPPO MARIA (1391-1447), reigned in succession; the former, who was cowardly, suspicious, and of a cruelty verging on insanity, was murdered, and the younger brother became sole ruler. The Venetians on the east, the Marquis of Montferrat on the west, and the Pope on the south, were rapidly curtailing his dominions, when, by a happy stroke of policy, he espoused Beatrice di Tenda, the widow of a condottieri leader, and thus obtained the services of a veteran band of soldiers. His fortunate choice of Carmagnola (q.v.) as his general led to the restoration of the former boundary line of his dominions. In 1441 he engaged the services of the celebrated condottiere Francesco Sforza (see SFORZA), to whom he gave his natural daughter Bianca in marriage; and on his death the Visconti family was succeeded by that of Sforza (q.v.) in the lordship of the Milanese. Collateral branches of the Visconti still exist in Lombardy. Consult: Sismondi, *Histoire des républiques italiennes* (Paris, 1826-33); Symonds, *Age of the Despots* (London, 1875).

VISCONTI. A family of Italian archæologists and architects. GIOVANNI BATTISTA VISCONTI (1712-84), a native of Sarzana, settled at Rome and succeeded Winckelmann as prefect of antiquities. He was employed by Clement XIV. and Pius VI. to collect works of ancient art for the museum of the Vatican, the *Museo Pio-Clementino*, as it was called. ENNIO QUIRINO VISCONTI (1751-1818) eldest son of Giovanni, as a youth aided his father in the preparation of the first volume of the engravings of the *Museo-Pio Clementino*. In 1784 he edited alone the second volume of the same series, and in 1787 was appointed conservator of the Capitoline Museum. The series of engravings of the *Museo* was regularly issued, the seventh and last volume being published in 1807. During the French occupation of Rome Visconti was a member of the Government, but in 1799 was compelled to flee to France and settled in Paris, where he was made curator in the Louvre, and professor of archæology. In 1801 appeared his great work, *Iconographie grecque*, and this was followed by the *Iconographie romaine* in 1817. In 1817 he went to London by express desire of the British Government, to appraise the value of the Elgin marbles (q.v.), and as a result of this visit published *Mémoire sur les ouvrages de sculpture du Parthénon*. He died in Paris, February 7, 1818. PIETRO ERCOLE VISCONTI (1802-80), nephew of Louis Tullius Visconti (q.v.), after studying at the Papal archæological academy became in 1836 commissioner of antiquities, director of the collections in the Vatican, and professor at the University of Rome. He left uncompleted his *History of the Noble Families of Rome and the Papal States*.

VISCONTI, LOUIS TULLIUS JOACHIM (1791-1853). A distinguished French architect, born in 1791 in Rome, the son of Ennio Quirino Visconti. He was brought in his eighth year to Paris, where he studied in the Ecole des Beaux-Arts and in the atélier of Charles Percier. Among his varied works in Paris were the architectural designs of the Molière, Louvois, and Saint Sulpice fountains, plans for a Bibliothèque Royale, and the transformation of the Dome des Invalides into a mausoleum for the remains of Napoleon Bonaparte (completed 1853). To him is also due the masterly design for the union of the Louvre and the Tuilleries, a problem which his master Percier, with Fontaine, had earlier endeavored to solve. This colossal enterprise was begun in 1852 under Napoleon III., and carried out during the following thirty years, chiefly under Visconti's associate, Hector Lefuel, who succeeded him on his death in December, 1853. While the exterior detail of the new wings is largely Lefuel's, the general disposition of the plan was Visconti's.

VISCONTI-VENOSTA, vā-nōs′tȧ, EMILIO MARCHESE (1829—). An Italian statesman, born in Milan. After his father's death, in 1846, he began to take a prominent part as a journalist in Liberal politics. He became an ardent follower of Mazzini, whom he left in 1853 to join Cavour, and in 1859, after a narrow escape from arrest by the Austrian authorities, he was named royal commissary to Garibaldi. In 1860 he was appointed adviser to the dictator Farini in Parma and Modena, in the interest of annexation to Sardinia, was elected to the Chamber of Deputies in the same year, and became Minister of Foreign Affairs in the Minghetti Cabinet in 1863, but resigned in 1864 because of popular disapproval of the convention of September, which he had concluded with France. In 1866 he became Ambassador to Constantinople, but was recalled to take charge again of the Foreign Office and conclude peace with Austria, after which he was retired. Again in 1869 he was made Foreign Secretary in Lanza's Cabinet and held the portfolio until the fall of the Right from power in 1876, when he retired, having passed the 'Guarantigie pontificie.' Visconti-Venosta became Senator in 1886, and in 1896 again received the portfolio of Foreign Affairs under Rudini, but was forced out by revolts in Milan and by general opposition to his conservative policy, in May, 1898. In 1899-1900 he was Foreign Minister in the Pelloux Cabinet, and in 1900-01 held the same post under Saracco. The most striking item in Visconti-Venosta's foreign policy was his eager friendship for France.

VISCOSITY (from Lat. *viscosus*, viscous, sticky, from *viscum*, *viscus*, bird-lime, Gk. ἰξός, *ixos*, mistletoe). When currents are produced in fluids, forces are observed which retard the relative motion of the parts. These forces of friction are said to be due to 'viscosity;' and the greater the friction, the more viscous the fluid.

VISCOUNT (OF. *visconte*, *viconte*, Fr. *vicomte*, from ML. *vicecomes*, viscount, from Lat. *vice*, in place of + *comes*, companion, count). In English history, originally the officer who acted as deputy to the earl, the earl being the King's immediate officer within his county. The hereditary title of viscount is a degree of nobility unconnected with office. It was first granted in England to John Beaumont, created a peer by the title of Viscount Beaumont in 1440. A viscount's coronet consists of a chased circlet of gold, round which are ranged an indefinite number of pearls, nine of them being most generally shown, smaller than those of a baron's coronet, and in contact with each other. The mantle is scarlet, and has two doublings and a half of ermine. A viscount is styled 'right honorable;' his wife is a viscountess; his eldest son has no courtesy title of peerage, but all his sons and daughters are styled 'honorable.' The title has a not dissimilar history in France, Italy, and Spain.

VISCUM. See MISTLETOE.

VISH'NU (Skt. *viṣṇu;* of uncertain etymology). The second god of the Hindu triad (see TRIMURTI), and regarded as the supreme deity by his worshipers, who are called Vaishnavas (q.v.).

In the Rig-Veda Vishnu is the 'wide-stepping' god who 'goes swiftly' and 'establishes the vault of heaven' and 'measures out the extreme spaces of earth,' while his 'dear path' is the heaven of pious men, or along the highest heavens. The deity thus described is apparently the sun, though some scholars prefer to regard the Vedic Vishnu as a giant of earth, his famous 'three strides' through the universe being interpreted as across the ground rather than through the sky. In the second period of Hindu thought, however, the union of the sun-god and Vishnu is complete, and at the same time Vishnu becomes much more important and more generally recognized as one of the supreme gods, appearing even as the supreme deity. The next phase of his character is that of a supreme All-god. About the time of the Christian Era this pantheistic Vishnu, who represents on the one hand the esoteric speculations of philosophy, and on the other the figure of a popular godling, entered into so close rivalry with the orthodox supreme god, Brahma, and with the sectarian god, Siva, that to reconcile the conflicting claims of each party the three were proclaimed to be forms of the same one supreme god. When this step was taken, Vishnu as a distinct personality disappeared, being merged with Brahma and Siva, and thenceforward he represented only a personal condition of the one All-god. While Brahma became more and more a deity of philosophers and Siva remained an object of fear, Vishnu became especially the god of the easy-going, life-loving middle classes, both in the northern and southern divisions of India, and ended his divine career by absorbing most of the local cults of the Hindu and barbarian natives. He was supposed to have descended from his heaven and become incorporate in various guises. These are the famous avatars of Vishnu. (See AVATAR.) In them the Vishnu appeared only in part; for being the All-god, the individual form was only a portion of the whole. This theory of avatars did more than anything else to make Vishnu a popular god; for, according to it, any local god might be a form of the All-god. This provided a means of bringing into the Brahmanic fold the worshipers of the most diverse divinities.

The oldest legends of the avatars have to do with mythical animals; then follow avatars in half human form, and finally come the great human avatars. Among these the oldest of all is the fish-avatar. At first, before Vishnu was recognized as All-god, we find the legend of a deluge, and the story of a monster fish, which preserved from death in the flood the ancestor of all mankind. The orthodox Brahmanic theologians assert that the saving fish was an incarnation of the god Brahma. It is not till much later that Vishnu is substituted for the earlier god. In no other instance is the historical genesis of the avatar so plainly preserved as in this, wherein a popular tale is transferred from one divinity to another.

The numerous avatars of Vishnu are given at first as ten, then as twenty, then again as twenty-two, and at last they become innumerable. First comes the fish-avatar already referred to; then the tortoise and boar avatars. These comprise the first group, in which possibly a totemic deity has been identified with Vishnu. The next group comprises the half-human man-lion form of Vishnu and the dwarf form, in which the deity is half beast and half god respectively. The tortoise and boar forms, like that of the fish form, are assumed in order to save earth itself from disaster. Both tortoise and boar raise the sinking land, so that these are also merely forms of a deluge-myth. In the dwarf avatar Vishnu tricks an evil demon, who possesses earth, by soliciting as much earth as the petitioner can cover with three strides. On this request being granted, the god renounces his dwarf form and with his ancient three strides covers the whole of earth. The last group of avatars comprises those of the two Ramas and of Krishna, together with the final claim or admission that Buddha was an avatar of Vishnu and the prediction that there is to be another avatar, that of the Saint Kalki. In this last group of avatars, beginning with the older Rama, the evil counteracted by Vishnu in human form is moral, not, as in the earlier legends, merely physical evil.

The most important of these avatars are those in human form. As Rama or as Krishna, the god Vishnu is worshiped by millions of Hindus, whereas in other forms he has only a restricted circle of worshipers, generally limited to a local cult. Especially is this true of the speculative avatars, such as Buddha in the group of ten, or as Kapila (the reputed inventor of the Sankhya philosophy) in the later group of twenty-two. In regard to these forms it may be said that the god is not really worshiped under them, but they are postulated merely on the general theory that the greatest men of the race, unless positively antagonistic to the Vishnu cult, must have been incarnations of the deity.

All these legends have resulted in swelling enormously the sectarian literature which clusters about Vishnu, and almost every legend has received its special gospel in the shape of a Purana (q.v.) or two.

When freed from all avatars, Vishnu as the supreme god, or as a member of the Trimurti and not as a mere name for the pantheistic All-god, is conceived as having a special heaven, called Vaikuntha. His wife is Lakshmi (q.v.), or the goddess of good fortune, and he is represented as dark in color, with four hands, his emblems being a disk (due to his solar attributes), a conch-shell or trumpet (such as he bore in battle), a lotus (from the heart of which Brahma is supposed to have been born), and a mace or sword. Other representations picture his avatars as a beautiful youth, to typify Krishna or Rama. The epic gives him a thousand names, most of which are epithets describing him as all-glorious, all-powerful, the savior, the preserver, or the very great one.

There is, however, another aspect of Vishnu, which may be called his philosophical form. In this form Vishnu becomes a mere name (interchangeable with Brahma or Siva) of the All-god as philosophically conceived. As such Vishnu is not a demiurge, which in all sectarian forms is his real position, but a being without parts or passions, having no attributes save those of being and knowledge. He is the name of the world-spirit out of which comes and into which returns all the transient group of phenomena which have no real existence and are due merely to ignorance on the part of those who live conditioned by these phenomena. This is the Vishnu of the Vedanta (q.v.), differing both from the Krishna-Vishnu of the sectary and from the Vishnu of the Trimurti, or triad of the co-equal supreme gods. Since Vishnu may be and is worshiped under any of these conceptions, he comes nearest to the all-sufficing notion of God, and his cult appeals alike to the grosser intellect of the sectary and to the most refined thought of the logician. In all of these phases may be seen a survival of the primitive sun-god. On the one hand the identification of the sun's place with the place of departed spirits led to a mystic conception of the god, whose attribute of light was further identified with that of goodness. On the other hand, the fructifying power of the sun led to the apotheosis of the generative power in man as in nature, and it is this function which is the chief element in Krishna worship, Krishna being renowned as the amorous shepherd, whose thousand wives or mistresses are his principal delight.

In sharp contrast to Siva, Vishnu is at all times a kindly god, and his cult is indicative of this fact. To him are offered no bloody sacrifices. He desires only the sacrifice of fruit and vegetables, milk and honey. The esoteric rites in honor of his human incarnations are also bloodless, though licentious in their debased form. On the whole he is a deity of light and joy. Gay banners and brilliant illuminations are seen at his feasts, and his many temples are crowned with flowers, not with the skulls of victims. Under the form of Juggernaut, or Jagannāth (q.v.), the savior of the world, he has been credited with taking pleasure in human sacrifice, but this is a gross error.

The sacred scriptures of Vishnu are of two sorts. The first are the few early texts which express a belief in Vishnu as the supreme god. Such expressions of belief are always incidental in the first instance, and they would not be of influence if it were not for the later evolution of Vishnu into the All-god. The earliest Upanishads (q.v.) and the still earlier Brahmanas (q.v.) do not recognize Vishnu as in any way a supreme deity. The second class of scriptures includes the *Bhagavadgītā* (q.v.), in which for the first time Krishna appears as Vishnu incarnate on earth, and the *Viṣṇu Purāṇas*, of which there are several, the oldest being called simply *Viṣṇu Purāṇa*, and the most popular being the *Bhāgavata Purāṇa*. These, together with a supplement to the *Mahābhārata* called the *Harivanśa* (q.v.) or genealogy of Krishna (as Vishnu), in which are told marvelous tales of Krishna's youthful exploits, are the classic texts in honor of the god, though each of the Vishnu sects (see VAISHNAVAS) has scriptures of its own. Consult: Muir, *Original Sanskrit Texts* (London, 1858-63); Hopkins, *Religions of India* (Boston 1895); Macdonell, *Vedic Mythology* (Strassburg, 1897), and see VISHNU in Plate of HINDU DEITIES, in the article INDIA.

VISIBLE SPEECH. A scientific form of universal alphabetics, devised by A. Melville Bell (q.v.) in 1848, which is equally adapted to every nation and spoken language. There is not a phonetic element in any language that cannot be reduced to its established standard of articulate correctness and accurately represented. Hence, visible speech, correctly written and read, presents and acts respectively the same linguistic sounds in every country. Human speech, however, consists of certain movements of the throat, tongue, and lips, associated in different countries with different sets of letters, so that one may know the letters perfectly in connection with a certain language, and yet be unable to pronounce them in some other language. This is effectively obviated by visible speech, as it consists in a form of writing which depicts the actual movements of the organs of speech, and inasmuch as these organs are alike in all men, and the effect of every action is the same in all mouths, the symbols used in graphically giving their requisite movements result in a strictly uniform standard of pronunciation in every language, regardless of linguistic differences and local peculiarities. For the characters employed in the system, see DEAF MUTE.

VISIGOTHS. See GOTHS.

VISION, or SIGHT. That sense which gives us knowledge of our surroundings through the medium of the eye and includes impressions of form, of colorless light (black, white, and gray), and of color. The function of the eye is the reception of stimuli imparted by means of vibrations of the surrounding ethereal medium (luminiferous ether), and the transference of corresponding stimuli to the optic nerve; the latter serves to transmit the resulting nerve-excitations to the occipital lobes of the brain, where they are concomitant with sensations of sight.

THE CONNECTION OF THE EYEBALL WITH THE BRAIN. (For a description of the eyeball, see EYE.) The eyeball is connected with the brain by a slender cord of nerve filaments, the optic nerve, destruction of which causes blindness. This nerve passes through a small opening in the apex of the orbit and thus reaches the interior of the skull; after passing along the base of the brain a short distance, the optic nerves of the two sides unite, a part of the fibres decussating and passing to the opposite side, a portion continuing upon the same side as the eye from which they arise. Penetrating the substance of the brain, the fibres of the optic nerve finally terminate in nerve cells of the gray covering at a region situated in the median and posterior aspect of the brain, known as the visual cortical area.

THE FORMATION OF IMAGES. Diffuse light gives rise merely to the impression of luminosity. In order to see objects distinctly, light must be collected so as to produce a sharply defined image upon the retina; this process constitutes focusing. Rays from different points of the object must be focused at corresponding points on the retina, and every radiant point of the object must have a corresponding focal point in the image (Fig. 1). If, for instance, the usually transparent cornea be rendered opaque by some disease, the person will still perceive light, but will be unable to recognize objects.

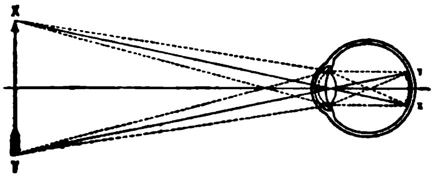


FIG. 1. Illustrating the formation of an image of an external object upon the retina.

The eye serves as an *optical instrument* which receives and focuses upon the retina rays of light from an object; it is often likened to the photographic camera, an interesting comparison that is founded upon many points of resemblance. Thus, the camera incloses a dark chamber, the walls of which are blackened so as to prevent reflection and the resulting irregular illumination which would interfere with the definition of images; in front, it presents an opening for the admission of rays of light; in this aperture is placed a glass lens or series of lenses designed to refract the rays of light and bring them to a focus upon the sensitive plate placed in the back of the instrument; the latter is capable of being moved forward or backward so that its position will correspond to the focus of the rays.

Compared with the camera, the eye possesses all these parts, arranged, of course, in a much more delicate and wonderful manner. It is a dark chamber, lined with the black pigment of the retina and choroid, presenting an opening in front for the admission of light (the pupil), and provided with a sensitive layer (the retina). The focusing is accomplished by the transparent media of the eyeball (cornea, aqueous humor, lens, and vitreous humor), of which the lens plays the most important part. The marginal rays, which would cause a blurring of the image (spherical aberration) and a chromatic ring (chromatic aberration), and which are cut off in the camera by a series of stops or diaphragms, are excluded in the eye by a colored curtain, the iris. The opening in the iris, the pupil, enlarges or diminishes in size according to various conditions presented. In a bright light and when the eye is focused upon near objects, the pupil contracts; in a dim light and with distant vision, the pupil enlarges. These changes occur unconsciously and automatically, whereas in the camera the adjustment is effected by mechanical means and requires different diaphragms for various changes in the distance of the object and the intensity of illumination.

ACCOMMODATION. The focusing apparatus of the eye is of wonderful construction. When we look at a distant object, the lens is kept flat by the tension of its capsule and its suspensory ligament, and is consequently less refractive; rays proceeding from a distant object being less divergent than from a near source, less power is required to focus such rays upon the retina. When the eye is fixed upon a near object, the rays coming from the latter being more divergent, greater refractive power is necessary in order to produce a distinct image upon the retina. Under such circumstances, the lens increases its convexity, especially that of its anterior surface, through relaxation of its ligament and capsule, and consequently increases its power. This change in the thickness and power of the lens, adapting the focus of the eye to various distances, is known as accommodation. It is due to the action of the ciliary muscle, which by its contraction relaxes the capsule of the lens, and thus allows the latter to bulge anteriorly. The fact that muscular action is responsible for this increase in the convexity and hence in the refractive power of the lens explains why the continued use of the eye for near vision results in fatigue. We can look at distant objects, such as scenery, for long periods with a feeling of comparative rest; but when reading a book or engaging in other similar use of the eyes, we focus for near objects; and the continued action of the ciliary muscle under such circumstances causes fatigue, which is just as natural as the tired sensation of the legs following long continued action of the muscles of these extremities in walking. Accommodation in the adult has a range from infinite distance to about six inches. After the age of forty-five the human lens becomes less elastic; as a result there is gradual loss of power to adjust the eye for near objects (presbyopia or old sight), which requires for its correction the use of spectacles containing convex lenses.

THE RETINA. This is the portion of the eye sensitive to light waves, and is described under EYE. The particular part thus sensitive is the layer which is called the *rods and cones*. This layer is composed of great numbers of minute rod-shaped and cone-shaped bodies. Light entering the eye influences the rods and cones in some manner not yet understood, though the changes are supposed to be photochemical in their nature; these changes in the rods and cones, produced by the vibrations of the luminiferous ether, result in stimuli which are transferred to the fibres of the optic nerve. Stimulation of the retina, in whatever way produced, is accompanied by the sensation of light; thus, with pressure on the eyeball there are luminous impressions (phosphenes), and with electrical stimulation, irritation of any sort, or division of the optic nerve there is the sensation of flashes of light.

In the outer portion of the rods, though not in the cones, is a purplish-red matter known as the visual purple, or the rod-pigment; this bleaches upon exposure to light and is regenerated during darkness or a faint light. It is not essential to vision, since it is absent from a part of the retina identified with most accurate sight: this area consists of cones only. Since the rod-pigment exists, in any appreciable quantity, only when the illumination is faint, and is found abundantly in the retina of the owl and other night-birds, but not at all in the rods of those animals which 'go to bed with the chickens,' it is believed to be the source of the adaptation to a faint light which the eye experiences after being for twenty minutes in a darkened room ('extended' Purkinje phenomenon). It is very probable that the rods themselves constitute an apparatus for impressions in black and white only, and are wholly insensitive to color.

The Field of Vision. The sensitiveness of the retina varies in different parts. The most sensitive portion corresponds to the posterior pole of the eyeball, a region which is called on account of its color the yellow spot or *macula lutea*, and on account of its special endowment the *region of most distinct vision;* this area presents in its centre a depression called the fovea. The fovea has no nerve fibres, blood-vessels, or retinal elements excepting cones; even the rods are absent. The *macula* (and still more markedly the fovea) serves to receive all those luminous sensations which give rise to distinct impressions of vision. When we wish to see anything distinctly, we turn the eyeballs toward the object, so that the image will fall upon this spot. Other parts of the retina are much less sensitive to form and color, but not to variations in brightness.

Vision can, therefore, be divided into (1) central or distinct, when the image of the object falls on the macula, and (2) peripheral, when the image falls on some other part of the retina. The space before the eye within which objects are seen, even though indistinctly, constitutes the *visual field;* its dimensions for each eye are: Externally or toward the temple, 90°, above 50°, below 70°, and internally or toward the nose, 60°; these represent the limits for white light, the fields for colors being less extensive. Though not adapted for distinct vision or for color-vision, the peripheral field is of the greatest use in giving us knowledge of the existence of objects placed outside of the direct line of vision; without it our surroundings would have the appearance which we get when we look through a tube. Though we see indistinctly with peripheral vision, eccentric portions of the retina are more sensitive to differences of light, irrespective of form and color, than the macula; hence in a very dim light we can often see an object better when it is outside of the line of direct vision, that is, when we are not looking directly at it.

The Blind Spot. The region corresponding to the entrance of the optic nerve into the eyeball is occupied by nerve fibres exclusively and presents an absence of all other retinal elements. This area constitutes a blind spot in the field of vision; though not generally noticeable, its existence can be demonstrated in the following manner. A cross and a round spot are drawn upon a sheet of paper, two or three inches apart (Fig. 2), the left eye is closed and the right eye fixed upon the cross; if now the sheet be moved forward and backward before the exposed eye, the round spot will disappear from view at a certain distance (about 3½ times the distance between the two figures) whenever its image falls upon the blind spot. See Blind Spot.

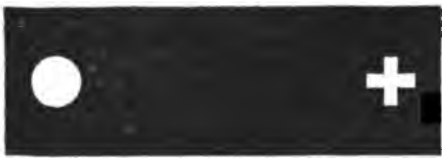


Fig. 2. For use in the experiment to demonstrate the existence of the blind spot in the field of vision.

The retina is supplied with blood-vessels which enter the eyeball with the optic nerve and, branching into smaller ramifications, spread out in the inner layer of the retina. Since they occupy a plane in front of that of the sensitive layer (rods and cones), they must cast a visible shadow; we are not usually conscious of these shadows, but we can be made aware of their existence by the following experiment. If, in a dark room, which serves to make the retina sensitive, after a time, to faint illumination, we keep a lighted candle moving upward and downward on one side of the eye, these shadows will become visible as beautiful arborescent lines.

The Ophthalmoscope. All details of the inner aspect of the retina become visible when the eye is explored with the ophthalmoscope, an instrument invented by Helmholtz in 1851, the essential part of which is a perforated mirror which serves to reflect light into the interior of the eye.

Interpretation of Retinal Images. The stimuli affecting the fibres of the optic nerve whenever the rods and cones of the retina are excited by the vibrations of the luminiferous ether are conveyed to the brain, where they determine changes in the cortical cells. The accompanying impressions are then referred by consciousness to definite positions in external space. Each point in a retinal image is referred to an external point in the line of direction (line through the nodal point of the eye) and consequently to the opposite side of the field of vision; objects seen to the right cast their images upon the left side of the retina, those occupying the left side of the field upon the right side of the retina. Though usually excited by stimuli from without, the retina may also be affected by luminous sensations independent of external causes, or the cerebral centre of sight may be the seat of excitation, producing impressions which are in every case referred to external space, thus giving rise to delusive visual phenomena (hallucinations). See Distance; Locality; Movement, Perception of.

Corresponding Points. Every part of the retina has its corresponding point in the field of vision; this is found by projecting a line from the retinal point through the nodal point of the eye, situated near the posterior pole of the lens. As a result of this law, it follows that the retinal image must be reversed as compared to the external object, the upper portion of the field corresponding to the lower part of the retina, and the lower portion of the field to the upper part of the retina. There has been much discussion as to how it is that we see objects right side up when the retinal image is inverted, but the belief that there is here anything to be explained is due to a misconception. We have no consciousness of either the retinal image or the retina, any more than of the crossing of the fibres of the optic nerve in the optic chiasm. Visual sensation follows only upon an excitation of the cortex of the brain, and if we were conscious of any part of the mechanism of seeing, it ought to be of the (chemical) reproduction of the image upon the visual cortical area. To suppose that we know anything about the physiological basis of our sensations, subjectively, is to commit what Professor James has called the psychologist's fallacy—the fallacy of thinking that we are inwardly conscious of things which we have learned about from the outside.

The Smallest Visible Retinal Images. In order to see two points distinctly (two stars, for instance), it is necessary that the distance between them be such that the images fall upon two separate cones at the macula; hence this distance is governed by the size of the cones in this region. If the two points are very close together so that their images fall upon a single cone, one impression only is produced, and they will be seen as one. It has been calculated that an object must subtend an arc of at least 60 seconds in the visual field in order to be distinctly visible, making an image of 0.0045 of a millimeter at the macula, this representing the diameter of the cones in this area, and this estimate has been confirmed by experiment. See Extension; Extent; Limen.

The Rate of Ethereal Vibrations. As has already been explained, the vibrations of the luminiferous ether constitute the normal stimulus of the retina. These ethereal vibrations differ in their rate of oscillation from 107,000,000,000,000 to 40,000,000,000,000,000 vibrations a second. The comparatively slow waves have the effect of warming bodies upon which they strike, and are known as heat waves; the most rapid ones have the property of breaking up chemical combinations and are known as chemical or actinic waves; while those intermediate in their rate of oscillation cause changes in the rods and cones of the retina and are known as light waves. The light waves vary in their rate of oscillation from 392,000,000,000,000 to 757,000,000,000,000 vibrations a second, and in wave lengths from 0.7667 to 0.3970 micromillimeter. The intensity or brilliancy of light depends upon the amplitude of the vibrations. For color perception, see Visual Sensation.

Binocular Vision. The two eyes ordinarily act together as a single instrument, and sight thus obtained is known as binocular vision. Each eye has its own field of vision; a considerable part of the inner portion of each field overlaps the other, thus forming a binocular field of vision. Although we have two eyes, we are conscious of only one visual impression; it should be remembered that the fibres from the right half of each eye go to the visual area of the right hemisphere, from the left half to that of the left hemisphere.

There being two retinal images for each object looked at, one for each eye, these two images must fall on corresponding parts of the retina in order that single binocular vision exist; when this is the case, the two images are projected into space to the same spot and consequently coincide or are superimposed. To obtain single binocular vision, the optical axes or visual lines of the two eyes must meet at the object seen directly; this is accomplished by the action of certain muscles of the eye. At the same time certain objects seen in indirect vision will also appear single—namely, those which lie within a particular series of points known as the horopter.

The external muscles of the eyeball serve to turn or rotate this organ in any direction; one turns the eyeball inward and outward upon the vertical axis; a second turns the eyeball upward and downward upon the horizontal axis; and a third set rotates the eyeball upon the antero-posterior axis. By the associated action of two or more of the muscles of both eyes the gaze can be turned toward any object; this is done rapidly, unconsciously, and automatically. Thus, in reading, the internal muscle of the right eye acts with the internal muscle of the left eye and sufficient convergence results; when we turn the eyes to the left, the external muscle of the left eye acts with the internal muscle of the right eye, etc. As a consequence of paresis of any of the eye muscles, double vision (diplopia) results whenever the object looked at is situated in a portion of the field corresponding to the sphere of action of the weakened muscle. If one eyeball be pressed upon with the finger so as to displace its visual line there will be double vision. In both of these instances the images of an object fall upon parts of the two retinæ which do not correspond. In cases of cross-eyes (squint), the eye which is habitually turned in or out, and which is responsible for the second image, gradually learns to exclude the latter, so that the annoying double images are not perceived.

Stereoscopic Vision. Binocular vision gives us a better estimation of solidity and distance than does vision with one eye. When both eyes are used, the degree of convergence of the visual lines and the amount of accommodation necessary for accurate focusing give us an estimate of the distance of the object. On account of the lateral separation of the two eyes and the resulting convergence of their visual lines, the image of each eye is slightly different; the image of the front of the object will be the same, but in addition the right eye will see some of the right side of the object and the left eye some of its left side; the mental combination of these images gives the impression of solidity or depth. This effect is produced, however, only within moderate distances; when objects are remote, convergence of the visual lines and differences in the retinal images become inappreciable; consequently distant objects appear flattened and without relief. The stereoscope is an instrument used to look at two photographic pictures of the same object or scene from different points of view, one representing what would be seen by the right eye, the other what would be observed with the left; when such a double photograph is looked at with this instrument, the two images are combined in the act of single binocular vision and produce the effect of solidity or depth. See Distance; Figure.

The Duration of Visual Sensations. The visual sensation upon the retina persists after the luminous stimulus has ceased; its duration is never less than one-tenth of a second, no matter how short the luminous stimulus. The spokes of a rapidly revolving wheel appear as a solid mass, because the images of the spokes upon the retina follow one another so rapidly that one impression cannot fade away before another has replaced it. For the same reason, a rapidly revolving disk upon which all the colors of the spectrum are represented gives the effect of a white surface, a second color sensation being thrown upon the retina before the impression of the first has had time to disappear.

This persistence of the retinal impression is responsible for positive after-images. If a brightly illuminated object be looked at steadily, the impression upon the retina may be so persistent that the form and color of the object are distinctly visible for a considerable time after the luminous stimulus has ceased to act. This positive after-image may be experienced by looking at a bright object, such as a gas jet, for a short period and then closing the eyes, when a brilliant image will be perceived for some time.

A luminous impulse of very short duration is sufficient to produce a complete retinal impression; thus it has been calculated that an electric spark lasting $\frac{1}{20,000,000}$ of a second is distinctly visible. This short duration refers only to the time necessary to excite the sensibility of the retina; the time required for perceiving the sensation is much longer, since the latter process includes passage of the visual sensation through the optic nerve (lasting at least $\frac{1}{1000}$ of a second), transmission through the intracerebral visual paths, and perception by the visual cortical area of the brain. Consequently by the time the image of an electric spark is perceived, it has already come to an end. This explains the fact that bodies in rapid motion appear as if at rest, when seen by a very brief illumination, such as an electric spark. For the same reason, the brief closure of the lids in winking causes no interference with sight, since the visual impression of external objects persists beyond the time required for rapidly closing and opening the lids. See Duration.

Fatigue of the Retina. The sensibility of the retina becomes diminished when the eye is exposed to continued impressions. If one eye be covered with a dark shade and the other be fixed upon a uniformly illuminated white surface, the latter becomes less brilliant after a time, owing to the retinal fatigue; if we then cover the eye previously in use and look at the white surface with the other, it will appear brighter because the retina previously shaded will have acquired greater relative sensibility. If we look steadily at a black disk one or two inches in diameter, placed upon a sheet of white paper, and then remove the disk and continue to look upon the paper, the latter will present a bright spot corresponding to the previous position of the black disk. This example of the effect of retinal fatigue is known as the *negative after-image;* the portion of the retina which was originally exposed only to the rays from the black disk with its comparative absence of light has become more sensitive, and consequently the portion of the paper corresponding to this sensitive area appears brighter; while the parts of the retina impressed by rays from the white paper become less sensitive and as a result this portion of the paper appears duller.

Parts of the retina which have suffered fatigue by continued impression of color are more sensitive to rays of the complementary color. If we place a piece of red paper upon a white ground and look at it steadily, a green after-image is seen when the colored paper is removed. If the eyes be fixed upon a piece of black ribbon placed upon a red cloth, the negative image seen upon withdrawing the ribbon will be a deep red color, the rest of the cloth appearing to be a dull brown; the former area is perceived by a part of the retina which has become more sensitive from exposure to rays coming from a black object; the latter surface appears dull because seen with a portion of the retina which has been fatigued by exposure to red rays. See After-Image.

Contrast. When after being exposed to one portion of the field the eye seeks another, the visual sensation will be modified by the amount of fatigue excited by that portion of the field upon which the eye has been fixed; the effect of this combination is to produce the phenomena of contrast. As a result of contrast, every part of the field of vision appears darker near a lighter portion and lighter near a darker portion. In Fig. 3, an example of contrast, a number of black squares are separated by white bands; the points of intersection of the latter appear darker than the rest of the white bands. See Contrast.

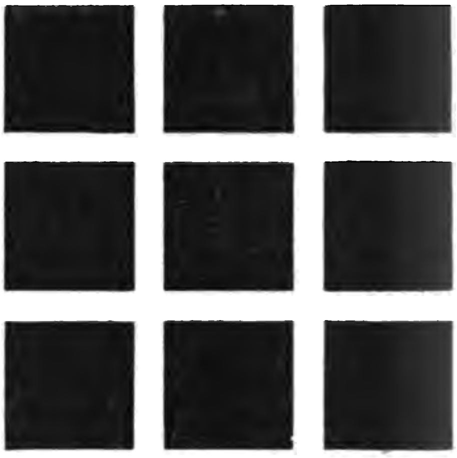


Fig. 3. Illustrating the phenomenon of contrast.

Irradiation. The refractive apparatus of the eye, though wonderfully constructed, presents some imperfections. Owing to the latter, points of light are not focused with absolute accuracy, and consequently produce small circles of dispersion on the retina. On this account, bright objects produce images with imperfectly defined outlines which appear larger than when objects of the same size are feebly illuminated; this phenomenon is known as irradiation. A familiar example is seen in Fig. 4. A white square upon a dark field appears larger than a black square of identical size upon a white background, because the white surface appears to encroach upon the dark portions of the field.

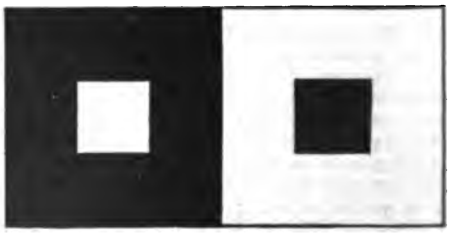


Fig. 4. Illustrating the phenomenon of irradiation.

Space Perception. Rays of light proceeding from a certain point in the visual field are focused upon a definite point on the retina, thus indicating the point from which the light comes; consequently the size and shape of objects are judged by the size and shape of the retinal image. This estimation is aided by the muscular sense of the muscles moving the eyeball, a certain amount of action of these muscles being accompanied by a certain degree of conscious effort. Our estimate of distance is to a great extent a matter of visual judgment, acquired as a result of experience, though it is also influenced by the size of the retinal image. A retinal image of given size may result from a distant object of large size or a small object near the eye; hence when we know the exact size of an object, we judge of its distance by the size of the retinal image; and, conversely, when we know the actual distance at which an object is placed, we judge of its size by the size of its image on the retina. As a result of this relationship, if we err in regard to the size, we are led into error in our estimate of the distance.

THE INFLUENCE OF MENTAL PROCESSES UPON VISUAL PERCEPTIONS. Our estimate of the size, form, distance, and direction of objects is based largely upon previous experience, and is the result of the physiological process of vision aided by former judgments which have been stored up in the brain. Such deductions are liable to error, either on account of error in judgment, or because of faulty vision. Vertical lines, for instance, appear longer than horizontal ones because we require a more powerful contraction of the relatively weak upper straight muscle of the eye concerned in the required movement than is required of the comparatively strong muscles which move the eye laterally; we judge the upward motion of the eye to be greater because for an equal amount of motion we require a greater muscle impulse. A familiar example of this tendency to overestimate the vertical dimension is the common error of supposing the height of the crown of a silk hat to be greater than its breadth, an illusion which disappears when the hat is laid upon its side.

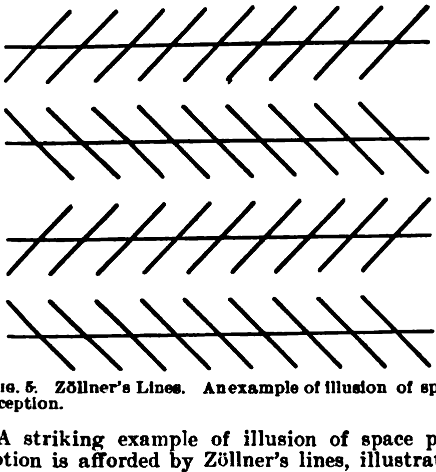


FIG. 5. Zöllner's Lines. An example of illusion of space perception.

A striking example of illusion of space perception is afforded by Zöllner's lines, illustrated in Fig. 5. These lines appear to diverge and converge alternately, although really parallel to each other, owing to their apparent direction being changed to make them appear more nearly perpendicular to the oblique lines crossing them; this tendency for the eye to make acute and obtuse angles approach right angles, is the result of our knowledge that images of familiar surrounding objects of square shape are often seen obliquely, and then form acute and obtuse angles upon the retina; we thus acquire the habit of mentally correcting such visual impressions. See ILLUSION.

Consult: Von Helmholtz, *Handbuch der physiologischen Optik* (Leipzig, 1896); Le Conte, *Sight* (New York, 1897); Foster, *Textbook of Physiology* (ib., 1900); Kirkes, *Handbook of Physiology* (ib., 1902); Schaefer, *Textbook of Physiology* (Edinburgh and New York, 1900); *American Textbook of Physiology* (Philadelphia, 1902); *Graefe-Saemisch Handbuch der gesammten Augenheilkunde* (Leipzig, 1902); Norris and Oliver, *Systems of Diseases of the Eye* (Philadelphia, 1900); May, *Manual of Diseases of the Eye* (New York, 1904); Baldwin, *Dictionary of Philosophy and Psychology* (New York and London, 1901); Calkins, *Introduction to Psychology* (New York, 1901).

VISION, DEFECTS OF. See SIGHT, DEFECTS OF.

VISION OF DON RODERICK. A narrative poem by Sir Walter Scott (1811) founded on a legend of the last Gothic King of Spain, written in aid of the Portuguese in the Peninsular War.

VISION OF JUDGMENT. A eulogy of George III. in English hexameters, by Robert Southey (1821). Its strongly accentuated conservative prejudices excited much criticism from liberals, and it was burlesqued by Lord Byron in a poem bearing the same title (published in vol. i. of *The Liberal*, 1823).

VISION OF PIERS PLOWMAN. See LANGLAND, WILLIAM.

VISION OF SIR LAUNFAL, THE. A poem, partly allegorical, by James Russell Lowell, published in 1848; founded on an Arthurian legend, and probably suggested by Tennyson's *Galahad.*

VISITATION, SISTERS OF THE. A religious Order for women in the Roman Catholic Church, sometimes also known as Salesian Sisters, from Saint Francis de Sales, to whom the idea of its foundation was due. It was established in 1610 at Annecy, in Savoy, with the purpose of visiting and caring for the sick and needy. It took its name and its example from the visit paid to Elizabeth, mother of John the Baptist, by the Virgin Mary (Luke i. 39). The actual founder, under Saint Francis's direction, was Saint Jane Frances de Chantal (q.v.). A second house was established in Lyons, but the Archbishop of that see, Cardinal de Marquemont, desired Saint Francis to change his original plan of a congregation without regular vows into a professed Order. This was accordingly done, with the adoption of the rule of Saint Augustine. Pope Paul V. confirmed it in this form in 1618. It spread through France and Italy, and now numbers about 170 convents. In the United States, to which it came in 1816, it has 22 convents and 700 sisters, whose principal occupation is teaching. The devotion to the Sacred Heart of Jesus, now so widespread in the Roman Catholic Church, had its formal beginning in this Order, of which Margaret Mary Alacoque (q.v.) was a member.

Consult Currier, *History of the Religious Orders* (New York, 1896).

VIS MAJOR (Lat., superior force). A term borrowed from the civil law and employed to denote an inevitable accident, that is, one which results from the operation of the forces of nature and which could not have been prevented by the exercise of care. See Carrier, Common; Contracts.

VISSCHER, vĭs'kẽr, Cornelis (c.1629-62). A Dutch engraver. He was a native of Haarlem, and is thought to have been a pupil of P. Soutman, but little is known of his life. His portraits are among the highest examples of Dutch engraving. Between 1649 and 1662 he produced about 180 plates, including "The Ratcatcher," "The Pastry Cook," "Susanna at the Bath," and others after Italian and Lowland masters.

VIS'TULA (Polish *Wisla*, Ger. *Weichsel*). A river of Central Europe. It rises on the north slope of the Carpathian Mountains in Austrian Silesia, and flows first northeastward on the boundary between Galicia and Russian Poland, then across the latter in a north and northwest direction, and finally again northeastward through the Prussian Province of West Prussia, emptying into the Frisches Haff and the Baltic Sea through several arms, one of which passes the city of Danzig (Map: Prussia, H 2). Its length is 650 miles. In its upper course it flows through a narrow valley with steep, wooded sides, but in Northern Poland the banks become low and the country more open until the river breaks through the Prussian ridge, where the banks are again high. In its lower course it divides repeatedly into parallel arms, inclosing wooded islands. The arms of the delta, one of which, the Nogat, enters the Frisches Haff through a large number of mouths, are subject to extensive change in their channels and in the volume of their discharge, and large sums are expended by the Prussian Government in works of regulation, partly to keep open a navigable channel, partly to protect the fertile delta region from inundation. The river is navigable for large river craft to the Austrian boundary, and for smaller vessels to Cracow. The traffic in grain, lumber, and other products is considerable, but navigation is rendered very difficult by constantly and rapidly shifting sandbanks. The chief cities on the Vistula are Cracow, Warsaw, and Danzig. Its chief tributaries are the San, the Bug, and the Pilica. A canal connects the river with the Oder.

VISUAL SENSATION (Lat. *visualis*, relating to sight, from *visus*, sight, from *videre*, to see). Stimulation of the retina by ether waves gives rise to sensations of color and to colorless sensations (black, white, and gray—called sensations of brightness quality by Hering). There are three chief characteristics of light sensations—color-tone, brightness, saturation—which correspond respectively to three chief moments—wave-length, amplitude, purity—in the physical vibrations set up in the ether. (1) *Color-tone* (as red, orange, yellow, blue) corresponds in the first instance to wave-length. The longest wave (answering to red) has a length of about 700 $\mu\mu$, (700 millionths of a millimeter); the shortest (which corresponds to violet), a length of about 400 $\mu\mu$. Intermediate wave-lengths condition the color qualities orange, yellow, green, blue, etc. (2) *Brightness* corresponds to the amplitude of the ether wave. A stimulus of wide amplitude gives rise to a sensation of great brightness, i.e. a brightness that approaches white. Black, which is as positive a sensation quality as red or white, is correlated with a stimulus of small amplitude or with the total absence of peripheral stimulation (as in a completely darkened room). (3) *Saturation* depends upon the purity or homogeneity of the stimulus. A light of a single wave-length produces a sensation of a high degree of saturation; a light which includes many or all wave-lengths of the physical spectrum, a sensation of a low degree of saturation (as a yellowish or reddish white) or one whose saturation is zero (black, white, or gray). While this correlation of physical and psychical moments is a general one, it has, nevertheless, several exceptions and modifications, the most important of which are considered below.

The colorless sensations (brightness qualities: Hering) form a one-dimensional system running through the grays from light to dark, with white at one end of the series and black at the other. The series may be represented by a straight line, at any point of which there is a brightness quality shading gradually on one side toward black, and on the other toward white. The place in the series of any given brightness is determined, theoretically, by the number of just noticeably different qualities between it and one end or other of the series, or practically by the position of the qualities which most resemble it on either side. The capacity for discriminating these qualities is known as sensible discrimination (q.v.) for brightness. It has been found that for moderate brightnesses the relative difference limen, i.e. the ratio of a just noticeable difference to the absolute brightness value with which the observation is made, is practically constant at about $\frac{1}{100}$; e.g. a gray of 100 photometric units is just noticeably different from one of 101 units. At the two extremes of the brightness series—the dead blacks and the brilliant whites—discriminability is much less. (See Intensity of Sensation.) It has been estimated, on the basis of experimental work, that there are almost 800 different brightnesses.

The series of color-tones runs through the spectrum from red to violet and embraces also the purples. They may be conceived as lying around the periphery of a quadrilateral figure with red, yellow, green, blue at the four corners and the intermediates—oranges, yellow-greens, green-blues, purples, etc.—lying along the sides. A quadrilateral form is chosen instead of a circle because there are distinctive changes at the four points indicated—more or less abrupt changes in 'direction.' The figure also provides for the fact that the ends of the spectrum resemble each other more than either end and the middle. Just noticeable differences have been worked out for color-tone as well as for brightness. Qualitative changes are much more rapid in some parts of the spectrum than in others. Sensible discrimination is greatest in yellow and blue-green and least in red and violet. In yellow and blue-green one can, under favorable conditions, detect a change in color quality in a difference in wave-lengths of less than $\frac{1}{1,000,000}$ mm. Under the same conditions (comparison of two spectra bit by bit) about 160 color-tones can be discriminated in the whole spectrum. It should be noted that language is misleading in regard to the names of color qualities. The compound terms 'yellow-green' and 'green-blue' indicate that these colors are less simple than red, green, or blue. This is not true. Any one of the 160 qualities is for introspection as simple and as ultimate as any other.

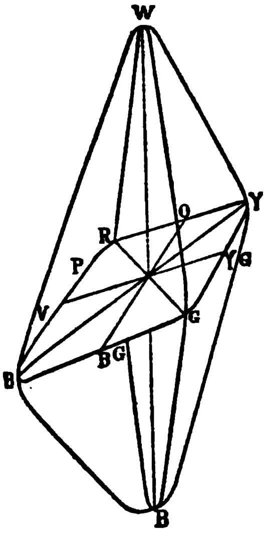


FIG. 1. THE COLOR PYRAMID.

The combination of color with brightness or, as it was stated above, the homogeneity or heterogeneity of the stimulus, gives rise to a third moment, namely, saturation. Saturation denotes the likeness or unlikeness of a color to gray. The relation of saturation to color-tone and to brightness is most easily shown by mixing, in various proportions (e.g. with revolving disks) a color (say, a red) with a gray of the same brightness value. Whatever the ratio of the two, the color-tone and the brightness remain constant, but the saturation, the richness, the purity, the 'depth,' changes. The more gray that is added the less saturated the color, until finally no color-tone remains and the saturation becomes zero. The whole number of visual qualities—brightness, color-tone, saturation—may be represented by a solid figure of the form of a double pyramid with a common base. The brightnesses will lie along the vertical axis of such a figure, the color-tones (at their maximal saturation) about the periphery of the base, and the various saturations along horizontal lines connecting the black-white axis with the periphery. The base will be tipped in such a manner that yellow will be nearer white than blue is. This indicates that a saturated yellow is brighter than a saturated blue. Every point on or within the figure will express, then, some definite color of a certain saturation and a certain brightness, while the vertical axis itself represents the series of colorless sensations. It is to be noticed that although change of saturation does not affect color-tone, it introduces, nevertheless, new visual qualities. A red, or a green, or a violet that is washed over with gray is qualitatively different from the original saturated color. Hence, in making an exhaustive enumeration of visual sensations, we must include the brightnesses, the color-tones, and the various saturations. The total has been estimated at about 33,000 sensation qualities.

The retina is not equally sensitive at all points to stimulation by ether waves. When the illumination is faint, the greatest sensibility to change of brightness is found a little outside of the fovea, or point of clearest vision. A very faint star, e.g. can be sensed there when it is invisible at the fovea. Stimulation at and around the fovea gives all the color qualities (spectral colors and purples); farther out toward the periphery only yellows and blues are visible; farther out still, only gray, black, and white. As regards color sensitivity, therefore, the retina may be said to be divided into three zones, a black-white zone (outermost), a black-white and blue-yellow zone, and an inner black-white, blue-yellow, and red-green zone. Hence it is found that as a mixed color stimulus moves outward from the fovea the resulting color changes at certain points and finally goes over into a gray. The method of determining the zones is called *ampimetry* (with constant fixation at the centre of a black field, a colored object moving out and in, to and from the limits of the field), or *perimetry* (with constant fixation, the object moving in a similar manner along the arc of a great circle which lies in a hemispherical surface convex to the observer's eye).

We have seen that color-tone depends upon wave-length. It also depends (1) upon amplitude (intensity of stimulus) to some extent, and (2) upon the composition of stimulus (mixture of radiations of different wave-lengths). (1) If the solar spectrum be made very bright or very weak, the relations of the colors to each other change. In a very bright dazzling series of colors (got, e.g. by looking at the sun through colored glasses) all the colors but yellow and blue tend to change in tone. The green-blues and violet-blues pass over into blue, the yellow-greens, yellow-reds, and even the reds grow yellowish, and the greens become whitish. In the *darkened* spectrum (called the Purkinje spectrum) it is the red, the green, and a bluish violet that spread at the expense of the other colors. At the same time the point of greatest brightness migrates from yellow to green, so that the red end of the spectrum grows dark faster than the violet end. The result is that blue, which at a moderate intensity looks darker than red, at a lower intensity grows lighter than red, before it disappears into gray. This shift of brightness in the darkened spectrum is known as *Purkinje's phenomenon*, after the physiologist who first called attention to it. To produce these latter changes it is necessary that the increase or decrease in brightness shall have lasted some time, and that it extend over the entire visual field, in order that the eye may become adapted to the new intensity. (2) The production of different color-tones by the mixture of wave-lengths is known as *color-mixture*. It is carried out by the mixture of spectral lights, of colored shadows, or reflections; of pigments, by the irradiation of neighboring colored spots (as in a mosaic); and by the rapid alternation of stimuli by means of revolving disks. There are three chief laws of color-mixture. (1) The law of complementaries: "For every color there can be found another complementary or antagonistic color, which if mixed with it in the right proportion gives a brightness quality (white or gray), and if mixed in any other proportion an unsaturated color of the tone of the stronger component." Some of the complementary pairs are red and verdigris, orange and greenish-blue, yellow and blue, green and purple. (2) The law of neighboring colors: "The mixture of any two colors which are not complementaries gives an intermediate color, varying in color-tone with the relative amounts of the two original colors, and varying generally in saturation with their nearness or remoteness in the color series." The mixtures of yellow and green, red and orange, blue and purple, are instances. (3) "The mixture of any two combinations which match will itself match either of the original combinations, provided that the illumination of the colors remain approximately the same" (Titchener). Mix, e.g. a gray made from red and verdigris with a like gray made from yellow and blue. The result is a gray which matches either of the component grays. The fact that this law does not hold when the illumination is diminished (failure of Newton's law of color mixtures)—that the mixture which contains green will then be far too bright—constitutes the phenomenon known as the 'extended' Purkinje phenomenon (i.e. for colorless light).

There are two principal theories of visual sensation, two hypothetical statements of the physiological conditions which underlie the various phenomena of color-vision. They are known as the Young-Helmholtz and the Hering theories.

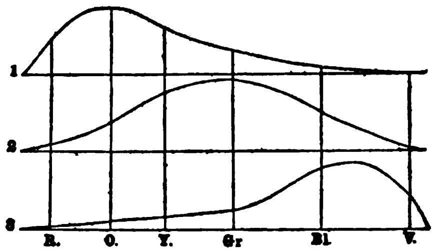


FIG. 2. The Young-Helmholtz Theory. The letters R O, Y, etc., designate the spectral colors. The three curves show roughly the relative values of the excitatory process, 1, in the red-sensitive fibres, 2, in the green-sensitive, and 3, in the violet-sensitive.

The Young-Helmholtz theory sets out from the laws of color mixture as derived by Newton. It posits the existence, in the visual apparatus, of three kinds of nerve fibres—a red fibre, a green fibre, and a blue or violet fibre—each of which if it were excited alone, would give its particular sensation. These three colors, red, green, and blue, are chosen as the primary colors because they give, by mixture, all the various colors and brightnesses at a relatively high degree of saturation (although approximately the same result may be obtained with other combinations of three). Any light stimulus is said to excite all three kinds of nervous elements, but in varying proportions. Red, e.g. excites the red fibre maximally and the green and blue fibres minimally. The color seen under any kind of stimulation depends upon the proportion in which the three kinds of nervous apparatus are affected. Yellow, e.g. results from a strong excitation of the red and green fibres and a weak excitation of the blue fibre. White is due to the equal excitation of all three fibres.

The Hering theory says that there are three 'visual substances' which undergo metabolic changes under the influence of light rays. Each substance is the seat of antagonistic processes: processes of dissimilation (decomposition) and assimilation (recomposition). Dissimilation in one substance gives white, assimilation black; dissimilation in a second gives yellow, assimilation blue; dissimilation in a third, purplish red, assimilation bluish green. From these six principal sensations all others are derived by combined excitation of the three substances. A balance of assimilation and dissimilation, in any substance, means absence of function; i.e. complementaries cancel each other and the gray that is left over is said to be due to a cortical excitation (G. E. Müller).

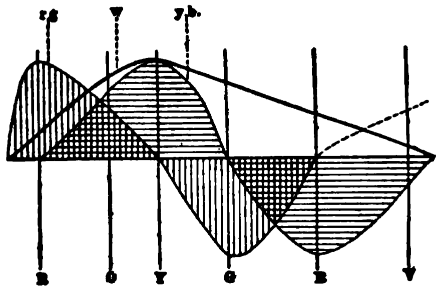


FIG. 3. The Hering Theory.—The line *rg* shows the effect of rays of different wave-lengths on the red-green visual substance; the effect is dissimilative to the point Y, assimilative from Y to B, and then again dissimilative to the end of the spectrum (broken line). The line *yb*, shows the effect upon the yellow-blue substance. The line *w* indicates the dissimilation of the black-white substance throughout the whole length of the spectrum.

The two theories must be tested by an appeal to all the facts of color-mixture, contrast, after-images, indirect vision, adaptation. Purkinje's phenomena, and color-blindness. The Hering theory meets the various classes of facts more easily and with less recourse to subsidiary hypotheses than does the Young-Helmholtz theory. The latter, indeed, would appear to have survived rather in virtue of the authority of Helmholtz than by its intrinsic merits. At the same time, it cannot be said that the Hering theory is wholly adequate to all the minute variations of visual phenomena.

Numerous other theories have been devised with a view to meeting the outstanding difficulties. of visual sensation. Thus the Franklin theory supposes that at an early period of development the eye is sensitive only to luminosity and not to color; at this period it possesses only a gray-perceiving substance, present in all parts of the retina, which is affected by all luminous vibrations, but most markedly by those corresponding to the middle of the spectrum; stimulation of this substance produces the sensation of white of all shades. In the course of development of the eye, this gray-perceiving material becomes differentiated in the cones first into two different substances, which are especially affected by the two halves, respectively, of the spectrum; this is the stage of development which corresponds to the yellow-blue color system of the partially color-blind, and also to that of the middle zone of the normal retina. In the final stage of development, the yellow constituent becomes again differentiated into two substances which respond respectively to red and to green light. The mixed colors are produced by simultaneous stimulation of two or more color substances in varying proportions. The Hering theory is formulated in static, not in genetic, terms; but if we put a genetic interpretation upon it, we must say that for it, too, the black-white substance is the earliest, the blue-yellow the next, and the red-green the last to appear in the course of evolution. Such an interpretation is borne out especially by the facts of color-blindness and of indirect vision, as understood by Hering and his school.

Another important theory is that of Wundt, who posits only two excitatory processes, a chromatic and an achromatic, and regards the former as a multiform, the latter as a uniform, photochemical process. Wundt thus gives up altogether the idea of primary 'components' of visual sensation—of the three ultimate colors of Helmholtz or the four of Hering—and substitutes for these 'component theories' a theory of gradations within a single process. It may be remarked that Wundt's recognition of a separate achromatic process antedates the formulation of Hering's theory. The independence of the achromatic process is accepted also by Von Kries, the author of another theory, which, while based on that of Helmholtz as regards the function of the retinal cones, sees in the rods special organs of achromatic vision.

BIBLIOGRAPHY. Ebbinghaus, *Grundzüge der Psychologie* (Leipzig, 1897); Wundt, *Human and Animal Psychology* (New York, 1894); Helmholtz, *Physiologische Optik* (Leipzig, 1896); Hering, *Lehre vom Lichtsinne* (Vienna, 1878); Titchener, *Experimental Psychology* (New York, 1901); Külpe, *Outlines of Psychology* (New York, 1895); Von Kries, *Gesichtsempfindungen* (1882); König, *Gesammelte Abhandlungen zur physiologische Optik* (Leipzig, 1903). See AFTER-IMAGE; CONTRAST; COLOR-BLINDNESS; WEBER'S LAW; QUALITY; INTENSITY OF SENSATION; PSYCHOLOGICAL APPARATUS.

VISUAL SENSATION—THE COLOR TRIANGLE. The fact that there are four colors—red, yellow, green, and blue—which are of distinctive character, and that the other colors all look like combinations (color-blends) of some two adjacent colors of this group, is well represented in the color-quadrilateral (shown in Fig. 1 in the preceding article). That does not, however, give proper representation to certain other phenomena of color-vision—these can only be expressed diagrammatically by means of a color-triangle. For instance, yellow and blue, at opposite ends of a diagonal of the figure, are complementary colors, but red and green are not complementary—red is complementary to green-blue, and green to purple (red-blue), while red and green when mixed together give yellow. So, in a general way, the non-saturated colors may be regarded as represented by points within the square, but no exact one-to-one correspondence between points and colors is possible in this diagram; the first principle of the plane is violated in the beginning, for the shortest series of distinguishable colors is not in a straight line. It is only necessary, however, to substitute a triangle for a square, with red, green, and blue at its vertices, white in the centre, and yellow on the line connecting green and red (Fig. 1) to secure a good diagrammatic representation of the whole color scheme, including the large body of fact comprehended under the term color-mixture. (For different intensities, this plane figure must be made the basis of a double pyramid with intense white and black at the two apices.) The underlying principle which makes this possible is, in the first place, that color sensations constitute a twofold continuum (intensity being kept constant), since they vary by just perceptible degrees in both color-tone and saturation. The further condition that is satisfied in the actual representation is (among others) that all colors that can be got by the mixture of any two are on a line joining the points which represent those two, and nearer to the point representing the color that they most resemble. Thus if a certain color *c* (Fig. 1) can be composed out of two parts of one color *a* and one part of another color *b*, then it must be represented on the color plane by a point on the line *ab* twice as far from *b* as from *a;* this is the point which would also be the centre of gravity of weights of two pounds and of one pound suspended respectively at the points *a* and *b*. All complementary colors, when mixed in the right proportion, make white light; hence all such colors are on opposite ends of lines which pass through a common point, W. Any color can be made up (with some loss of saturation) out of mixtures of a certain three, red, green, and blue (or violet). Hence the general outline of the figure is a triangle. The fact that these mixtures lack something of saturation requires the assumed fundamental colors to be taken at least outside of the actual spectral color-line (Fig. 2).

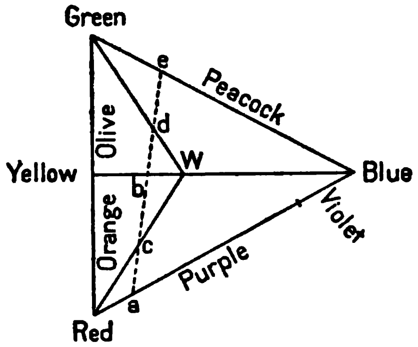


FIG. 1. THE COLOR TRIANGLE (DIAGRAMMATIC).

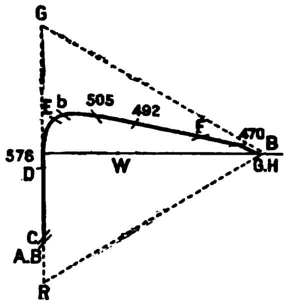


FIG. 2. THE ACTUAL COLOR TRIANGLE.

The color triangle of Fig. 1 expressed (as do all the color diagrams of Hering) the vague idea of the representation of the color continuum by the points of a plane. Clerk-Maxwell was the first to construct a triangle which should represent exact quantities obtained by experiment. The one here given is that of König; it is the result of a vast amount of work done with the aid of the admirable color-mixing apparatus of Helmholtz. This curve is therefore at once the expression of a large number of definitely observed facts, and also, in consequence, extremely serviceable in enabling one to keep all these facts in mind (Ebbinghaus). The choice of the exact wave-lengths which represent the pure red, yellow, green, and blue is based upon observations made on the color-blind, to be mentioned below. The proportions in which the three physical color constituents must be mixed in order to reproduce all the colors of the spectrum is shown on a different plan in Fig. 3. These curves are also the result of actual measurement, of the most exact kind; the color triangle, in fact, represents the same measurements in terms of trilinear coördinates.

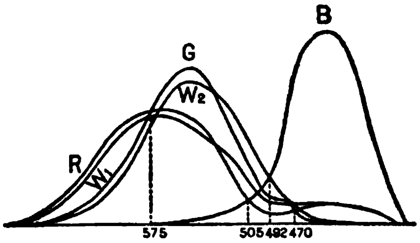


FIG. 3. THE CONSTITUENTS OF THE COLORS OF THE SPECTRUM.

It is unfortunate that nomenclature is in a very backward stage in the subject of light and color. Both these words are used with perfect ambiguity to denote now the sensation and now the physical cause of the sensation—viz. certain trains of ether waves, the photogenic radiations. For instance, the fact of color which is exhibited in the color triangle is that erythrogenic radiations mixed with chlorogenic radiations in a certain proportion suffice to produce the yellow color sensation. This has nothing to do with the question whether yellow, in the subjective sense, is a color blend (like blue-green) of green and red —it is evidently not that. So white (the sensation) is not compounded of yellow and blue sensations, but it is caused by the working together of the causes (physical and physiological) of the sensations of yellow and of blue. If these two very different things were to be kept distinct, there would be no difficulty in reconciling the different views in regard to color; the facts of three-color mixture would be accepted by the psychologists (as they are not now), and the physicists would not imagine that they constitute a theory of color sensation. Helmholtz called his book *Physiological Optics*. The psychological facts of color are to-day so much more in evidence that one writing on the subject now would write on psychological optics.

The color triangle should therefore be thought of rather as consisting of four contiguous color triangles, or, to make use of a convenient device of the mathematicians, portions of different sheets of four coincident planes, each the locus of the (more or less unsaturated) four possible binary color blends. If, for instance, a slightly bluish green have added to it more and more of a slightly purplish red (*a*, Fig. 1), there will result four separate series of color-changes: a series of whitish bluish greens (*c*..*d*), greenish yellows (*d*..*b*), yellowish reds (*b*..*c*), and reddish blues (*c*..*a*).

The characteristics of color-blindness need restatement in this connection. Observations on the color sense of the color-blind by means of colored worsteds serve for the practical purpose of testing railway employees, but they are of no scientific interest. By means of the color-mixing apparatus of Helmholtz and König, it has been shown that the cases of congenital color-blindness are either total (black-white vision alone remains) or partial of the type of yellow-blue vision (red-green blindness). So few cases of blue or yellow blindness have been described (none have been accurately examined) that this form of defect must be regarded as insufficiently established. Either the absence or the rarity of yellow-blue blindness would indicate that blue and yellow were the primitive forms of color-vision, and that red and green, the last to be attained, are the most readily lost. All the color equations of the dichromates are accepted by those having normal eyes (tetrachromates), but many distinctions which are made by the latter are not recognized by the former. The fundamental colors of the color triangle (Fig. 2 or Fig. 3) can be chosen (and have been here so chosen) that all the sensations of the red-green blind can be reproduced by mixtures of those elements in the proportions represented by either the pair of curves W_1 and B or the pair W_2 and B; in both instances, however, the sensations perceived are yellow and blue. Red-green blindness is therefore of two types, according as the distribution throughout the spectrum of the undifferentiated yellow sense follows the curve of red or the curve of green. The sensations of the achromate would be represented on a line at right angles to the plane of the color triangle through the point W. The color scale of the yellow-blue visioned (yellow, whitish yellow, white, bluish white, and blue) will be represented on the line YB (Fig. 2). The degree of saturation of the different spectral colors will be got by projecting the spectrum upon the yellow-blue line by means of lines drawn through the points R or G according to the type of blindness. Thus the neutral points of the defectives of the first class are the points in which the line RW cuts the color curve—that of the defectives of the second class the points in which that curve is cut by the line GW. As there is only one particular color-tone, which is a pure green or a pure red with no admixture of blue or yellow, it follows that most of the reds or greens of nature appear to these defectives to be not absolutely colorless, but either blue or yellow (brown) of a very unsaturated quality. Hence they learn to use the fourfold nomenclature of the normal person with a remarkable degree of good luck; it is no worse for them to say 'scarlet' for the whitish yellow in which they see the soldier's coat than it is for us to coin a fresh term, pink, for what is merely a whitish red. Hence it is not incomprehensible that the existence of such a defect should have remained unknown until about a hundred years ago, and that, even after it was known, a man of striking scientific endowment, such as William Pole, should not have discovered until nearly middle age that he was himself a dichromate.

Consult: Ebbinghaus, *Grundzüge der Psychologie* (Leipzig, 1897); König, *Gesammelte Abhandlungen zur physiologische Optik* (ib., 1903); Calkins, *Introduction to Psychology* (New York, 1901); Baldwin, *Dictionary of Philosophy and Psychology* (New York and London, 1902).

VIŚVĀMITRA, vĭsh-vä′mĭt-rȧ. A celebrated priest and sage of ancient India. He belonged originally to the Kshatrya or warrior caste, being King of Kanauj (q.v.), but by extraordinary acts of religious austerity he exalted himself to the dignity of the priestly class, an example without parallel in ancient India. In the *Rig-Veda*, especially in the third book, a number of hymns are ascribed to him as author, and his bitter rivalry with the sage Vasishtha (q.v.) for the position of chief priest at the court of King Sudas, together with his competitor's greater success, form incidents that are reflected on an historic background. The traditional rivalry between the two appears likewise in the epic and in the *Purāṇas* (q.v.). The first book of the *Rāmāyaṇa* (q.v.) gives a legendary account of the way in which Visvamitra rose. An incident of Visvamitra's life during this period forms the subject of Kshemisvara's *Caṇḍa-Kāuśika*, or 'Wrath of the Descendant of Kusika,' which is one of the best of the Sanskrit dramas. Consult: Muir, *Original Sanskrit Texts*, vol. i. (2d ed., London, 1868); Kaegi-Arrowsmith, *The Rigveda* (Boston, 1886); Wilkins, *Hindu Mythology* (2d ed., London, 1900). See Hariśchandra.

VIS-VIVA. A term devised by Leibnitz (1695) and formerly used to denote the product of the mass of a body into the square of its velocity. It was applied to one-half this quantity, or $\frac{1}{2}mv^2$, by Coriolis. This is now known as kinetic energy. See Energetics.

VITACEÆ (Neo-Lat. nom. pl., from Lat. *vitis*, vine, from *viere*, to twine, twist; ultimately connected with Eng. *withy*), or The Vine Family; also called Ampelidaceæ. A natural order of dicotyledonous plants, of which the grape may be regarded as the type. About 450 species are known, natives of warm and temperate climates, all shrubs, mostly climbing. The only genus of the order of much economic value is Vitis, the grape, but species of the genus Cissus and of Ampelopsis (which many unite with Vitis) are widely planted for ornament.

VITA′LIA′NUS. Pope 657-672. He was born in Campania and came to the Papal throne when the Greek Emperor Constans II. (d. 668) was persecuting those who opposed monothelitism. Tactfully he ignored this opposition and cultivated friendly relations with the Emperor, with such success that the latter made him a visit at Rome in 663. He also put Constans's successor Constantine IV. under obligation to the Papal See by helping him in his campaign against a rival. This Pope is also remembered as the sender of the distinguished Theodore (q.v.) to the See of Canterbury.

VITALIS, vė-tä′lĭs. The nom-de-plume of Sjöberg, the Swedish poet.

VITA′LIS ORDER′ICUS (1075-c.1143). A Norman historian. He was the son of Odelerius, confessor to Roger of Montgomery, and was born at Atcham, near Shrewsbury, England. He entered the Monastery of Saint Evroult in Normandy in 1085, and with the exception of short intervals spent the remainder of his life there. At the suggestion of Rober du Sap and Guerin des Essarts he began to compose the annals of Saint Evroult, and afterwards expanded his work into a general history of thirteen books, bearing the title *Historia Ecclesiastica*. The work, which begins with the Apostolic era, is of value chiefly for the period in which Ordericus himself lived. The original manuscript is now in the Bibliothèque Nationale at Paris. It was first published in Duchesne's *Historiæ Normanorum Scriptores* in 1619. It is contained in Migne's *Patrologia Latina*, and an English translation of it was published in four volumes in Bohn's *Antiquarian Library* (1853-55).

VITAL STATISTICS (Lat. *vitalis*, relating to life, from *vita*, life, from *vivere*, to live). That branch of statistics which studies the growth and changes of population. The facts which it seeks to interpret are derived from two main sources, censuses and registration reports. Censuses give information regarding population at a certain day, and show the changes and growth of population only by comparison between the results of two or more censuses. Registration reports are obtained by tabulating the records of certain important events made at or near the time of their occurrence. The scope and accuracy of these registration reports vary greatly with time and place. They usually include deaths, marriages, and births, and sometimes divorces, with various statistical facts about each. The number of such occurrences is controlled mainly by the number of people in the community for which the report speaks. To exclude this, the most important cause of difference in the figures, it is usual to compute the average number of births, deaths, or marriages occurring in a fixed unit of time, usually a calendar year, and in a fixed unit of population, usually 1000. The result of such a computation has been named a rate. The death rate means the average number of persons dying in a year to each 1000 of the population. The marriage rate and the birth rate have similar meanings, except that the first term of the ratio is the number of persons marrying or the number of children born, respectively. Rates of this class are sometimes known as crude or simple rates in distinction from refined or corrected rates in which the unit of population may be a group each of whom possesses certain specified characteristics. Thus death rates are computed for a specified age and sex and occupation and race, both terms of the ratio being correspondingly limited, as for example the death rate of negro married women between twenty-five and thirty-four years of age.

The main statistical facts regarding the population being found under the heading Statistics, the present article is confined to the statistical results derived from rates.

General Death Rate. Perhaps the highest death rate for great countries where records are kept occurs in Russia, with 33.5 per 1000 on the average for 1884-93; Chile, with 33.3; and Hungary, with 32.4. The lowest death rates are found in Great Britain, the Scandinavian countries, and those few American States for which information is obtainable, England having a death rate of 19.2 for the decade 1884-93, Norway 16.9, Massachusetts 19.6, and Rhode Island 20.2. The death rate is usually somewhat higher in cities than in rural districts, but with the increase of sanitary precautions and the development of preventive medicine the difference between city and country is steadily decreasing. Thus in the United States in 1890 the average death rate of the cities of the registration States was 22.1 and that in the rural districts 15.3. In 1900 the death rate of the cities had fallen to 18.6, while that of the rural districts had risen to 15.4, so that the apparent difference between the two was reduced one-half. Deaths are recorded with less completeness in the rural districts, a fact which would tend to exaggerate the real difference between city and country, and it is probable that the foregoing figures for the rural districts understate the true death rate and that the slight increase during the decade testifies to an increase of accuracy rather than to an increase in the number of deaths.

SEX. Wherever records exist the average death rate for males of all ages is higher than the death rate for females. Thus, in England and Wales on the average of the ten years 1881-90 the death rate of males was 20.2 and that of females 18.0, and similarly in the registration cities of the United States in 1900 the death rate of males was 20.0 and that of females 17.2.

AGE. The first year of life and the years of extreme old age are those in which danger of death is greatest. Thus the death rate of male children in England during the first year of life was 161.0, a rate that is not equaled for any subsequent year of life until the age of eighty-one is reached. The lowest death rate for each sex is reached at about eleven to thirteen years of age, when the death rate in healthy communities is from 4.0 to 5.0, not more than one-fourth of the average for all ages. The ages from three to fifty or slightly above fifty are the healthy years of life, or the years at which the death rate is below the average for all ages. The larger the proportion of the population belonging to these ages, the lower the death rate is likely to be. Cities usually contain a much smaller proportion of persons over fifty than do the country districts about them and not much, if any, larger a proportion of children. They also contain a larger proportion of females than the country districts in their vicinity. These differences in age and sex composition of the population of cities, giving them a disproportionate number of the healthy ages and the healthier sex, tend to mask the real difference between the death rate of city and country districts.

AGE AND SEX. The lower death rate of females holds for nearly all periods of life, the main exception being during ten or fifteen years below the age of twenty, when the death rate of females is as high as or a little higher than that of males. Modern civilization has so reduced the perils of childbirth that women in early adult years, although subject to this special danger in addition to those common to both sexes, have a death rate lower than men of the same ages. The death rate of English women, twenty to twenty-four, is 5.5, that of English men of the same age, 5.7, and the relation in other parts of the world is the same. But while the difference even at this age is slightly in favor of the female sex, the difference at younger and older ages is much greater. The following figures give the death rate of each sex in the registration area of the United States for 1900:

AGE	Death rate		Ratio of male rate to female taken as 100
	Of males	Of females	
0- 4	56.7	47.5	119
5-14	4.4	4.2	105
15-24	6.7	6.1	110
25-34	9.5	8.5	112
35-44	12.4	10.5	118
45-64	24.1	20.1	120
65	91.1	82.6	110

If the death rate for individual years were obtainable with accuracy, it would probably appear that in the United States, as in England, Norway, Prussia, and other countries, there were a few years of age in which females had a higher death rate than males. But the salient fact shown by the figures is that the differences are at a maximum during the years of infancy and above the age of forty-five, and at a minimum at the healthiest period of life.

INFANT MORTALITY. The death rate of children constitutes a very sensitive barometer of sanitary conditions, partly because that class of the population migrates little, but mainly because of its extreme sensitiveness to sanitary and hygienic conditions. There is hardly any difference between different countries, different social classes, or different periods of time, more pronounced than in infant mortality. In Norway, for example, only about 10 per cent. of the children born alive die before they reach one year old; in Russia the proportion rises to one-fourth, and in Bavaria to three-tenths. In Massachusets about one-sixth of the children born die under one year of age. According to the figures of the Twelfth Census, the death rate of whites under one year of age is 158, that of the colored 372, indicating that the infant mortality of the colored population exceeds that of Austria, Russia, or Bavaria.

RACE. The influence of race upon vitality is one which cannot be clearly distinguished from that of other factors usually associated with it. In the countries of Europe which still furnish most of our information regarding vital statistics the differences of race are elusive, and in consequence this distinction is seldom, if ever, drawn in the vital statistics of those countries. For the native population of Australia and New Zealand vital statistics are almost entirely lacking, but what indications there are point to a high death rate and a low vitality. Statistics on this subject from South Africa have been but recently organized and are still too slight to be significant. The largest body of evidence on this topic is that furnished by the vital statistics of the United States.

In the year 1899-1900, for which the vital statistics of the Twelfth Census speak, 475,640 deaths of whites and 35,710 deaths of negroes were reported in the registration area, including nearly two-fifths of the population of the country, mainly in the Northeast States and in cities. These are deaths enough to give reasonably accurate rates for the two races. They show a death rate for the whites of 17.3 and for the negroes of 30.2. From the published tables it is impossible to derive the death rate of whites and negroes by ages, but the figures for the colored, 94.3 per cent. of whom were negroes, furnish an approximate index of the death rate of the negroes. The rates are indicated in the following table:

AGE	Death rate of	
	Whites	Colored
0- 4	49.7	118.5
5-14	4.1	9.8
15-24	5.9	15.6
25-34	8.6	16.9
35-44	11.1	21.0
45-64	21.5	36.7
65	86.0	108.6
All ages	17.3	29.6

The death rate of the colored race in the United States up to the age of twenty-five is apparently about two and one-half times that of the whites, and the difference between the two races is apparently greatest between the ages of fifteen and twenty-five. From that age the difference greatly declines, the mortality of the colored being a little less than twice that of the whites between the ages of twenty-five and forty-five, and above the age of sixty-five exceeding that of the whites by only about one-fourth.

MARITAL CONDITION. The death rate of married men is almost always, if not always, less than that of the unmarried of the same age. Thus, in the registration area of the United States in 1900, the death rates of males were as follows:

AGE	Death rate of		
	Single	Married	Widower
15-44	9.4	8.1	19.6
45-64	33.3	20.4	37.6
65	107.8	75.0	116.4

The death rate of the married is uniformly least and that of widowers uniformly greatest. Various reasons for the difference have been assigned. Among them are the more regular life of husbands, their better economic condition, and their better health at the start, the weak and sickly being unable or unwilling to enter matrimony. Probably all of these reasons are at work. An interesting evidence of the beneficial influence of marriage upon the health of men has been drawn from the figures for Norway and Sweden. As a rule the death rate rises slowly but steadily from the minimum in the early teens to the maximum at the end of life. But if marriage is a healthier state than single life, then during the years when large numbers of men are passing from the less healthy to the more healthy condition the tendency to an increase of the death rate with age might diminish or disappear. And that is precisely what is observed. The death rate of bachelors and of husbands taken separately increased steadily with age, but the death rate of all males between thirty and thirty-four was less than between twenty and twenty-four, an anomaly which Kiaer explains by pointing to the much larger proportion of married men at the later age period. The effect of marriage on the vitality of women is not so clearly beneficial. During the early years of married life the difference is decidedly to the disadvantage of wives compared with spinsters; it gradually declines, disappears at about the age of forty, and at later ages the health of wives is better than that of unmarried women.

OCCUPATIONS. The leading source of information regarding the mortality in various occupations is the English statistics. The influence of occupation is most marked during the ages between twenty-five and sixty-five, after the person has been for some time thus engaged, and before retirement to some less exacting work or to industrial inactivity has come to a large proportion. For the purpose of comparison between the several occupations the 'comparative mortality figure' is computed. This is found by ascertaining the number of men twenty-five to thirty-four, thirty-five to forty-four, forty-five to fifty-four, and fifty-five to sixty-four years of age, necessary to yield in one year, at the death rates determined for the entire male population of those ages, 1000 deaths, thus:

AGE	Males	Death rate of all males	Computed deaths
25-34	22,586	7.67	173
35-44	17,418	13.01	227
45-54	12,885	21.37	275
55-64	8,326	39.01	325
			1,000

and then applying the observed death rates for men of the same ages in the occupation in question to equal groups, as follows:

AGE	Males	Death rate of clergymen	Computed deaths
25-34	22,586	4.23	96
35-44	17,418	5.18	90
45-54	12,885	10.52	136
55-64	8,326	25.35	211
Comparative mortality figure			533

A comparative mortality figure above 1000 indicates that the mortality of men engaged in the occupation in question is above that of all men twenty-five to sixty-four years of age and vice versa. The following table gives the number of deaths reported for a few of the leading occupations and the comparative mortality figures:

OCCUPATION	Number of deaths	Comparative mortality figures
Transport service	27,796	1,219
Building trades	25,502	957
Agriculturists	23,998	602
Metal-workers	23,089	1,128
General laborers	20,634	1,221
Coal-miners	11,629	925
Shopkeepers	10,456	859
Textile manufacturers	10,220	1,054

But within the foregoing great groups, including all those for which at least 10,000 deaths were reported, wide differences are observed. Thus, among those engaged in transport service, railway engineers and firemen have a comparative mortality figure of 810, and dock and wharf laborers a comparative mortality figure of 1829.

The healthiest occupations, as shown by these English figures, are those of clergyman (533), farmer (563), teacher (604), and lawyer (821).

The occupations coming near to the average for all occupied males are physician (966), tailor (989), and bricklayer or mason (1001). Among those ranking high in mortality are brewers (1427), hotel servants and innkeepers (1659), potters (1706), and file-makers (1810).

Birth Rate. As a rule in old and long-settled countries the birth rate is high where the death rate is high. The converse, however, is not true, a number of countries having a moderate or high birth rate and at the same time a low death rate. The birth rate of female children is lower than that of males. It is usual to state these facts by computing the number of males born to every 100 or 1000 females. In general there are from 104 to 106 male children born to every 100 female. In the United States there are no trustworthy statistics of births for any large sections of the population. An indication of the birth rate may be found by computing the number of children under five years of age reported by the census to each 1000 women between fifteen and forty-four. The children under five are selected rather than those under one, because many of the latter class are erroneously reported as one year and a smaller number are omitted by the enumerators. In 1890 there were 529 childen in the United States under five years of age to each 1000 women between fifteen and forty-four. In 1900 the ratio had slightly declined to 518, indicating that in the United States, as elsewhere, the birth rate has slightly declined. The figures for the whites fell from 517 to 509, those for the colored, mainly negroes, from 619 to 584, indicating that the birth rate among the colored is decidedly higher than among the white, but that the decline among them has also been more rapid, so that the birth rate of the two races is approximating. The facts may be obtained separately at each census for the cities having at least 25,000 inhabitants and for the rural districts. They show that the proportion of children in the rural districts has been almost stationary, declining in the ten years only from 574 to 572, while the ratio in the cities has declined from 401 to 390, or several times as rapidly. This indicates that the birth rate in cities having at least 25,000 inhabitants is lower than it is elsewhere and that the difference between city and country is increasing. Among the whites the ratio of children in the rural districts was the same (559) in 1890 and 1900, the whole decline for that race having come in the cities, where the proportion fell from 407 to 399. Among the colored the proportion fell outside the cities from 672 to 651 and in the cities from 305 to 260. For the colored races, therefore, mainly the negro, the difference in birth rate between city and country is far greater than it is for the white, the proportion of negro children in cities being much less and the proportion of negro children in country districts much greater than the corresponding proportions among the whites. In Washington, D. C., for example, there were in 1900 25 colored children to every 100 colored women between fifteen and forty-four, but 30 white children to every 100 white women. In Maryland, outside Baltimore, there were 67 colored children to 100 colored women and 53 white children to 100 white women, and in Virginia likewise, outside Richmond and Norfolk, there were 63 colored and 61 white children to 100 women of corresponding races. The smallest proportion of children under five to 1000 women of child-bearing age is found in the District of Columbia (285), California (372), Massachusetts (381), Vermont (382), Rhode Island (391), and New Hampshire (393), indicating what is established by the figures in detail, that the New England States and the States of the Pacific Coast have at present the lowest birth rate. The highest birth rate is found in North Dakota (754), Indian Territory (742), and Oklahoma (709). They illustrate the general fact that countries or sections which are receiving large numbers of immigrants are also those in which large additions to the population through births are being made.

Whether the native population of the United States is maintaining itself by excess of births over deaths is a much disputed question regarding which the statistical evidence is so meagre as to afford no certain reply. It is probable that in the New England States the native population is not maintaining itself, but it is inadmissible to generalize from conditions there to those throughout the country. Indeed, the figures for the country as a whole seem to indicate that the native population is increasing from its own loins.

Marriage Rate. In most civilized countries the marriage rate, like the death rate and the birth rate, is slowly declining. With the improvement of medical knowledge and the introduction of sanitary measures the average duration of human life tends to rise, approaching nearer and nearer to the normal limit mentioned by the Psalmist. In consequence, the number of births requisite to produce a given number of adults tends to decrease. There is little doubt that the food supply and the other necessaries and comforts of life tend to increase, but much, if not most, of this increase is absorbed in advancing the standard of comfort. As fewer births are needed to maintain or moderately to increase the population, so fewer marriages are needed to accomplish the same end.

In some States or countries the marriage rate obtained by comparing the number of marriages with the total population has not declined. Even in them, however, when the more accurate ratio, that between the marriages and the adult population, or better yet the adult unmarried population, is computed, it is usually found that the marriage rate has declined. The United States lacks marriage statistics obtained through registration, and in this, as in other fields of vital statistics, is compelled to rely upon inferences derived from the census. Only for the last two censuses, those of 1890 and 1900, has information on this subject been afforded. Of all persons in the United States rather more than one-third (36.5 per cent.) are married; about 1 in 20 (5.1 per cent.) are widowed; and 3 in 1000 (0.3) are divorced, the remainder, not quite three-fifths (57.9 per cent.), being single. The proportion of each of these classes, except the last, has increased in the last ten years: the married from 35.7 per cent., the widowed from 4.7 per cent., and the divorced from 0.2 per cent. This seems contrary to the general tendency already mentioned. A part of this change is due to the decreasing proportion of children and in consequence the increasing proportion of persons of marriageable age. Yet even when attention is confined to the population over fifteen years of age, the proportion of married in the United States slightly increased from 55.3 per cent. in 1890 to 55.5 in 1900. Examination of the figures for conjugal condition by sex and age shows that this slight increase in the per cent. married was confined to the periods of early adult life, the per cent. of married persons among men twenty to twenty-four years of age having risen from 18.9 in 1890 to 21.6 in 1900, and the per cent. of married females from fifteen to nineteen years of age having increased from 9.5 in 1890 to 10.9 in 1900. The per cent. of married persons, male or female, at each later age was less in 1900 than in 1890, with an insignificant exception for women forty-five to sixty-four years of age, where the proportion of married was substantially the same at the two censuses. This increase in early marriages is probably an index of the unusual prosperity of the United States during the few years immediately preceding the Twelfth Census, and the figures do not warrant the belief that the proportion of married persons in the United States is likely to increase.

Bibliography. For English figures and results William Farr's *Vital Statistics* (1885) and Arthur Newsholme's *Elements of Vital Statistics* (2d ed., 1899) should be consulted. The supplement to the *Fifty-ninth Annual Report of the Registrar-General* gives a summary and analysis of recent official figures (1881-90), and is especially good on the death rate of occupations (1890-92). The fullest and most critical summary of results for the leading countries will be found in Westergaard's *Lehre von der Mortalität und Morbilität* (2d ed., 1901). American statistics in this field are weak and defective, the best sources of information being the volumes of the United States Census and the annual registration reports of a few States, especially Michigan, Massachusetts, and Rhode Island.

VITASCOPE. See Kinetoscope.

VITEBSK, vē-tyĕpsk′. A government of Western Russia, bordering on the Baltic Provinces. Area, about 17,450 square miles (Map: Russia, C 3). It has a flat and somewhat undulating surface, with low hills in the southeast and the north, and extensive marshes in the west. The region is watered principally by the Düna and its tributaries. There are about 2500 small lakes and ponds. Agriculture is the principal occupation. The peasants migrate for the winter months in considerable numbers to the more industrially developed regions of the country. Population, in 1897, 1,502,916, of whom the Russians constituted over two-thirds, the Letts about 20 per cent., and the Jews about 10 per cent.

VITEBSK. The capital of the Government of Vitebsk, in Western Russia, situated on the Düna, 387 miles south of Saint Petersburg (Map: Russia, D 3). It is an old town, poorly built, but containing some noteworthy specimens of ecclesiastical architecture, notably the Uspensky Cathedral (1771), the Cathedral of Saint Nicholas, and the Roman Catholic churches of Saint Anthony and Saint Michael, the last possessing an interesting library. Population, in 1897, 66,143, of whom the Jews constituted about two-thirds. In the beginning of the eleventh century Vitebsk formed a part of the Principality of Polotsk and a hundred years later it became the capital of the independent Principality of Vitebsk, which was annexed in the fourteenth century to Lithuania and later to Poland. It was annexed to Russia in 1772.

VITELLIN. See Globulins.

VITEL′LIUS, Aulus (a.d. 15-69). A Roman emperor (January-December a.d. 69). He was a son of Lucius Vitellius; was born in a.d. 15, and through his father's influence at court became consul a.d. 48 and afterwards proconsul of Africa, where his administration gave great satisfaction. He had been a companion of Tiberius at Capreæ, and was equally a favorite with Caligula, Claudius, Nero, and Galba, the last of whom appointed him commander of the legions in Lower Germany. Vitellius had not been a month in his new post before he completely gained the affections of his soldiers by extreme familiarity and liberality, and on January 2, 69, they proclaimed him Emperor. This decision was adopted by the rest of the troops in Gaul; and two armies, under Valens and Cæcina, immediately set out to secure Rome, Vitellius following leisurely. The adherents of his predecessor, Otho, who had supplanted Galba, were leniently treated, with the exception of the centurions of Otho's army, who were put to death. His government was marked by great moderation, but his personal depravity and the gluttony for which he was notorious soon disgusted the Romans, and the legions of Pannonia and Illyricum, having proclaimed Vespasian Emperor, advanced into Italy under Antonius Primus. They were opposed by the Vitellian troops, commanded by Cæcina, but gained a decisive victory near Bedriacum, and another, on the following evening, over another Vitellian army which had marched to the support of the first. In the south, however, Vitellius's brother, Lucius, defeated Vespasian's partisans in several battles. Rome, however, which in the meanwhile had been the scene of violence and bloodshed, was soon in the possession of Antonius Primus. Vitellius was found wandering about his palace in terror, and after being ignominiously exposed in the streets, was killed by repeated blows, his head carried about Rome, and his body thrown into the Tiber in December, a.d. 69.

VITERBO, vē-tĕr′bō. A city in the Province of Rome, Italy, situated at the foot of the Monte Cimino, 54 miles by rail north-northwest of Rome (Map: Italy, G 5). It is encircled by old Lombard fortifications, and has well-built streets. It is noted for its handsome examples of architecture and its interesting palaces. The fine Romanesque-Gothic cathedral, in the extreme southwest corner of the city, contains the tombs of several popes. It dates from the twelfth century, and has a Gothic campanile. The splendid Municipal Palace stands in the centre of the city. It dates from 1264, and has a fine portico and attractive frescoes. It contains the municipal museum of Roman and Etruscan antiquities. The Church of Santa Maria della Salute has an artistic portal, and the small Church of Sant' Angelo an interesting façade. The former Church of Santa Maria della Verità now serves as the public hall. The public garden lies near the north end of the city. In the vicinity of the city are Etruscan cemeteries and also the beautiful pilgrimage Church of Santa Maria della Quercia. The manufactured articles of Viterbo include leather, paper, cloth, soap, matches, and playing cards. There are warm medicinal springs in the neighborhood, and mines of alum and sulphur. Population (commune), in 1901, 21,292.

Viterbo was the capital of the 'patrimony of Peter'—the extensive grant to the Pope by the Tuscan Countess Matilda (d. 1115). It was often a Papal residence, and has been the scene of five Papal elections.

VITET, vê'tâ', LUDOVIC (1802-73). A French author and political leader, born in Paris. He was educated at the Ecole Normale, but after spending some time in travel gave up the profession of teaching for that of letters. In 1824 he began contributing literary and artistic criticisms to the *Globe*. In his first books, *Les barricades* (1826), *Les états de Blois* (1827), and *La mort d'Henri III. à St. Cloud* (1829; the trilogy united in 1844 under the title of *La Ligue*), Vitet opened a romantic vein new to French literature, by presenting historical occurrences in vivid dramatic form. After the Revolution of 1830 Guizot created for the young writer the post of inspector of historic monuments. He was a member of the Chamber of Deputies from 1834 to 1848, of the Legislative Assembly in 1849, and of the Constituent Assembly in 1871. In 1845 he became a member of the Academy. He was the author of *Histoire des anciennes villes de France* (1833); *Histoire de Dieppe* (1833); *Fragments et mélanges* (1846); *Histoire financière du gouvernement de Juillet* (1848); *Les états d'Orléans* (1849); *Le Louvre* (1852); *Essais historiques et littéraires* (1862); *Etudes sur l'histoire de l'art* (1863-64); *La science et la foi* (1865); *Lettres sur le siège de Paris* (1870-71); the posthumous *Etudes philosophiques et littéraires* (1874); and *Le Comte Duchâtel* (1875).

VITEX (Lat., chaste tree, Abraham's balm). A genus of trees or shrubs of the natural order Verbenaceæ. *Vitex Agnuscastus*, the chaste tree, a native of the Mediterranean region, is downy, with digitate leaves, white on the back, and has an acrid fruit. It derives its name from the practice of Grecian matrons of strewing their couches with its leaves, especially during the sacred rites of Ceres, in order to banish impure thoughts, for which purpose a syrup made of its fruit was also used in convents in Southern Europe. *Vitex Negundo*, an Indian species, has aromatic leaves, which are bruised and applied to the temples for relief of headache. In Australia *Vitex acuminata* and *Vitex Lignum-vitæ* yield close-grained, hard wood used in cabinet-making.

VITI (DELLA VITA), vē'tē (dĕl'lȧ vē'tȧ), TIMOTEO (1467-1523). An Italian painter of the Umbrian school. He was born at Ferrara, and was the principal pupil of Francia, with whom he studied at Bologna, 1490-95. He then settled at Urbino, where he stood in high favor with the reigning Duke and became chief magistrate of the town, residing there until his death in 1523. The position of Timoteo in the development of Italian painting is one of the most interesting problems of modern research in art history. It was formerly supposed, on the authority of Vasari, that after his tutelage with Francia Timoteo came under the influence of Raphael at Urbino, but Morelli has shown that Timoteo, who was much older than Raphael, was the teacher. His works show all those qualities which we call Raphaelesque: subtle grace of line, the harmonious balance of all elements, a rare poetic charm. Timoteo's earliest efforts show the influence of Francia and Costa; as, for example, the "Madonna with Two Saints" (1495, Brera, Milan), formerly ascribed to Raphael; the beautiful figures of Saints Margaret (Bergamo) and Apollonia (Urbino); a "Madonna," with Saints John the Baptist and Sebastian (Brera); and the fine altar-piece of the Cathedral of Urbino (1504). Gradually the Umbrian influence replaced that of Francia; and to this later period belong the "Magdalen" (1518, Pinacoteca, Bologna), a signed altar-piece at Cagli, and another in the Cathedral of Gubbio, representing the "Legend of Magdalen" (1521). It is asserted by Vasari that Timoteo labored as Raphael's assistant in Santa Maria della Pace, but this statement is now generally discredited. On the other hand, Morelli's attribution of the designs for seventeen majolica plates from Castel Durante in the Correr Museum (Venice) seems more likely. Consult Morelli, *Italian Painters: Critical Studies of Their Works*, vol. ii. (London, 1892-93).

VITI (vē'tē) **ISLANDS**. See FIJI ISLANDS.

VITILIGO. Acquired albinism; leukodermia. A disease characterized by the disappearance of pigment from the skin. Vitiligo is common in tropical countries, rare in Europe and America. In most cases, the pigment disappears so that white patches are formed around whose edges the pigment is darker. These patches grow larger with time, coalesce, and finally the white area spreads so as to cover the whole body. The complete process involves many years. No disturbance of dermal secretion or sensation occurs, except an occasional previtus. Either sex may suffer from it; and, though seen at as early an age as four years, it is rare before ten or after thirty years of age. It is more common in the dark races. The cases of negroes who gradually become white are cases of vitiligo. It is practically admitted to be an angio-neurosis or a tropho-neurosis, and it in many instances has been preceded by wasting illness, such as scarlet fever, typhoid fever, or severe intermittent fever. It generally progresses symmetrically, and thus differs from congenital white patches, as well as from the maculo-anæsthetic leprosy of India, with which it has been confounded. Spontaneous arrest may occur, but the prognosis is not hopeful for recovery. In its treatment, Brito has more ingeniously than usefully suggested the production of an argyria. (See SILVER, USES OF IN MEDICINE.)

The use of general tonics and hygienic measures may stay the progress of the decolorization, while never restoring the pigment. For illustrated report of a case consult Magruder and Stiles in *Medical Record*, New York, March 10, 1894, p. 294.

VITORIA, vē-tō'rē-ȧ, or **VITTORIA**. The capital of the Province of Alava, Spain, 30 miles south of Bilbao, on the left bank of the Zadorra River (Map: Spain, D 1). The upper, or old town, with some ancient ruins still visible, is narrow, gloomy, and dirty, while the new town, on a lower level, is more open and elegant, with finer buildings and charming paseos and plazas. The Cathedral of Santa Maria de Vitoria is a twelfth-century church and fortress, and was restored in the fourteenth century. Its companion fortress church, San Vicente, was reconstructed in the fifteenth century. Among the secular structures the Municipal Building is interesting architecturally and contains many memorials of Isabella the Catholic; the Palace of the Provincial Deputation, a nineteenth-century structure, is filled with mementoes of the life of the province. The poorhouse occupies the former Colegio de San Prudencio. Here was the first modern prison in Spain.

The climate of Vitoria is cold and humid. The occupations of the inhabitants are dependent upon the industries of the city, which comprise the manufacture of chairs, mirrors, picture-frames, iron bedsteads, woolens, leather, oilcloth, chocolate, *pastas*, crockery-ware, malt liquors, and chemicals. Population, in 1900, 32,617.

Vitoria appears in history during the tenth century, when it was an important fortress with extensive local privileges. During the Middle Ages there were many fierce conflicts within its walls, between the aristocratic and democratic factions. Its part in the War of the Communes told heavily against it in loss of population and privileges. It was the scene of the decisive victory, June 21, 1813, by which Wellington drove the French out of Spain. Here, in 1833, originated the Carlist struggle.

VITRÉ, vē'trâ'. The capital of an arrondissement in the Department of Ille-et-Vilaine, France, 23 miles by rail east of Rennes, on the left bank of the Vilaine (Map: France, E 3). The remnants of the fortifications, into some of which the houses are built, the gloomy seventeenth-century houses with their balconies nearly meeting over the narrow streets, and the half ruined fourteenth-fifteenth century castle with its massive restored donjon, give the town a strikingly feudal aspect. In the court of the castle, which now contains a library, a museum of natural history, and a prison, stands a collegiate chapel dating from the twelfth century. The famous Château des Rochers, the occasional residence of Madame de Sévigné, lies a short distance south of Vitré. Hosiery, cloth, and goat-skin clothing are manufactured. Population, in 1901, 10,775.

VITREOUS TEXTURE. See IGNEOUS ROCKS.

VITRIFIED FORTS (from Lat. *vitrum*, glass + *facere*, to make, do). The name applied to ancient rude structures, a portion of whose walls shows the action of intense heat in solidifying the rocks by fusion. These archæological enigmas are found chiefly in Scotland, but they also exist in Ireland, Germany, Austria-Hungary, and France. They seem to represent a first step in glass-making.

VITRIOL (OF., Fr. *vitriol*, from ML. *vitriolum*, vitriol, neu. sg. of *vitriolus*, variant of Lat. *vitreolus*, glassy, diminutive of *vitreus*, glassy, from *vitrum*, glass). A name given by early chemists to certain vitreous or glass-like salts, especially sulphates, including chiefly 'blue vitriol' or copper sulphate, 'green vitriol' or ferrous sulphate, 'red vitriol' or cobalt sulphate, and 'white vitriol' or zinc sulphate. Oil of vitriol or vitriolic acid is the old name given to sulphuric acid, while the name 'vitriolated soda' was applied to sodium sulphate, and 'vitriolated tartar' to potassium sulphate. 'Elixir of vitriol' was the name given to the aromatic sulphuric acid of the Pharmacopœia.

VITRU'VIUS POL'LIO, MARCUS. A distinguished Roman architect and engineer of the first century B.C., and the author of the earliest extant work on architecture. The place and exact date, alike of his birth and death, are uncertain; but it seems most probable that he was born in Formiæ in the first quarter of the century and died during the later years of the reign of Augustus (B.C. 30-14). His fame rests chiefly on his great work, *De Architectura;* but he was also the architect of the basilica and Ædes Augusti at Fano, and probably of other buildings, and the custodian of the Imperial engines of war. He was pensioned for life by Julius Cæsar.

The work, *De Architectura Libri Decem*, by which he is chiefly known, was composed in the later years of his life, and consists of dissertations upon a wide variety of subjects relating to architecture, engineering and sanitation, practical hydraulics, acoustic vases, and the like. It was long lost, but was rediscovered in the fifteenth century in a manuscript at Saint Gall; the oldest manuscript dates from the tenth century, and much doubt has been cast upon the authenticity of certain portions of the text, which suggest the age of Diocletian rather than of Augustus. It has been studied for the past four centuries as a thesaurus of the practice and theory of building in the Augustan age; but the tendency is now to regard it rather as the work of a theorizer and student of Greek authorities than as the product of practical experience. It was the object of special study, comment, and annotation during the period of the Renaissance. The earliest printed edition was that of Sulpitius (Rome, 1486); the standard modern edition is by Rose (Leipzig, 1889); see also Nohl, *Index Vitruvianus* (Leipzig, 1876). English translations are by Newton (London, 1771-91) and Gwilt (ib., 1826; reprinted 1874).

VITTORIA, vê-tō'rê-ȧ. A town in the Province of Syracuse, Sicily, 18 miles by rail northwest of Modica (Map: Italy, J 11). The surrounding district produces excellent wine, besides honey, fruit, silk, and cattle. Population (commune), in 1901, 32,151. Near by are the ruins of the ancient Camarina (q.v.).

VITTORIA. A town of Spain. See VITORIA.

VITTORIA COROMBONA, kō'rôm-bō'nȧ. See WHITE DEVIL.

VITTORINO DA FELTRE, vê'tô-rē'nô dȧ fĕl'trȧ (1378-1446). An Italian educator, born at Feltre. His family name was Rambaldoni, but he took from his birthplace the name by which he is commonly known. About 1422 he became professor of rhetoric in Padua, and also opened a school for young men. In 1423 he removed to Venice, and afterwards became tutor to the children of the Marchese Gian Francesco Gonzago of Mantua. In 1425 he with his charges established himself in a villa allotted for the purpose. Other noble youths were permitted to enter the school, and in another department poor youths were received upon an equal footing with those more favored by fortune. Throughout the course there was a close contact between student and teacher. Vittorino's methods, which have been compared with those of Pestalozzi, were so successful that his school was looked upon as a model throughout all Italy. A *Vita de Vittorino* was written by Rosmini (Bassano, 1801). Consult also: Woodward, *Vittorino da Feltre and Other Humanist Educators* (Cambridge, 1897); Symond, *Age of the Despots* (London, 1875); and *The Revival of Learning* (London, 1877).

VITTORIO, vê-tŏ′rê-ô. A town of the Province of Treviso, Italy, at the entrance of the vale of Santa Croce, 25 miles by rail north of Treviso (Map: Italy, G 2). It was formed in 1879 by the union of the towns of Ceneda and Serravalle. There is a masterly altar-piece by Titian in the Cathedral of Serravalle. Vittorio has saline and sulphur springs and is a pleasant summer resort. The breeding of silkworms is extensively carried on, and woolens, paper, cement, and lime are manufactured. Population (commune), in 1901, 18,969.

VI′TUS, Saint. A martyr of the time of the Roman Emperor Diocletian. He is supposed to have been put to death in Lucania or in Rome, and his festival day is June 15th. Relics purporting to be of him are preserved at Corbey and at Prague. His name is commonly applied to the peculiar nervous disorder scientifically known as chorea. The manner in which the disease came to be known as Saint Vitus's dance is in dispute. A probable explanation is that in the Middle Ages sufferers from the dancing mania were accustomed to repair to the chapels of Saint Vitus in Swabia and elsewhere for relief, and that in this way a connection grew up between the saint's name and the disease. Another explanation is that in certain places in Germany in the seventeenth century it was believed good health could be obtained for a year by dancing before the saint's image on his festival day, and that in this way the original Saint Vitus's dance was confounded with the disease. The aid of the saint is also invoked against sudden death, hydrophobia, and so on. See Chorea.

VIVALDI; vê-väl′dê, Antonio (c.1675-c.1743). An Italian violinist, born at Venice. He studied music with his father, a violinist at San Marco, but entered the priesthood at an early age. He was in Darmstadt for a time, and in 1713 returned to Venice, where he was appointed director of the Conservatorio della Pietà. He published 12 trios for two violins and 'cello; 18 violin sonatas with bass; 23 concerti per violino principale; 2 violini di ripieno, viola e basso per l'organo; 12 concerti per violino principale; 2 violini concertanti, viola, violoncello e basso d'organo; he produced about 28 operas, mostly in Venice. Some of his concertos for the violin and his sonatas are still considered valuable.

VIVARINI, vē′vȧ-rē′nê, Antonio, or Antonio da Murano (c.1410-c.1470). An early Italian painter, born at Murano. He was, with Johannes Alemannus, one of the founders of the so-called school of Murano and the eldest of the several Vivarini. He worked with Johannes from 1440 to 1446 and after 1450 with his younger brother Bartolommeo. Of his rare pictures there are several in Venice, such as "Crowning of the Virgin" (1444; San Pantaleone), 'Paradise' (Accademia), and three altar-pieces (1443-44; San Zaccaria). Others are in Berlin, Bologna, Brescia, London, Padua (San Filippo), and Rome (the Lateran).

VIVER′RIDÆ (Neo-Lat. nom. pl., from Lat. *viverra*, ferret). A family of small carnivorous mammals comprising the civets, ichneumons, and the like. The group is represented by fossil forms that range back to Eocene times. The early members are interesting in that they show points of resemblance to animals of other families, such as cats, weasels, bears, and hyenas, and thus present a very generalized type of early carnivore. The principal genera are Amphictis, Ictitherium, and Palæoprionodon, all from the Tertiary deposits of Europe. An allied and ancestral family, Viverravidæ, includes still more generalized types comprised in the genus Viverravus from the Eocene of North America. Consult: Beddard, *Mammalia* (London, 1902); Wortman and Matthew, "The Ancestry of Certain Members of the Canidæ, Viverridæ, and Procyonidæ," *Bulletin of the American Museum of Natural History*, vols. xii. and xiv. (New York, 1899, 1901). See Civet.

VIVES, vē′vâs, Juan Luis (1492-1540). A Spanish philosopher, born in Valencia. He studied at Valencia, Paris, and Louvain, and taught at the latter university. He was a friend of Erasmus. He was invited to England by Henry VIII., who made him tutor of the Princess Mary, in 1523; wrote for her *De Ratione Studii Puerilis Epistolæ Duæ;* was imprisoned for opposing the divorce of Queen Catharine of Aragon, 1528, and when released the following year went to Bruges, where he lived till his death, May 6, 1540. His principal works are *De Disciplinis* (comprising seven books *De Causis Corruptorum Artium*) and *De Anima et Vita* (1539); in addition to these and several other metaphysical works, he wrote commentaries on Augustine's *City of God.* He was one of the most important logicians of his time. His works were collected and published by Coccius in two folio volumes, Basel, 1555, and by Majori in eight folio volumes, Valencia, 1782-90. Consult Namêche, *Mémoire sur la vie et les écrits du J. L. Vives* (Brussels, 1841).

VIV′IAN, VIVIANE, or **VIVIEN.** An enchantress in Arthurian romance, the nymph who brought up Lancelot in her fairy palace in the lake, whence she was called the 'Lady of the Lake,' also the mistress of Merlin, whom she imprisoned by a charm in the Forest of Broceliande. In the old romances she is described as lovely and pure, but Tennyson in his *Idylls* portrays her as a wily and evil woman.

VIVIAN GREY. An early novel by Benjamin Disraeli (1826-27). Although the plot and characterization are faulty, it achieved a marked success. It presented a new type of hero, the man of the world, and showed that the sinister rebel of Byronism had had his day.

VIVIANITE (named in honor of J. H. *Vivian*, an English mineralogist). A mineral hydrated ferrous phosphate crystallized in the monoclinic system. It has a pearly lustre, and is blue to green in color. In occurs associated with copper, iron, and tin sulphides in veins, and also with iron ores, as limonite, and sometimes in cavities of fossil or buried bones. This mineral is found in Cornwall, England; in Transylvania, in Greenland, in France, and in the United States at various localities in New York, New Jersey, Maryland, Virginia, and California. It is sometimes called 'blue iron earth,' or 'native Prussian blue.'

VIVIEN DE SAINT-MARTIN, vē′vyăN′ de săN′mär′tăN′, LOUIS (1802-97). A distinguished French geographer, born in the Department of Calvados. He went to Paris in 1814, and devoted his life to the writing of works on geography. Among his works are two volumes of a *Histoire universelle des découvertes géographiques* (1845-47); *Etudes de géographie ancienne et d'ethnographie asiatique* (1850-54); *Etude sur la géographie et les populations primitives du Nord-Ouest de l'Inde d'après les hymnes védiques* (1860); *Etude sur la géographie grecque et latine de l'Inde* (1858-60); *Le nord de l'Afrique dans l'antiquité grecque et romaine* (1863); *Histoire de la géographie et des découvertes géographiques* (1873); *L'atlas universel de géographie moderne, ancienne et du moyen âge* (1877). He also issued the first two volumes of the monumental work, *Nouveau dictionnaire de géographie universelle*, and the next two with the assistance of Louis Rousselet, who completed the work (7 vols., with a supplement, 1879-96).

VIVIPARY (from Lat. *viviparus*, bearing living young, from *vivus*, alive + *parere*, to bear, produce). (1) The development of young separable shoots in those regions of the plant usually devoted to the formation of reproductive structures of other kinds; or (2) the development of young plants from unshed seeds. Vivipary of the first sort is exhibited often in the regions of the flower, where either the entire flower or only those parts of it which would produce sporangia (sporophylls) are replaced by a purely vegetative structure capable of growing at once into a new plant. The sporangia of ferns are sometimes replaced by young plants (apospory, q.v.), a form of vivipary. The term is sometimes applied also to the formation of plantlets in any unusual position, as on the winged leaves of Bryonia. (See MALFORMATION.) Vivipary from seeds is best illustrated by the mangrove (q.v.).

VIVISECTION (from Lat. *vivus*, alive + *sectio*, a cutting, from *secare*, to cut). A term originally employed to designate cutting operations upon living animals for the purposes of experimentation, but now broadened to include experimentation of any kind, painful or painless, to demonstrate or discover physiological facts or theories, upon living creatures. Those experiments comprise inoculation with disease, subjection to different conditions of temperature, atmospheric pressure, or food, or to the action of various drugs and medicines, as well as to cutting operations involving the ligature of arteries, exposure of nerves, or removal of vital organs. Physiological investigations on living animals were carried out by Galen and the Alexandrian school, and all the important discoveries during the later centuries of the Christian Era were made in this way. The method was accepted as a necessary means to scientific knowledge until the nineteenth century, when the widely published and needlessly cruel and numerous experiments of Majendie and other investigators in France, Germany, and Italy, caused public displeasure. Persistent agitation in England resulted in the appointment, in 1876, of a royal commission to investigate the subject of vivisection in that country, and the passage of the Vivisection Act, which regulated, and to some extent restricted, the practice. Experiments performed for instruction were, in particular, permitted only under stringent limitations. Invertebrate animals were not protected, but horses, dogs, mules, asses, and cats were especially safeguarded. An active propaganda for the total suppression of vivisection has been steadily maintained in Great Britain and in the United States. Anti-vivisection protests include objections to alleged experimentation upon human beings in pauper hospitals and insane asylums. The chief argument against vivisection (based mainly on the undoubtedly cruel experiments carried on before the days of anæsthetics) are that the practice is unnecessary and cruel.

The whole weight of scientific opinion is in favor of vivisection conducted in a humane manner. Experiments as at present performed involve no avoidable suffering. Cutting operations are done under complete anæsthesia, with ether or chloroform, as in the human subject. Animals seriously mutilated are killed before regaining sensibility. There is nothing to gain and much to lose by the infliction of pain, in the conduct of most experiments, and the investigator, for this reason, if for no other, is led to avoid it.

The benefits to mankind derived from animal experimentation are incalculable. Practically all our knowledge of physiology, of the effect of medicines, and of bacteriology is gathered from this source, and there is hardly a life-saving or pain-relieving appliance, measure, or operation that has not been directly derived through vivisection. Only a few benefits derived from it can be mentioned here. The whole subject of the circulation of the blood, of transfusion of blood and saline fluids, was worked out on animals. All the facts concerning respiration were discovered in the same way, and the practical application of the knowledge thus derived has led to the life-saving procedure of artificial respiration in cases of asphyxiation from gases, drowning, hanging, and poisoning, to the use of oxygen in cases of failing respiration, and to the science of ventilation. The functions of the nerves, spinal cord, and brain and the location of the various nerve centres are among the most difficult and important problems solved by vivisection. The treatment of aneurism by ligature, the repair and transplantation of bone, skin-grafting, absorbable ligatures, the arrest of hemorrhage by torsion of the arteries, the epoch-making discovery of general anæsthesia, the diagnostic and therapeutic uses of electricity, hypodermic medication, and the phenomena of inflammation are examples of the usefulness of animal experimentation. The immense advances in our knowledge of contagious and infectious diseases, their bacteriology, and their prevention, were made through vivisection. Diphtheria antitoxin, which has saved thousands of lives, and the various other antitoxic serums (see SERUM THERAPY) are products of the same method of investigation. These benefits are practical, and from a humanitarian as well as a scientific point of view outweigh many times the pain inflicted on animals and the destruction of animal life. See Paget, *Experiments on Animals* (London and New York, 1903); Leffingwell, *The Vivisection Question* (New Haven, Conn., 1901), and numerous articles in English and American magazines. The principal English antivivisection organs are the *Zoöphilist* and *Abolitionist*.

VIZAGAPATAM, vē-zä'gŭ-pŭ-täm'. A seaport and capital of a district in Madras, British India, 178 miles northeast of Masulipatam, at the mouth of a small estuary, on an inlet of the Bay of Bengal (Map: India, D 5). The harbor is shallow and small. Panjam cloth, bags, and carved and other fancy wares are extensively manufactured. The population in 1901 was 40,892, including a large number of Europeans who reside in the suburb of Waltair. Vizagapatam came under control of the English in 1768.

VIZCACHA. See VISCACHA.

VIZCAINO, vēth'kȧ-ē'nō, SEBASTIAN (c.1550-1615). A Spanish explorer, born in Huelva. He became chief pilot of New Spain, and in 1596-97 attempted unsuccessfully to explore Lower California. In 1602-03 he explored and carefully surveyed the coast north of Cape Mendocino, discovered a bay, which he named Monterey in honor of the Viceroy, and dispatched northward from Cape Orford a vessel which sailed to 46° north latitude, and reached the mouth of a large river, probably the Columbia. The observations made by him on the California coast were used by Enrique Martinez in constructing thirty-two charts, which are still preserved in the archives of the Council of the Indies. His reports on his two voyages to California were published by Torquemada in *Monarquia Indiana* (Madrid, 1615), and the greater part of them can be found in Burney's *Collection of Voyages to the South Sea* (London, 1811).

VIZETELLY, HENRY RICHARD (1820-1894). An English printer, publisher, and author, born in the parish of Saint Botolph, London. As an engraver he worked under John William Bonnar and Orrin Smith, and his best work was for an edition of Longfellow's *Poems*. With Herbert Ingram, the founder, Vizetelly was prominent in establishing the *Illustrated London News* in 1842. In 1852 he began the publication of books, and about this time he issued a reprint of *Uncle Tom's Cabin*, which was very successful. He vigorously opposed the newspaper stamp duty and was sued for penalties amounting to $60,000 for publishing his newspaper, the *Illustrated News*, without the stamp; but the example he set was followed by other newspaper proprietors, the duty was abolished, and the penalties were not enforced. He was in Paris throughout its siege by the Germans, and subsequently published a graphic description of events in that city entitled *Paris in Peril* (1882). Afterwards he established a publishing house in London. He issued translations of Zola's novels, and, on the ground that these were 'obscene libels,' he was fined and imprisoned for three months. His brother FRANK, illustrator and war correspondent, born 1830, was with the army of Hicks Pasha at El-Obeid in November, 1883, and probably perished in the Kashgil massacre. Several sons of Henry Richard Vizetelly achieved prominence: EDWARD HENRY (1848-1903), journalist, war correspondent, and author; ERNEST ALFRED (1853—), journalist, war correspondent, and translator, particularly of Zola; ARTHUR (1853—), editor and translator; and FRANK HORACE (1864—), author and encyclopædist.

VIZIANAGRAM, vē'zē-ŭ-nŭ-grăm'. A town in the Vizagapatam district, Madras, British India, 30 miles north by east of the city of Vizagapatam (Map: India, D 5). It has a Maharaja College and a library. The city is the residence of a Zamindar or Raja, who controls one of the largest and most ancient estates in India. Population, in 1901, 37,270.

VIZIER, vĭz'yẽr, or **VIZIR**, vĭ-zēr' (Arab. *wazir*, carrier of burdens, counselor, from *wazara*, to bear burdens). A title of State functionaries in the Ottoman Empire and other Mohammedan States. It was first employed by Abul Abbas, the first Abbaside caliph, about 750; in the Ottoman realm it was introduced by the Sultan Orkhan (1326-59). Originally used as a designation of the Prime Minister, the title was conferred in 1386 by Amurath I. on his victorious general, Timur-tâsh. From this period the number of viziers was gradually increased. The Grand Vizier is, after the Sultan, the most important personage of the Turkish Empire; he unites in his own person the whole powers of the State, and is charged with a corresponding responsibility.

VIZZINI, vēt-sē'nē. A town of the Province of Catania, in Sicily, Italy, 41 miles by rail southwest of Catania (Map: Italy, J 10). It has a large fruit industry. Population (commune), in 1901, 17,764.

VLAARDINGEN, vlär'dĭng-en. A quaint old town of the Province of South Holland, Netherlands, at the mouth of the Meuse, five miles west of Rotterdam (Map: Netherlands, C 3). There are a handsome church and town hall. It is a centre for the cod and herring fishery of the Netherlands, more than 125 boats and 1500 men being engaged in that occupation. Population, in 1899, 16,661.

VLACICH, vlä'tsēĸ. A German Lutheran theologian, who wrote under the Latinized form of his name, Matthias Flacius (q.v.).

VLADIKAVKAZ, vlȧ'dyē-kȧf-kȧz'. The capital of the Territory of Terek and a fortress of Northern Caucasia, situated on both banks of the Terek (Map: Russia, F 6). The river is crossed by an iron bridge. Population, in 1897, 43,843, chiefly Russians, Armenians, and Jews. The town was founded in 1784.

VLADIMIR, vlȧ-dyē'mēr. A government of Central Russia, between Moscow and Nizhni-Novgorod. Area, over 18,800 square miles (Map: Russia, F 3). It belongs to the Central Russian plateau and is intersected by deep river valleys which give the surface a somewhat hilly appearance. It is watered principally by the Oka and its tributary the Klyazma. Iron, alabaster, and china clay are the principal minerals. The climate is colder than that of Moscow. A considerable part of the government is still under forest. The soil is largely stony and clayey, and the domestic output of grain is sufficient only to satisfy in part the demand. In manufacturing, however, Vladimir occupies a prominent position among the governments of Russia. Next to Moscow it is the largest centre of the textile industries in the country. In 1898 there were in the government 1347 establishments, employing over 200,000 persons, with an output of about $140,000,000, of which textiles (chiefly cotton and linen) represented over $120,000,000. The household industries produce cotton and silk goods, woodenware, metal articles, pottery, and icons. Local artisans migrate to other parts of Russia, and peddlers from Vladimir penetrate even as far as Austria and Siberia. Population, in 1897, 1,570,733, almost exclusively Russian.

VLADIMIR. The capital of the Government of Vladimir, in Central Russia, situated on the Klyazma, 114 miles east-northeast of Moscow (Map: Russia, F 3). It is an ancient town in a sad state of decline. It still has remnants of its former splendor, such as the Golden Gate, the Uspensky Cathedral (twelfth century), which is the burial place of the Princes of Vladimir, the Dmitrievsky Cathedral, and a number of ancient monasteries. Population, in 1897, 28,300. The prominence of Vladimir dates from the twelfth century, when Andrew Bogolyubsky made it the capital of the Grand Principality of Vladimir, known also as Suzdal. It attained great prominence and was the seat of a metropolitan. In the fourteenth century it began to decline, and with the absorption of the grand principality by Moscow entirely lost its importance.

VLADIMIR. The name of several Russian princes.—Vladimir I., the Great or the Saint, the first Christian sovereign of Russia, ruled from 980 to 1015. The facts of his life must be gleaned from the sagas, and are subject to doubt. The account generally accepted is as follows: After the death of his brothers he became ruler of all Russia, and by conquest he increased his territory very greatly. Russia at this time was an ill-compacted empire; the various Slavic tribes which dwelt within its boundaries acknowledged the sovereignty of the Russian princes solely by the payment of tribute, and that only when the princes were powerful enough to enforce it. Vladimir sought to increase the central authority. Many of his subjects were Greek Christians, his mother, Olga, had become one, and he wished to be allied with the Byzantine Imperial family, and for these and other reasons resolved to adopt Greek Christianity. He first made an attack upon the Byzantine Empire, then sent an embassy to Constantinople, promising peace and his conversion, in exchange for the hand of Anna, the sister of Constantine IX., threatening war in case of refusal. His demands were gladly complied with, and after his marriage and baptism at Kherson in 988, he returned to Kiev, destroyed all his idols, and commanded his subjects to be baptized. Churches were built, schools established, capital punishment was supplanted by fines, and excessive lenity shown to all criminals. He died July 15, 1015. The Russian Church has decreed him the epithets of 'saint' and 'equal of the Apostles.' The order of Vladimir was founded in his honor by Catharine II. (q.v.) in 1782, and the University of Kiev was also named for him.—Vladimir II. (1053-1125), surnamed Monomachus, the great-grandson of the preceding, was Grand Prince of Kiev from 1113 to 1125. In his youth he led a band of auxiliaries to join Boleslas II. of Poland in the wars with Bohemia, gaining such renown that on his return he was ranked at the head of Russian warriors. Vladimir's father succeeded to the Grand Principality of Kiev (1078), and Vladimir wrested from their lawful possessors Smolensk, Tchernigov, and Novgorod; though some years afterwards his cousin Oleg, the dispossessed Prince of Tchernigov, with the aid of the Polovtzes (a Turkic nation which was at that time the terror of the Russians), recovered his dominion. Vladimir, having subsequently routed the Polovtzes in several engagements, became so popular that in 1113 he was chosen Grand Prince of Kiev, and for twelve years he displayed his eminent qualities as a ruler and a warrior. Most of Vladimir's fame, however, rests on his writings, which present an interesting picture of the internal life of Russia at the beginning of the twelfth century. Vladimir's mother was a daughter of the Byzantine Emperor, Constantine Monomachus; and Alexis Comnenus, who wished to be on good terms with his powerful northern neighbor, is said to have sent him the crown, sceptre, and sword of his grandfather, which are still shown as such, and which are employed in the coronation of the Czar. Consult Rambaud, *History of Russia*, vol. i. (Boston, 1886).

VLADIMIR-VOLHYNSK, vô-lĭnsk′. An ancient town in the Government of Volhynia, Russia, situated on a tributary of the Bug, 210 miles west-northwest of Zhitomir. The Church of Mstislav, originally erected in the twelfth century, has been rebuilt several times. The town is mentioned by Nestor (q.v.) in 988, and judging from the writings of contemporary chroniclers as well as from existing remains, it was a place of considerable prominence and splendor as the chief town of Volhynia. Population, in 1897, 9695, mostly Jews.

VLADISLAV, vlä′dĭs-lȧv. The name of several Polish kings. See Ladislas.

VLADIVOSTOK, vlȧ′dyê-vôs-tôk′. The capital of the Maritime Province of Siberia, and the chief Russian commercial and naval port on the Pacific, situated at the southern end of the Muravieff-Amursky Peninsula and on the Golden Horn (Map: Asia, N 4). The harbor is spacious, safe, and ice-free for nine months in the year. The mean annual temperature is somewhat over 40°. The town is well built. The commerce is very important and is largely in the hands of the Chinese. The imports consist principally of manufactures, and the exports of raw materials. Population, in 1880, 7300; in 1897, 28,896; in 1901, 38,000, of whom 24,700 were military, 8000 Chinese, 2300 Japanese, and 2200 Korean. Vladivostok was founded as a military post in 1862 and was declared a free port in 1873. It rose rapidly, and has been strongly fortified. Its position as the eastern terminus of the Trans-Siberian Railway greatly adds to its importance, but the rise of Port Arthur (q.v.) and Dalny (q.v.) will probably prove detrimental to its further development, owing to the superior situation of these two ports.

WLOCLAWCK, vlyôts-lyȧ′vĕk, or **VLOTSLAVSK**, vlôts-läfsk′. A town in the Government of Warsaw, Russian Poland, situated near the left bank of the Vistula, about 90 miles northwest of Warsaw (Map: Russia, A 4). It has extensive manufactures. Population, in 1897, 23,065.

VODENA, vô-dā′nȧ. A town in the Vilayet of Monastir, European Turkey, situated about 50 miles west-northwest of Saloniki (Map: Turkey in Europe, C 4). It has many churches and mosques and produces tobacco, cotton, and woolen goods. Population, 14,000.

VOĖTIUS, vô-ē′shĭ-ụs, Gisbert (1588-1676). A Dutch theologian. He was born in Heusden, became a minister at that place in 1617, and in 1634 was made professor of theology and Oriental languages in the University of Utrecht. He was engaged in numerous bitter religious controversies; at the synod of Dordrecht combated Arminianism with great violence, afterwards attacked the works of Descartes and Coccejus, and exercised great influence upon the theology of his time. His works were published under the title of *Selectæ Disputationes Theologicæ* (1648-69), and again as *Politica Ecclesiastica* (1863-76).

VOGEL, fō′gel, Eduard (1829-56). A German explorer, born at Crefeld. He was educated at Leipzig and at Berlin, where he studied with Encke; and was attached for two years to Bishop's observatory in London. In 1853 he was commissioned by the British Government to assist Overweg and Barth in their explorations of Central Africa. Passing through Tripoli, he reached Murzuk in August, 1853, Kuka in January of 1854, and in December met Barth near Bundi. Returning with the latter to Kuka, on Lake Chad, he then proceeded southward alone to Yakuba, and was the first white man ever seen in that region. The remainder of 1855 he spent in the vicinity of Yakuba and the Benue River. In November and December he went back to Bornu and Kuka. Early in 1856 he started eastward for the Nile, and penetrated as far as Wadai. But in Wara he was apprehended by the Sultan and killed, probably about February 8th. Several expeditions were undertaken in search of him, the most noteworthy of which was that of Heuglin in 1860. It was not until 1873, however, that his fate was finally ascertained by Nachtigal. His sister, Elise Polko, published his notes in her *Erinnerungen an einen Verschollenen* (1863). Consult Pahde, *Der Afrikaforscher Eduard Vogel* (Hamburg, 1889).

VOGEL, Hermann Karl (1842—). A German astronomer, born in Leipzig He studied at the universities of Dresden and Leipzig. In 1865 he became assistant and later second observer in the observatory at Leipzig. In 1870 he became astronomer in the private observatory of Bülow near Kiel, and here he devoted himself with great success to astro-physics. In 1874 he became observer in the new astro-physical observatory at Potsdam and in 1882 director of this institution. In 1892 he was elected member of the Berlin Academy. The first spectroscopic star catalogue ever published was that by Vogel in 1883. He also published: *Beobachtungen und Positionsbestimmungen von Nebelflecken und Sternhaufen* (1867-76); *Bothkamper Beobachtungen* (1873); *Untersuchungen über das Spektrum der Planeten* (1874-95); *Der Sternhaufen im Perseus* (1878); *Sternspektraltafel* (1888); *Ueber den neuen Stern im Fuhrmann* (1893).

VOGEL, Hermann Wilhelm (1834-98). A German photochemist, celebrated for his work with the spectroscope, for his discoveries in the direction of chromophotography, and for his activity in all branches of the photographic art. He was born at Dobrilugk (Lower Lusatia), and was educated at the Royal School of Technology in Berlin. To that institution he was called in 1864 as instructor of photo-chemistry and later became full professor. He carried on researches relating to the purely scientific aspect of photography, devised a photometer (1864), and was first to discover the ultra violet rays of hydrogen (1878), and to enlarge the knowledge of spectral photography. His publications include: *Die Photographie auf der Londoner Weltanstellung* (1862; 4th ed. as *Handbuch*, 1890-94); *Die chemischen Wirkungen des Lichts und die Photographie* (1874; trans. into English, French, Italian, Russian, and Japanese); *Praktische Spektralanalyse irdischer Stoffe* (1877); *Lichtbilder nach der Natur* (1879); and *Aus der neuen Hexenküche* (1880).

VOGEL, Hugo (1855—). A German historical and genre painter, born at Magdeburg. He studied at the Düsseldorf Academy under Gebhardt and Wilhelm Sohn and first turned to historical subjects with his "Luther Preaching at the Wartburg" (1883, Kunsthalle, Hamburg). This was followed by "The Great Elector Receiving French Refugees at Potsdam" (1885), and by "Duke Ernest the Confessor Receiving the Holy Communion at Celle, 1530" (1887, Hanover Museum). In the City Hall of Berlin he executed two large mural paintings, "Reception of French Refugees by the Great Elector" and "The Councilors of Berlin and Cologne Taking Holy Communion in Both Forms. After that he applied the principles of plein-air painting with an inclination toward naturalism, held in check by a strong feeling for beauty, as may be seen in "After the Baptism" (1890, Sainte Gudule, Brussels), and a large "Allegory of Industry" (1894).

VOGEL, Sir Julius (1835-99). A British colonial statesman, born in London. He was educated at the London University School and the Government School of Mines; emigrated to Melbourne in 1852; and after engaging in journalism in that city, went in 1861 to New Zealand, where he established the Otago *Daily Times*, the first daily paper in the colony. He became a member of the Otago provincial council in 1862, and was the head of the provincial Government from 1866 till 1869. He was a member of the House of Representatives in 1863; was Colonial Treasurer. Commissioner of Stamps, and Postmaster-General from 1869 till 1872; and was Premier in 1873-74, and again in 1876. From 1876 till 1881 he was agent-general of New Zealand in London. Returning to the colony in 1884, he was Colonial Treasurer, Postmaster-General, Telegraph Commissioner, and Commissioner of Customs from that year until 1887. His published works are *Great Britain and Her Colonies* (1865) and *Anno Domini 2000; or Woman's Destiny* (1889; 3d ed. 1890).

VOGELSANG, fō'gel-zäng, Hermann (1838-74). A German mineralogist. He was born at Minden and studied at Bonn. In 1865 he was appointed professor at the Polytechnic School of Delft. He is remembered for his pioneer work in the use of the microscope for geological purposes, for his demonstration of the presence of liquid carbonic acid in many minerals, for his researches in the formation of crystals, and for his beginning of a new classification of rocks. He published: *Ueber die mikroskopische Struktur der Schlacken und Beziehungen zur Genesis der kristallinischen Gesteine* (1864); *Ueber die Systematik der Gesteinslehre* (1871); *Ueber die natürlichen Ultramarinverbindungen* (1873); and *Die Kristalliten* (1875).

VOGEL VON FALCKENSTEIN, fō'gel fōn fäl'ken-stīn, Eduard (1797-1885). A distinguished Prussian general, born in Breslau. In 1813 he entered the army and distinguished himself at Montmirail in 1814. He took part in the campaign in Denmark in 1848; became a lieutenant-general and commander of the Fifth Division in 1858; and was chief of staff in the Schleswig-Holstein War of 1864. At the breaking out of the Seven Weeks' War in 1866 he was put in charge of the army in Western Germany that was to act against the allies of Austria. He defeated the Hanoverians in the battle of Langensalza on June 28th, and forced them to capitulate. On July 2d he set out for Frankfort by way of Fulda and Hanau, defeated the Bavarians at Kissingen on the 10th, then the troops of Hesse-Darmstadt on the 13th; on the 14th drove back a reinforcement of Austrian and Hessian troops; and on the 16th entered Frankfort. A few days afterwards he was appointed commander. After the war he was made commander of the First Army Corps, and in 1867 he was elected to the North-German Reichstag. In 1870 he commanded the forces upon the Baltic, and in 1873 he was retired. Consult Wengen, *General Vogel von Falkenstein und der hannoversche Feldzug, 1866* (Gotha, 1886).

VOGEL VON VOGELSTEIN, fō'gel-stīn, Karl (1788-1868). A German painter, born at Wildenfels. He studied at the Dresden Academy and, after painting portraits at Saint Petersburg for several years, from 1808, went to Italy in 1813, was appointed professor at the Dresden Academy in 1820, Court painter in 1824, and was ennobled in 1831. Of many portraits he painted there, those of Pope Pius VII., Frederick, and Augustus the Just are in the gallery at Dresden. In 1842 he went again to Rome and composed a "Scene from Dante's Divina Commedia" (Palazzo Pitti, Florence). After his return to Dresden he painted "Twelve Scenes in Goethe's Faust" (Dresden Gallery) besides historical paintings in churches at Annaberg, Dresden, Leipzig, and Wolmar. In 1853 he retired from his professorship and lived alternately in Rome and in Munich, where he died.

VOGHERA, vō-gā'rȧ. A town in the Province of Pavia, Italy, on the left bank of the Staffora, 39 miles by rail southwest of Milan (Map: Italy, D 3). The Church of San Lorenzo (eleventh century) was remodeled in the baroco style in 1660. The fortifications which were erected in the Middle Ages by the Visconti have been replaced by shady promenades. Population (commune), in 1901, 20,661.

VOGL, fō'g'l, Heinrich (1845-1900). A German tenor, born in Munich. He was a schoolmaster at Ebersberg from 1862 to 1865, during which period he devoted much time to the study of vocal music. He resigned his school appointment, and studied under Franz Lachner and Hugo Jenk in Munich. His début occurred in *Der Freischütz* at the Munich Court Opera, November, 1865, in which he achieved immediate success. Shortly afterwards he was selected to succeed Schnorr von Carolsfeld as the model Tristan, and became famous as a Wagnerian singer. His compositions include songs, part-songs, and some chamber music, as well as one opera, *Der Fremdling*, produced in Munich (1899). In 1868 he married Therese Thoma, a dramatic soprano, who also was famous for her portrayal of Wagnerian rôles, and especially that of Isolde.

VOGL, Johann Nepomuk (1802-66). An Austrian poet. He was born in Vienna and from 1818 until his death was in the service of the Government in Lower Austria. He is known for his ballads, which are still popular. Among his works may be mentioned: *Oesterreichisches Wunderhorn* (1834); *Balladen und Romanzen* (1837); *Soldatenlieder* (1849); *Twardowsky der polnische Faust* (1853); and *Jügerbrevier* (1862). Consult Schmidt, *J. N. Vogl* (Vienna, 1868).

VOGLER, fōg'lẽr, George Joseph, better known as Abbé Vogler (1749-1814). A German organist, theorist, and composer, born at Würzburg. He went to Rome and took holy orders. He founded the "Mannheimer Tonschule" at Mannheim and received the appointment of chaplain and second kapellmeister. From 1786 to 1799 he was Court conductor at Stockholm, where he founded a music school. In 1807 he was appointed Court kapellmeister at Darmstadt and founded a third "Tonschule" where both Weber and Meyerbeer received instruction. Among his works are the operas *Der Kaufmann von Smyrna* (1780), *Albert III. von Bayern* (1781, *Castor und Pollux* (1784), *Gustavus Adolphus* (1791), *Samori* (1804), and *Der Admiral* (1810), besides a great deal of church music.

VOGRICH, vōg'rĭk, Max (Wilhèlm Carl) (1852—). An Austrian pianist and composer born in Szeben, Transylvania. At the age of fourteen years he was a proficient pianist and was sent to the Leipzig Conservatory for special studies under Reinecke, Richter, Hauptmann, Wenzel, and Moscheles. He completed his course in 1869, and from 1870 until 1878 was engaged in extended concert tours throughout Continental Europe, South America, and the United States. He was particularly successful in New York, where he appeared with Wilhelmj, the violinist. From 1882 to 1886 he was engaged in musical tours and teaching, in Australia, after which he returned to New York and made that city his permanent residence. Among his many compositions are several operas, whose libretti he also wrote, which received their first presentation in Europe; *Vanda* (1875); *Lanzelot* (1890); *King Arthur*, produced in Leipzig in 1893; and *Buddha* (1899). His oratorio *The Captivity* was brought out in New York in 1891, as was the cantata *The Young King and the Shepherdess*. Another cantata, *The Diver*, was first produced in Detroit. He also wrote several masses, symphonies, violin and pianoforte concertos, and sonatas, besides numerous duets, songs, and chamber music.

VOGT, fōkt, KARL (1817-95). A German-Swiss naturalist, born at Giessen. He studied medicine there and at Bern, and in 1847 he became professor of zoölogy in Giessen, but being compelled to leave the country a year later, on account of his share in the political agitation of 1848, he left Germany and accepted the professorship of geology in Geneva in 1852, remaining there until his death. He became a member of the Swiss Federal Council in 1878. Vogt was one of the most eloquent exponents of Darwinism. He published authoritative works on zoölogy, anthropology, and zoölogy, of which the following are important: *L'Histoire naturelle des poissons d'eau douce de l'Europe Centrale* (with L. Agassiz, 1839); *Physiologische Briefe* (1845-46); *Ocean und Mittelmeer* (1848); *Die Säugetiere in Wort und Bild* (1883); *Traité d'anatomie comparée pratique* (with E. Yung, 1888).

VOGÜÉ, vō'gṳ'ā', CHARLES JEAN MELCHIOR, Marquis de (1829—). A French archæologist and historian. He was born in Paris and was privately educated. In 1853-54 and in 1861 and 1862 he traveled widely in the Orient. In 1868 he was elected a member of the Académie des Inscriptions et Belles-Lettres. In 1871 he was appointed by Thiers Ambassador to Turkey, and in 1875 was transferred to Austria, but after the retirement of MacMahon in 1879 he left the diplomatic service. In 1901 he was elected a member of the French Academy. His chief works in archæology are: *Les églises de la Terre Sainte* (1860); *Mélanges d'archéologie orientale* (1869); *L'architecture civile et religieuse du Ier au VIème siècle dans la Syrie centrale* (1865-77); in history, *Le maréchal de Villars* (1888), *Les mémoires de Villars* (ed. 1884-92), and *Le duc de Bourgogne et le duc de Beauvilliers* (1900).

VOGÜÉ, EUGÈNE MARIE MELCHIOR, Vicomte de (1848—). A French critic and historian, born at Nice, cousin of the preceding. During the Franco-Prussian war he served as a volunteer and was wounded at Sedan. After 1871 he was attaché to the French embassies at Constantinople, Cairo, and Saint Petersburg, respectively. At the latter Court he passed seven years, but in 1882 gave up the diplomatic service to devote himself to literature. In 1888 he was made a member of the French Academy. It was through Vicomte de Vogüé that Russian novelists first became widely known in France and afterwards throughout the English-speaking world. His more important publications include: *Syrie, Palestine, mont Athos* (1876); *Histoires orientales* (1879); *Le roman russe* (1886); *Regards historiques et littéraires* (1892); *Heures d'histoire* (1893); *Cœurs russes* (1894); *Le rappel des ombres* (1900); *Pages d'histoire* (1902); and the novel *Les morts qui parlent* (1899). Consult Rod, "Le Vicomte E. M. de Vogüé," in *Les idées morales du temps présent* (Paris, 1891).

VOGULS. A Finno-Ugrian tribe numbering about 7000 living in the Northern Urals, Russia. They are of short stature and robust, dolichocephalic, with blue or gray eyes, flat concave nose, long blonde or brown hair, and light skin inclined to yellow. They live by the chase, using as weapons the bow and arrow, the flint-lock gun, and traps. Their domestic animals are the dog and cattle. Their tents and domestic utensils are made from birch bark; their canoes of the same material are made water-tight with resin. They dress like the Russians and are nominal Christians, but worship idols and make sacrifices of animals. Totemic tattooing is practiced among them and polygamy is common. Consult: Müller, *Ugrischer Volksstamm* (Berlin, 1837); Ahlqvist, *Unter Wogulen und Ostjaken* (Helsingfors, 1885); Rabot, *A travers la Russie boréale* (Paris, 1894).

VOICE (OF. *vois*, *voiz*, *vuiz*, Fr. *voix*, from Lat. *vox*, voice; connected with Gk. *ἔπος*, *epos*, word, Skt. *vacas*, speech). The audible sound produced in the larynx of any animal possessing that organ. The primary vocal elements originating in the larynx are modified in their passage outward through the pharynx and mouth so as to form articulate speech or musical sounds, i.e. speaking and singing. The whole respiratory apparatus is concerned in the production and modulation of the voice. The lungs force a column of air, under varying degrees of pressure, through the trachea or windpipe against the vibrating portions of the larynx (q.v.), generating a sound which is modified by the tongue, teeth, lips, etc. The study of the varying conditions in the interior of the larynx is made possible by the use of the laryngoscope (q.v.). On attempting phonation, the arytenoids (movable cartilages to which are attached the posterior ends of the cords) are seen to raise themselves in the fold of mucous membrane which covers them, and rapidly approach each other. This movement approximates the edges of the vocal cords, and consequently narrows the opening of the glottis. During the emission of the most acute sounds the glottis contracts into a mere line. The arytenoid cartilages are raised and meet in the median line, the epiglottis is drawn outward, and a short, stiff tube is then formed above the glottis, all these parts being in a state of extreme tension. It is impossible to study with the laryngoscope the manner of formation of the gravest chest tones, because the arytenoid cartilages approach each other closely and bend under the border of the epiglottis, which is depressed, so that the cords are hidden. The larynx possesses within itself more delicate powers of adjustment than any musical instrument. In addition to the movements already mentioned, the vibrating portions of the cords can be shortened or lengthened, or limited to their edges; the free edges can be sharpened or blunted, and the whole cord can be flattened out like a ribbon. The entire mechanism is adapted to meet varying degrees of pressure of the column of air in the trachea, and the quality of the sound produced is further modified by the adjustable centres or ventricles of the larynx.

Tone has three attributes: strength or loudness, pitch, and quality or *timbre*. *Strength* depends upon the energy of the expirating blast, and upon the structure and adjustment of the vocal organ and the resonance apparatus. *Pitch* depends upon the rapidity of the vibrations, this being determined by the length and tension of the cords. *Quality*, as has been shown in the article SOUND (q.v.), depends upon the character and number of the partial tones (overtones) accompanying any fundamental note sounded; and this is determined mainly by the form and thickness of the cords.

The principal difference between male and female voices lies in their pitch; but they are also distinguished by their quality, the female voice being softer. There are two kinds of male voice, bass and tenor, and two kinds of female voice, contralto and soprano, all differing from each other in quality. The essential difference between bass and tenor and contralto and soprano is not range merely, for the bass and contralto often sing very high notes, but is one of tone or *timbre*, which distinguishes them even when they are singing the same note. The barytone and mezzo-soprano are the intermediate voices of the male and female, respectively. The boy's larynx is like that of the female, and his voice is similar in range and pitch, but is somewhat louder and different in *timbre*. At puberty the boy's larynx undergoes a rapid change, into the bass or tenor, and is said to crack or break, the peculiarity then noticed being due to imperfect control of the muscular mechanism, and also to the congested and swollen state of the mucous membrane of the cords, incident to active growth. See SINGING.

In each larynx different parts or regions of the scale are produced by different laryngeal mechanisms. Laryngoscopic observations show that for each region or system there is a particular 'setting' of the larynx, which is maintained throughout each register, the chief change being an increasing tension of the cords as the notes rise in pitch; at the 'break' or change of register there is a sudden shifting of the setting. In most voices the ear recognizes three registers, the lower, middle, and upper, also termed the thick, thin, and small registers. In the first the cords vibrate as thick masses, in the second only their thin edges vibrate, and in the last the vibrating chink of the glottis is much reduced in length. Ease and smoothness of transition from one register to another is one of the principal objects in training the singing voice. The lower and middle registers are sometimes called the chest voice, and the upper the head voice. In the male the thin register is called the *falsetto*. Women use mostly the upper part of the chest register and the lower part of the falsetto. Young children use the falsetto entirely. The middle voice, that is the upper part of the chest register, is used in public speaking, on account of its flexibility, reach, and the ease with which it is sustained. Besides the musical tones formed in the larynx a large number of other sounds can be produced in the vocal tubes. Speech consists in the modification of the laryngeal tones by other organs superior and anterior to the larynx (as the tongue, the cavity of the fauces, the lips, teeth, and palate, with its velum and the uvula acting as a valve between the throat and nostrils), so as to produce those articulate sounds of which language is formed.

Ventriloquism appears to consist merely in the varied modification of the sounds produced in the larynx in imitation of the modifications which distance imposes upon the voice. The essential mechanism of ventriloquism consists in taking a full breath, then keeping the muscles of the chest and neck fixed, and speaking with the mouth almost closed and the lips and lower jaw as motionless as possible, while air is very slowly expired through a narrow glottis. Care is also taken that none of the expired air is allowed to escape through the nose. Much of the ventriloquist's skill, however, in imitating sounds coming from particular directions depends on deceiving other senses than hearing. The direction from which sounds reach the ear is never very clearly distinguished, and when the attention is directed to a particular point, the imagination is apt to refer to that point whatever sounds we may hear. See PALATE; ACOUSTICS. Consult: Helmholtz, *Die Lehre von den Tonempfindungen* (Brunswick, 1877); Browne and Behnke, *Voice, Song and Speech* (New York, 1887); Mackenzie, *The Hygiene of the Vocal Organs* (London, 1887); Durant, *Hygiene of the Voice* (New York, 1879); and Foster, *Textbook of Physiology* (New York, 1898).

VOICING. A term applied to regulating the quality of tone in organ-pipes. Tuning has to do only with correctness of pitch; but in voicing a certain quality is aimed at. The first requirement is, that all the pipes must be made uniform. This is done by carefully regulating the amount of wind admitted and the angle at which it strikes the upper lip, and also by slightly changing the edge of the lip. Flue-pipes and reed-pipes require different treatment, so that voicers to-day generally make a specialty of either of these pipes. Voicing requires a very fine ear.

VOICES OF THE NIGHT. A collection of poems by Longfellow (1839), including the well-known "Psalm of Life." Most of the poems appeared originally in the *Knickerbocker Magazine*.

VOID (OF. *voide*, *vuide*, Fr. *vide*, empty, probably from Lat. *viduus*, bereft, deprived, widowed; connected with OPruss. *widdewu*, OChurch Slav. *vĭdova*, Skt. *vidhavā*, Goth. *widuwō*, OHG. *wituwa*, Ger. *Wittwe*, AS. *widewe*, Eng. *widow*). In law, an act or agreement which has no legal force or effect is said to be void. A clear and substantial distinction is made between *void* and *voidable*. That which is void is a nullity in law from its inception, but a voidable act or agreement has full legal force and effect until set aside. For example, an illegal contract is void, whereas one induced by fraud is only voidable at the option of the defrauded party. See CONTRACT; VOIDABLE.

VOIDABLE. In law, an act or agreement which may be set aside or rendered of no effect by a party thereto, or by a competent court, is voidable. However, it continues to have full legal effect until such action is taken. The privilege of treating a contract as voidable is given to persons who have been imposed upon by reason of weakness of mind or lack of experience and discretion, as in cases of infants and in cases of fraud. See CONTRACTS, and consult the authorities there referred to; also VOID.

VOIGT, foiᴋt, Georg (1827-91). A German historian, born at Königsberg, son of Johannes Voigt. He was educated in Königsberg. In 1858 he became professor at Munich, in 1860 he went to Rostock as professor of history, and in 1866 to Leipzig, where he remained till his death. In 1854 appeared his *Wiederbelebung des klassischen Altertums oder das erste Jahrhundert des Humanismus,* and from 1856 to 1863 his chief work, *Enea Silvio de Piccolomini als Papst Pius II. und sein Zeitalter.*

VOIGT, Johannes (1786-1863). A German historian. He was born at Bettenhausen, Thuringia. In 1817 he was called to Königsberg as professor of history, which position he held during the remainder of his life. His best known works are *Hildebrand als Papst Gregor VII. und sein Zeitalter* (1815); *Geschichte Marienburgs* (1824); the excellent *Geschichte Preussens* (1827-39); *Codex Diplomaticus Prussicus* (1836-61); and *Geschichte des Deutschen Ritterordens* (1857-59).

VOIGTEL, foiᴋ'tel, Richard (1829-1902). A German architect, born at Magdeburg, and educated at the Berlin Academy. After Zwirner's death in 1862 he became head architect in the work on the Cologne Cathedral. He drew up plans for many churches in the Province of Posen, and restored several small Gothic churches and the beautiful church at Sinzig.

VOIR DIRE, vwär dēr (OFr., to say the truth). A Norman French term employed to denote the examination of a witness or juror in order to determine his legal competency. By the common law, a person having a financial interest in the result of a cause could not be a witness therein, and a person called as a witness might be examined to determine his competency in this respect. This rule no longer prevails in the United States. It is customary to examine jurors on *voir dire* in order to ascertain whether they have any bias or prejudice for or against either party, and whether they possess the necessary qualifications to act as jurors in the cause. See Jury.

VOIRON, vwä'rôɴ'. A town of the Department of Isère, France, on the left bank of the Morge, 14 miles northwest of Grenoble. The modern Church of Saint Bruno is attractive. A conspicuous copper statue of Notre Dame de Vouise stands on a tower 50 feet high. Silk, paper, straw hats, and chemical products are manufactured. Population, in 1901, 12,625.

VOIT, foit, Karl von (1831—). A German physiologist. He was born at Amberg, Bavaria, and was educated in Munich, Würzburg, and Göttingen. He entered the Physiological Institute of Munich in 1856 as Bischoff's assistant, and became professor of physiology in 1863. In 1865 he founded the *Zeitschrift für Biologie,* in which most of his important writings on the subject of nutrition appeared. These include: *Physiologisch-chemische Untersuchungen* (1857); *Ueber die Theorien der Ernährung der tierischen Organismen* (1868); *Ueber die Kost in öffentlichen Anstalten* (1876); *Untersuchung der Kost in einigen öffentlichen Anstalten* (1877); *Physiologie des allgemeinen Stoffwechsels und der Ernährung* (in vol. vi. of Hermann's *Handbuch der Physiologie,* 1881).

VOITURE, vwå'tụr', Vincent (1597-1648). A French poet and courtier. He was born at Amiens, and educated at the College of Calvé et Boncour and at the University of Orléans, where he pursued the study of law. He was introduced to the fashionable life of Paris and soon became a favorite at the Hôtel de Rambouillet among such men as Corneille, Balzac, and Chapelain. His wit was redoubtable. On the formation of the French Academy in 1635 he was one of the first members admitted, but took no active part in its proceedings. Voiture's brilliant verse delighted the salons during his lifetime, but remained unpublished till 1650, when his *Œuvres* appeared. They have gone through many editions, as successive generations have been pleased by the lightness of his touch (e.g. ed. Roux, 1856). The *Lettres* were published by Uzanne (1880). Consult: Sainte-Beuve, *Causeries du lundi,* xii. (Paris, 1851-62); Rahstede, *Wanderungen durch die französische Litteratur, Vincent Voiture* (Oppeln, 1891).

VOKES, vōks, Rosina (1858-94). An English actress, the youngest of the famous 'Vokes family,' which included her brother Frederick (1846-88) and her sisters Jessie (1851-84) and Victoria (1853-94). She participated in many of the early successes of the family, including the popular *Humpty Dumpty* and other pantomimes during the sixties. In 1870 she was married to Cecil Clay and retired from the stage. Fifteen years afterwards she appeared in America, where for several successive seasons her vivacious talents were warmly appreciated in light comedies like *A Pantomime Rehearsal* (written by her husband), *The Schoolmistress, The Circus Rider, Wig and Gown,* and others. She finally left the stage late in 1893 because of ill health, and died at Torquay, England.

VOLANT. In heraldry (q.v.), a term meaning flying.

VOLAPÜK, vō'lå-pụk. An artificial language invented by Johann Martin Schleyer (born 1837), a German priest in 1879, and intended to be used as an international language. The aim in the formation of Volapük, as in the formation of most other 'universal languages,' has been to exclude elements supposed not to be universal, and therefore presumed to be too hard for some persons to acquire or manage. This theory, if strictly applied, would leave a poor minimum of speech, which would be inadequate for any scientific use; but it has never been strictly applied. The sounds admitted into Volapük are those represented by the following 27 letters: *a ä e i o ö u ü b c d f g h j k l m n p r s t v x y z.* The letters, with a few exceptions, are used in their Latin, Italian, or German values. The vowels are nominally long. Shortening is not allowed, theoretically, to weaken or obscure the vowel. The 'umlaut' vowels, *ä ö ü,* though far from universal, are admitted to fill out the inflexive scheme, which depends much on vowel distinctions. The consonants, *q, w, ng, th* (*thin*), *dh* (*this*), *zh,* etc., are excluded; *c* and *j* are perversely used. The words are arbitrarily formed from the aggregate European vocabulary. The Latin, English, German, or other national word for a given notion is chosen, and is cut down to its simplest form, the root, stem, or first syllable, with the omission or alteration of sounds or sequences of sounds not allowed in the scheme. Thus for 'house' the Latin *domus* is taken, reduced to *dom* (pronounced dôm); for 'time' the English *time*, reduced to *tim* (pronounced tīm); for 'teaching' the English *teach* (tītsh), reduced to *tit* and altered to *tid* (pronounced tīd). The words are often disguised beyond recognition, as *kod* (English *cause*), *dan* (German *Dank*), *nam* (Latin *manus*). All stems except particles must end in a consonant. To these are added many inflexive and formative endings, and some prefixes. In nouns the ending *a* indicates the genitive, *e* the dative, and *i* the accusative (*dom, doma, dome, domi*).

The verb formations are rather numerous. The six vowels *a ä e i o u* indicate the six tenses. Passive forms begin *pa-*, *pä-*, etc. Prepositions are used to supplement inflexions (*a, bei, de, ko*, etc.). Throughout, synthesis, as in Latin and Greek, is the rule, and cumulation is the result. Polysyllables abound. As the radical words are mostly reduced to a single syllable, the stem is often hidden in the built-up form. The first aspect of Volapük is therefore much like that of an entirely strange language, with nothing to appeal at once to the memory or the imagination. The dictionary and grammar must be consulted at every word, until the words and forms are memorized.

Volapük was first published in 1879. It soon found disciples and promoters in Germany, Austria, France, Holland, the United States, and other countries. International congresses were held (1884, 1887, 1889), directors were chosen, an academy or governing council was formed (1887), and resolutions and statutes were adopted. The second stage soon arrived. Proposals for the improvement or extension of the system were at first decided by the academy, with a right of veto conceded to the inventor. But the apparatus became unwieldy; change was hindered, the academicians became restive, and dissensions increased. Individual reforms of the scheme were published by dissatisfied Volapükists; and independent inventors put forth new schemes of their own. The adherents of Volapük in its first form fell off, and the whole movement almost collapsed. But a number of the leaders continued their efforts and debates, and at length, with a reorganized academy, under the directorship of Woldemar Rosenberger (1893-98) and the Rev. M. A. F. Holmes (1898-1903), formed what is practically a new system, very different in vocabulary and inflection from Volapük, called *Lingu international*, or specifically *Idiom neutral*, 'the neutral language.' Consult: Schleyer, *Entwurf einer Weltsprache* (Sigmaringen, 1879); *Wörterbuch* (Constance, 1880; 4th ed. 1888); Kirchhoffs, *Dictionnaire volapük-français et français-volapük* (Paris, 1887); id., *Le Volapük* (ib., 1886 et seq.); Dornbusch, *Abridged Grammar of Volapük* (trans. from Kirchhoffs, 1887); Sprague, *The International Language: Handbook of Volapük* (New York, 1888); Hain, *Grammar of Volapük* (London, 1888). See UNIVERSAL LANGUAGE.

VOLCANIC BRECCIA. See TUFF.

VOLCANO. As most generally understood, a volcano is a mountain which in a period of activity throws out molten or other material from the earth's interior, this material, taken collectively for all volcanoes, being lava (or its disrupted parts, scoriæ, or cinders and ashes), steam, and various gases—sulphurous, sulphureted hydrogen, hydrochloric, methane, etc. There is no limitation as to the size (in height or diameter) of the 'mountain;' therefore, volcanoes vary from small hillocks to giant excrescences of the earth's surface, many of its loftiest summits (as Orizaba and Popocatepetl, in Mexico; Cotopaxi and Aconcagua, in the Andes; Kilimanjaro, in East Central Africa; Demavend and Ararat, in the Caspian region of Asia—between 17,000 and 23,000 feet in altitude) being of a volcanic nature. Indeed, it would seem that the greater part of the mass of most volcanoes is built up of the materials which the volcanoes throw out. Therefore, in youth these mountains are small, and they develop in size as the eruptions continue in time and magnitude. The size of a volcano is, however, in no way a measure of the force of its activity, unless, perhaps, one may assume the reverse proposition of what is very generally believed. Many of the most violent or paroxysmic and destructive eruptions are those which have taken place from comparatively low volcanoes, like Vesuvius, Skaptar Jökull, in Iceland, the Soufrière of Saint Vincent, Coseguina in Nicaragua, Krakatoa in the Sunda Sea, Bandai-San in Japan, and Pelée on the island of Martinique, mountains measuring only a few thousand feet in height.

THE PARTS OF A VOLCANO. It is customary to recognize as the fundamental parts of a volcano: the basal portion or mountain proper; a more steeply rising and conical portion, or 'cone;' and the pit or basin-shaped depression found on the summit of most active volcanoes and known as the crater—the seat of eruptivity. There is no sharp or fast line delimiting these parts or making them necessary parts of a volcano, for in many there is no separation between the cone and the base proper—or the whole mountain might be said to be the cone —and in some volcanoes eruption takes place without any opened crater (Giorgios, in Santorin, 1866, Pelée, and some of the ancient puys of Central France). When present, and it is most generally present, the crater occupies a position on the actual summit of the mountain, but its true relation is frequently masked by the breaking away of a portion of the crater-wall, when the caldron appears sub-central or lateral, with its base a considerable distance down the slope of the volcano. True lateral craters or 'craterlets' are formed when the main mountain has broken out over its surface supplemental or 'parasitic' cones, which are sometimes very numerous, as in the case of Etna. The persistently active Kilauea, situated at the 4000-foot level on the slope of Mauna Loa, is a supplemental crater of that volcano, but its activity is mostly, if not entirely, independent of the mountain on which it is parasitically placed. The size of the crater bears no relation to the height of the mountain carrying it. Orizaba, three and a half miles high, has a crater less than 1000 feet in diameter; the crater of Popocatepetl is hardly more than double that size. On the other hand, Haleakla, a Hawaiian volcano on the island of Maui, 10,000 feet in height, has a crater (seemingly the largest in the world) 20 miles in circumference; and the ancient crater surrounding Aso-San, 5630 feet, in Japan, is perhaps still larger. Again, the size of the crater in no way measures the intensity of an eruption. Krakatoa, Vesuvius, and Pelée, at the times of their greatest paroxysms, had craters of only moderate dimensions, that of Pelée being about 2500 feet in diameter.

THE BUILDING UP OF A VOLCANO. It has already been remarked that probably much the greater number of volcanoes have made their own masses through the simple accumulation in time of their ejected products: in other words, the heaping up about the point or points of activity of lava, cinders, or ashes, most generally, perhaps, of all three of these products. Inasmuch as these are thrown out with a certain amount of alternation or regularity, the mountain itself acquires a regular internal structure, which, in section, would appear in alternating layers (strata) of deposition. Some volcanoes, whose eruptive energies are of a greater kind, and are not expressed in steam eruptions, are built up almost entirely of lava, and their outer dress, depending upon the viscosity or liquidity of the outflows, is either steep (like the *mamelons* of the island of Bourbon, and some of the puys of the Auvergne region of France) or very gentle, descending in a gradient of from 15° to 5° or less, as in some of the Hawaiian volcanoes. Other volcanoes are constructed almost wholly of cinders or scoriæ, but the composite cone is the one of most general occurrence.

It was at one time held that volcanoes, instead of being in the main accumulations of ejected material, were massive upheavals or swellings of the earth's surface, caused by the pent-up force within acting upon the depressing surface. The more accurate study of volcanic phenomena has not given proof of the existence of 'craters' or 'cones of elevation,' as these assumed structures have been called. At the same time it is by no means improbable that in the initial formation of some (or even many) volcanoes a preparatory step has been the upheaving of the deeper strata through magmatic intrusions, a condition that is fairly well indicated by the uplifts which are recognized in or associated with the structures known as *laccolites*—intruded lava-masses which have forcibly domed up the strata lying over the areas of upward passage of escaping lava. The Henry Mountains of southeastern Utah, the Euganean Hills (or portions of them) in Northern Italy, are familiar examples of this type of structure. The prodigious force of this uprising lava is measured by the thousands of feet of thickness of sedimentary strata which it has bodily uplifted.

THE MATERIAL EJECTED. The quantity of material ejected in the course of eruption is ordinarily dependent upon the force or violence of the eruption, and the period of its continuance. Skaptar Jökull, in its great eruption of 1783, threw out a mass of lava the cubical contents of which are thought to have equaled the bulk of the Mont Blanc *massif*. In the historic eruption of Vesuvius of the year 79 there was no lava-flow, but the discharge of fragmental products (cinders and ashes) was very large, burying, as is well known, a considerable portion of Campania with débris several feet in thickness. The cataclysm of Krakatoa in 1883 was responsible for the extrusion of material which, it has been thought, could not have measured less than 4.3 cubical miles; and this again, we are informed by some geologists, could hardly have been more than the one-hundredth part of the material that was thrown out by Temboro, on the island of Sumbawa, in 1815. It seems not unlikely that on certain days of its eruptions in May and August, 1902, the ejecta of Pelée, chiefly ashes, more than equaled in bulk the quantity of sediment discharged by the Mississippi River in the course of a full year. The projectile force of eruption is such that the lighter materials of eruption are thrown many miles into the air, where they may be kept suspended for months or even years, as in the case of the Krakatoa eruption, moving about with the upper atmospheric currents, and giving rise, through the sifting out and reflection of the sun's rays, to those remarkable phenomena which are known as the 'red glows' or 'volcanic afterglows.' These, made beautiful by their intense illumination, and impressing the beholder at times with the aspect of a vast conflagration, usually follow the true sunset by the period of about a half-hour (20-40 minutes), and rise to a position in the sky possibly exceeding 45° above the horizon. The afterglows of the Krakatoa eruption, which were the first to be carefully observed, were thought to have been deflected from dust particles sailing at a height above the earth's surface of from 30 to 50 or even 70 miles, and were continued for a period of considerably over a year. The afterglows following some of the Antillean eruptions were less brilliant and less continuous, and were seemingly thrown from a height not exceeding 20 to 25 miles, and at times, possibly, of only 8 to 15 miles. In both cases the phenomena were observed over widely removed portions of the earth's surface, which led to the conclusion that they were visible over the entire circumference of the globe, appearing at different localities at different times, depending upon the rate of travel of the suspended dust particles. Those from Krakatoa traveled with a general velocity of from 50 to 70 miles per hour, or more than twice that which impelled the particles from Pelée. The course of travel was in both cases from east to west.

ELECTRIC, MAGNETIC, AND ACOUSTIC DISTURBANCES. The ordinary electric disturbances which are associated with volcanic eruptions have long been recognized. These are the lightning flashes and peals of thunder which appear or are generated (perhaps as the result of friction) in the furious steam-cloud which is shot out from and overhangs the vent of the active volcano. In addition to the commoner or true flash-lightning, other forms of electric or pyro-electric discharge have been observed in association with volcanic discharges—balls or 'stars' of electric luminosity appearing in the volcanic cloud, as has several times been noted in the case of the Vesuvian eruptions, and again noticed at the time of the eruption of Tarawera, in New Zealand, in June, 1886. But the most wonderful displays were those which were associated with the outbreaks of Pelée, notably those of the evenings of May 26th and August 30th. On the latter date the 'electric' figures appeared as clustered or rocket stars, moving in straight and serpent lines (sometimes in parallel series), normal circles, and circles with zigzag streamers. These were observed simultaneously with the ordinary zigzag lightning, and lacked but little of the latter's blinding brilliancy. It has so far been impossible to determine the exact or absolute nature of these vivid lights traversing the volcanic cloud, but there can be no question as to their electric character, even if it be assumed that a certain distinctive condition had possibly been prearranged in the distribution of a field of inflammable or other gases.

Perhaps the most remarkable feature of the great Pelée eruption of May 8, 1902, was the violent disturbance in the magnetic field which it occasioned. While minor disturbances of the magnetic needle had already been noted in earlier eruptions, these had generally been in close proximity to the scene of action, and in some instances had been referred to as an effect of the ejection of rock material containing magnetic iron. But at the time of the Pelée eruption the disturbance seems to have been of world-wide penetration, as it was noted by careful observers at most widely removed stations of meteorological and magnetic research, such as Cheltenham (Maryland), Baldwin (Kansas), Toronto, Stoneyhurst (England), Val Joyeux (France), Athens, Potsdam, Pola, Vienna, and Zi-ka-wei (China), the last-named station being situated almost exactly on the meridian of longitude opposite to that of Pelée—otherwise, on the opposite side of the globe. At most of these stations, the disturbance was noted almost exactly two minutes after the time of the destruction of Saint Pierre, and in some places its continuance was extended over several hours. No satisfactory interpretation has up to this time been given regarding the nature of these magnetic phenomena.

The Krakatoa eruption of 1883 seems to have made itself felt as a distinct non-seismic shock or tremor through the entire diameter of the earth, and perhaps the same is true of the May eruption of Pelée. At any rate, a barograph record made at Zi-ka-wei indicates a distinct concussional wave arriving at the station four hours after the magnetic disturbance was initiated. There is hardly room to doubt that the more rapid of the shock-pulsations were transmitted directly through the earth, and were followed at a later time by the surface waves, which, traveling in opposite directions over the globe, gave interference areas as well as areas of most pronounced concentration. The sound-waves following volcanic eruptions travel, doubtless, both through the earth's interior and over its surface. Eruptions are frequently heard at very great distances, and yet, anomalous though it may appear, need not be audible near by. Humboldt called attention to this singular fact in connection with the eruption of the Soufrière in 1812, the noise of which was well noted in the valley of the Orinoco and beyond, at a distance in direct line of perhaps 750 or 800 miles. The May eruption of Pelée was likewise transmitted by sound to the most distant parts of the Orinoco Valley, and to the northern coast of Venezuela (Maracaibo, 800 miles distant), and yet all evidence points to the conclusion that it was not heard at Fort-de-France, the capital of Martinique, at a distance of 14 miles from the scene of the great disaster. Similarly, no true shock of the eruption of August 30, 1902, of which the writer was witness, was detected on the slope of the volcano itself at a distance of four miles in a direct line from the crater, although it was remarked at Port-of-Spain, on Trinidad, and at Carupano, on the Venezuelan coast, with the distinctness and intensity of the discharge of siege guns. These anomalies in sound-carriage still await their explanation, although the facts bearing upon the explanation are not unlikely to be similar to those which underlie the ordinary forms of acoustic opacity—alternating layers, with different degrees of tension, density, and temperature of the atmosphere.

ATMOSPHERIC DISTURBANCES. These appear mainly in winds of great violence, frequently of tornadic intensity, which pass in advance of the clouds of eruption (in this sense comparable with the wind that is forced ahead of a snow avalanche), and others whose course is directed toward the volcano, and which are seemingly indraughts into vacual areas made by the sudden explosion of steam. These so-called contrary currents have been noted particularly in the eruptions of Tarawera, in 1886, of Bandai-San, Japan, in 1888, and of Pelée. They are also at times very destructive, almost as much so as the direct winds which are scattered about by the outgoing blasts. It is not unlikely that most of the destruction that followed the explosion of Bandai-San, in 1888, and which resulted in the annihilation of the greater part of seven villages, was the work of this form of wind. Many attempts have been made to associate volcanic outbursts with particular phases of the moon and sun (sun-spot periods) and with special meteorological conditions of our atmosphere; and on these assumed relations special prophecies as to future volcanic happenings have been built. But no relation of this kind has so far been found, nor is there well-founded reason for believing that it in any way exists. Many of the most violent eruptions have taken place during storm periods; others of equal violence at times of almost absolute atmospheric stability. For at least six days preceding the May eruption of Pelée the barometric variation at noon was only one millimeter, the barometer marking steadily at this time 762 millimeters. This condition also existed at and before the time of Pelée's second death-dealing eruption (August 30, 1902), and it was noted in the great eruption of Vesuvius in 1794.

THE GEOGRAPHICAL DISTRIBUTION OF VOLCANOES. With hardly an exception all volcanoes are situated in what can reasonably be assumed to be areas of weakness in the earth's crust, such areas being the ocean basins themselves, the border-lands of these basins, or the mountain ranges which flank or construct the continental outlines. It follows then that volcanoes are either insular (oceanic) or sub-oceanic—i.e. placed on the continents close to the oceanic border. No distantly inland (active) volcano is known unless it can be shown to be in a region of crustal instability (Southern Mexico) or one in which a comparatively recent disruption has taken place (the volcanoes of the Great Rift Valley, of East Central Africa—Mfumbiro Group). Mount Wrangel, in Alaska, is a possible exception to this rule. The main line of areas of volcanic distribution are: (1) The Pacific-Caribbean belt following the Andes of South America, with many dormant, extinct, or active summits (Aconcagua, Mistí, Cotopaxi, Sahama, Chimborazo, Tolima); the Lesser Antilles (Soufrière, Pelée, and many peaks on Saint Lucia, Dominica, Guadeloupe, etc.); Central America and Mexico (Irasú, Coseguina, Izalco, Santa Maria, Agua, Fuego, Popocatepetl, Orizaba, Colima, Jorullo); the west coast of North America (Shasta, Hood, Rainier, Baker, Wrangel, Illiamna, Sheshalden, Makushin); Kamchatka, the Japanese Islands, (Fujiyama, Aso-San, Bandai-San, Asamayama); the Philippines (Mayon) and Sunda Sea Islands (Gelunggung, Papadayang, Tengger, Temboro, Krakatas); New Zealand (Egmont), and Victoria Land (Antarctica: Erebus and Terror). All of these seem to define a nearly continuous line or belt of weakness or disruption in the earth's crust. (2) A Mediterranean-Caspian region is defined by the positions of the Lipari Islands (with Stromboli), Etna, Vesuvius, the Ægean Islands (with Santorin), Demavend, and Ararat. (3) An Atlantic region, defined by the mainly quiescent volcanoes of Iceland (Hecla, Skaptar Jökull), the Azores (Pico), Madeira, Canaries (Teneriffe), Cape de Verde Islands, Tristan da Cunha, etc. (4) A Pacific region, with the numerous volcanoes on the small islands of the Polynesian group and the three main volcanoes of Hawaii (Mauna Loa, Mauna Kea, and Kilauea).

The Cause of Volcanic Eruptions. There is still much obscurity regarding the causes that condition volcanic eruptions—that permit of the generation of steam within the earth's interior, of its explosive escape through the 'crust,' and of the formation or existence of the molten magmatic mass that reaches the surface as lava or in its disrupted form, as scoriæ and ash. The accessible facts seem to point to the conclusion that the steam or vapor of water is derived from the hydrated rocks of the earth's superficial mass, and its sudden evolution is due to release from pressure of the rock or magma with which it is inbound, or to steady and increasing superheating. These conditions, as well as that of the uplifting and outthrow of lava, might be supplied as the result of deep rock displacements, which, by squeezing, would bring the more highly heated deeper crust nearer to the surface or to the critical point of dismemberment. And these displacements can readily be ascribed to vast subsidence, notably of the sea bottom.

Bibliography. Lyell, *Principles of Geology*, vol. i. (New York, 1872); Geikie, *Text-Book of Geology* (London, 1893); Scrope, "Considerations on Volcanoes," *Geological Magazine* (London, 1870); Fuchs, *Vulkane und Erdbeben* (Leipzig, 1875); Mallet, "Volcanic Energy," *Philosophical Transactions of the Royal Society* (London, 1873); Dana, *Characteristics of Volcanoes* (New York, 1890); Judd, *Volcanoes* (ib., 1891); Russell, *Volcanoes of North America* (ib., 1897); Heilprin, *Mont Pelée and the Tragedy of Martinique* (Philadelphia, 1903); and various memoirs by Reyer, Lapparenty, Bonney, Supan, Humboldt, Von Buch, and Darwin.

See Geology; Vesuvius; Etna; Pelée, Mont; etc.

VOLE. An English name, little used in America until recently, for the smaller members of the rat family (Muridæ) of the genera Arvicola, Evotomys, Calomys, and their near allies. The species are numerous and widely distributed, being found in Europe, Asia, Africa, and North and South America. Some of them are completely terrestrial in their habits, others are aquatic. See Mouse; Meadow-Mouse.

VOL'GA. The largest river of Russia as well as of the whole of Europe. It rises among a cluster of lakes and marshes in the Valdai Hills in the Government of Tver, 205 miles southeast of Saint Petersburg, and flows in a generally southeastward course, though it describes a large zigzag with sharp bends at Samara and Tsaritsyn, between which its course runs to the southwest. It empties through a large delta into the Caspian Sea, after a course of about 2300 miles (Map: Russia, G 5). Its total fall from its source to its mouth is less than 900 feet, and its current is throughout tranquil and regular, wholly without falls or rapids, so that the river is navigable almost to its source. The extreme upper portion of the river flows between wooded hills, but after leaving the Valdai plateau the entire remainder of its course lies within the great plains. The right bank is generally higher than the left, and for a considerable distance along the middle course it is lined by a limestone escarpment with steep, wooded cliffs, a spur of which deflects the river at Samara in a long, narrow loop 50 miles to the eastward. The left bank is low, and in some places along the middle course it is lined with great marshes and trembling forests, in which the trees are supported by soil floating on soft mud. In the lower course both banks are low, but dry, owing to the rapid evaporation. Here the river receives practically no tributaries, and flows through saline steppes lying below sea level. Below Tsaritsyn the river begins to divide into a number of parallel arms, but the true alluvial delta begins only a short distance above Astrakhan. The delta is about 70 miles wide, and consists of eight large and numerous smaller arms which are all merged together under a single sheet of water during the floods. The main channel near its mouth is several miles wide; below the confluence of the Kama the width of the river is 1500 yards, and at Tver it is about 200 yards.

In some places the channel is nearly 100 feet deep, in others it is scarcely more than four or five feet in the lower and two or three feet in the upper reaches. The quantity of sediment deposited seems to increase from year to year; shoals and sandbars are continually formed, and a number of dredging machines have to be kept constantly at work. The chief tributaries of the Volga are the Kama from the east, a large river in itself, and the Oka from the west. The whole system waters twenty-two of the Russian governments, and has a total navigable length of 9000 miles. Steamers ascend the main stream for more than 2000 miles. Though the river is icebound more than one-third of the year, the traffic is enormous, amounting to over 14,000,000 tons of goods annually, or more than one-fourth of the total traffic on all the Russian railroads. The principal articles carried are timber, grain, salt, and naphtha. The chief ports on the river are, in the order of their shipping, Astrakhan, Nizhni-Novgorod, Tsaritsyn, and Saratov. Connected with the Volga is a vast canal system, through which communication is established between the river and the Black, Baltic, and White seas. The fisheries in the Volga are very important.

VOLHYNIA, vŏl-ĭn'ĭ-ȧ. A government of Southwestern Russia, bordering on Austria and Poland. Area, over 27,700 square miles (Map: Russia, C 4). The northeastern part belongs to the region of Poliessie (q.v.) and is mostly marshy. The southern part is hilly and intersected by deep river valleys. The chief river is the Western Bug. There are numerous lakes. The climate is moderate but unhealthful in the north. Forests cover a considerable part of the area and are exploited on a large scale, timber being extensively exported to Germany and England. In the south, where the soil is fertile, agriculture has attained a considerable degree of development, especially among the German colonists. Rye, wheat, oats, sugar beets, tobacco, and hops are produced. Stock-raising is also important. The chief manufactures are beet sugar, spirits, and leather. Population, in 1897, 2,997,902—Russians, Jews, and Poles. Capital, Zhitomir (q.v.). The region of Volhynia was inhabited by Slavs and belonged to Russia at the very beginning of Russian history. In the fourteenth century it passed to Lithuania and was united with Poland in 1569. It passed to Russia in 1795.

VOLITION. See WILL.

VOLK, DOUGLAS (1856—). An American figure painter, born in Pittsfield, Mass. He studied in Paris under Gérôme, and in Italy. After his return to America he taught at the Cooper Institute, New York City (1879-84), organized the Minneapolis School of Fine Arts (1886), and again taught at the Cooper Union and the Art Students' League. His paintings, which usually combine figure and landscape, exhibit good drawing and fine color. Notable among them is "The Arrow," which won the Carnegie prize at the Society of American Artists in 1903. Other works include "In Brittany" (1876); "Domestic Life in Normandy" (1878); "Puritan Girl" (1881); and "A Girl of the Colonies" (1903). He was elected to the National Academy of Design in 1899.

VOLKELT, fŏl'kĕlt, JOHANNES IMMANUEL (1848—). A German philosopher, born in Lipnik, Galicia, and educated at Vienna, Jena, and Leipzig. He became professor of philosophy at Basel in 1883 and at Würzburg in 1889, and in 1894 was made professor of philosophy and pedagogy in Leipzig. In philosophy his main efforts have been his opposition to positivism and his attempt at a new metaphysical theory. His independent position was arrived at after successive periods in which he followed Hegel, Schopenhauer, and Hartman. Volkelt has written on æsthetics as well as on philosophy proper. His more important works are: *Pantheismus und Individualismus im System Spinozas* (1872); *Die Traumphantasie* (1875); *Kants Erkenntnistheorie*, a searching piece of criticism (1879); *Aesthetische Zeitfragen* (1895); *Arthur Schopenhauer, seine Persönlichkeit, seine Lehre, sein Glaube* (1900); and *Die Kunst des Individualisierens in den Dichtungen Jean Pauls* (1902).

VOLKMANN, fŏlk'män, RICHARD VON (1830-89). A German surgeon, born in Leipzig, son of the physiologist Alfred Wilhelm Volkmann (1801-77). He studied medicine at Halle, Giessen, and Berlin, and in 1867 became professor of surgery and director of the clinic at Halle. He was one of the most prominent surgeons of his day, and a pioneer in the introduction of antiseptic methods in Germany. He edited (1870-89) *Beiträge zur Chirurgie*, and contributed to the Pitha-Billroth *Handbuch der Chirurgie* a section on diseases of the locomotory organs (1865-72). Under the pseudonym Richard Leander, he wrote a juvenile *Träumereien an französischen Kaminen* (1871), which passed through more than a score of editions, *Gedichte* (3d ed. 1885), *Kleine Geschichten* (2d ed. 1888), and *Alte und neue Troubadourlieder* (2d ed. 1890). Consult Krause, *Zur Erinnerung an Richard von Volkmann* (Berlin, 1890).

VOLKMANN, ROBERT (1815-83). A German instrumental composer, born at Lommatzsch. He studied both organ and piano with his father, violin and 'cello with Friebel, and composition with Anacker at Frieberg and K. F. Becker at Leipzig, where he received great encouragement from Schumann. From 1839 to 1842 he taught music at Prague and finally settled at Pesth, where he spent most of his time, with the exception of a four years' stay at Vienna (1854-58). He was professor of harmony and counterpoint at the National Academy of Music for several years. Among his works are: For pianoforte solo, *Phantasiebilder; Dithyrambe und Toccate; Souvenir de Mahrohl; Nocturne; Cavatine und Barcarole.* For pianoforte duets, *Sonatina; Musikalisches Liederbuch; Die Tageszeiten;* three marches; *Rondino* and *Marcia-Capriccio;* transcriptions of his other works and variations for two pianofortes on a Handel theme. Among his vocal works are masses, offertories, sacred songs, and a Christmas carol of the twelfth century. He also wrote symphonies, serenades, and much instrumental music.

VOLKMANN, WILHELM FRIDOLIN, von Volkmar (1821-77). An Austrian psychologist, born in Prague. In 1846 he became a lecturer in æsthetics, afterwards in philosophy, at the University of Prague, and in 1856 was appointed to a professorship in philosophy there. His chief studies were in the exact psychology of the school of Herbart. His most important publication is the *Grundriss*, afterwards the *Lehrbuch der Psychologie vom Standpunkte des philosophischen Realismus* (1856; 4th ed., by Cornelius, 1894-95).

VOLLMAR, fŏl'mär, GEORG HEINRICH VON (1850—). One of the leaders of the Social Democratic Party of Germany, born at Munich. He entered the Bavarian army at an early age and served as lieutenant in the war with Prussia in 1866. He then enlisted in the Papal army, and after a short service entered the Bavarian railway service, which he left to take part in the Franco-German War, in which he served as an officer until badly wounded at Blois. Having become interested in social studies, he was led to embrace Socialism, and between the years 1878 and 1886 was imprisoned several times as a result of his activity in propagating socialistic ideas, organizing secret societies, etc. Vollmar became prominent in the German Reichstag, to which he was repeatedly elected after 1881, except during the period 1887-90; in the Legislature of Saxony (1883-89); and particularly in the Legislature of Bavaria, of which he became a member in 1893. He became one of the leaders of the Conservative wing of the Social Democrats. He showed himself ready to make concessions to the principle of private ownership in the case of the small landowners, or peasants. His publications include: *Der isolierte socialistische Staat* (1880); *Ueber die nächsten Aufgaben der Socialdemokratie* (1891); and *Ueber Staatsocialismus* (1892).

VOLLMÖLLER, fôl′mĕl′ĕr, KARL (1848—). A German philologist, born in Ilsfeld, Württemberg, and educated in Tübingen, Bonn, Munich, Berlin, and Paris. He traveled in Spain in 1874-75 and became a lecturer in Strassburg in 1875. He was professor at Erlangen (1877-81), and then at Göttingen until 1891, when he retired, settled in Dresden, and devoted himself to Romance philology. He was editor of the valuable yearly summary, *Kritischer Jahresbericht über die Fortschritte der romanischen Philologie* (1890 et seq.), and published *Kürenberg und die Nibelungen* (1874), *Poema del Cid* (1879), *Spanische Funde* (1890), *Beiträge zur Litteratur der Cancioneros und Romanceros* (1897), *Rezensionsexemplar und bezahlte Rezension* (1902).

VOLLON, vô′lôɴ′, ANTOINE (1833-1900). A French still-life, landscape and figure painter, born in Lyons. He studied at the Lyons School of Fine Arts, and under Ribot. Vollon is considered one of the greatest of modern still-life painters. In the rendering of metals, the flesh of dead game, the fresh color and bloom of vegetables and flowers, and particularly in the painting of fish, he has few equals. He also painted figures, which he sometimes combined with still life and landscapes. His coloring is rich and harmonious. His works include "Art and Gluttony" (1864), "Sea Fish" (1870, in the Luxembourg), "The Kettle" (1872, Lyons Museum), and "Fishers" (1889).

VOLNEY, vôl′nâ′, CONSTANTIN FRANÇOIS CHASSEBŒUF, Count de (1757-1820). A French philosophic writer and politician. He was born in Craon. He studied medicine and Eastern languages, spent some years in Egypt and Syria, wrote *Voyage en Egypte et en Syrie* (2 vols., 1787; trans. 1787), was elected to the States-General (1789), joined the Republican movement and contributed to its anti-Christian 'philosophy' the famous *Les ruines, ou méditations sur les révolutions des empires* (1791; trans., New York, 1796; London, 1827), and to its pedagogy *La loi naturelle, ou le catéchisme du citoyen français* (1793), in spite of which he fell under suspicion of royalist leanings, and was saved from execution only by the fall of Robespierre. Soon afterward (1794) he was made professor in the Paris Ecole Normale, traveled in the United States (1795-1808), was made Senator (1799), Academician and Commander of the Legion of Honor. He was created Count by Napoleon (1808), and a peer by Louis XVIII. (1814). His later works are: *Tableau du climat et du sol des Etats-Unis* (2 vols., 1803; trans., 1804); *Recherches nouvelles sur l'histoire ancienne* (3 vols., 1814-15; trans., 1819). Consult a study by Berger (Paris, 1832), and Sainte-Beuve, *Causeries du lundi*, vol. vii. (Paris, 1857-62).

VOLO, vô′lô, or **VOLOS**. The capital of the Nomarchy of Magnesia, Greece, 37 miles southeast of Larissa, on the Gulf of Volo (Map: Greece, D 2). It is situated near the sites of the three ancient cities of Demetrias, Pagasæ, and Iolcus, and has interesting remains of the early Greek and Roman periods. The citadel, the Church of Hagios Nikolaos, and the monument modeled after the Parthenos of Phidias are noteworthy. Volo has a good harbor. Population, in 1896, 16,232.

VOLOGDA, vô′lôg-dȧ. A government of Northeastern Russia, extending from latitude 54° 40′ to 64° 50′ N., and from longitude 38° 32′ to 59° 56′ E. Area, 168,900 square miles (Map: Russia, G 2). It is a flat region, marshy and wooded in the north, and with some offshoots of the Ural Mountains in the east, reaching an altitude of nearly 5000 feet. This mountainous region is barren and almost uninhabited. The western part contains the bulk of the population. Vologda is amply watered by the Dvina, with its headstreams and tributaries, the Mezen and the Pechora. The climate is continental and exceedingly severe. The agricultural area is very restricted, and the larger part of the inhabitants find a source of livelihood in fishing, hunting, and lumbering. In the southern part the crops are abundant, and some products, especially flax, are even exported. The forests cover over three-fourths of the entire surface, and belong largely to the Crown. Stock-raising is favored by the abundance of pasture land, and dairying is assuming an industrial character in the southwest. Population, in 1897, 1,365,587, chiefly Russians, but containing also many Zyrians, a people of Finnish stock, who have retained many of their national traits.

VOLOGDA. The capital of the Russian Government of Vologda, at the head of the Sukhona River, 289 miles north-northeast of Moscow (Map: Russia, F 3). It trades extensively with Archangel and Saint Petersburg in agricultural and forest products, spirits, and leather. Population, in 1897, 27,822. The town was founded in the twelfth century, and attained considerable commercial importance in the sixteenth century, when Archangel carried on an extensive trade with England and Holland. The foundation of Saint Petersburg removed the centre of the foreign trade of Russia to the west, and Vologda lost its former importance.

VOLPO′NE. A comedy by Ben Jonson produced in 1605, printed in 1607. Volpone, a rich Venetian, pretends to be dying to gain gifts from expectant heirs, but his repulsive hypocrisy is unmasked and punished.

VOLSCI, vŏl′sī. An ancient Italian people of Umbro-Sabellian stock. (See UMBRIA.) Their territory was bounded on the west by that of the Latini, on the north by the Æqui and Hernici, on the east by the Samnites, and on the south they had the sea. The country is mountainous, rising abruptly out of the Campagna, and bordered, on the side toward Rome, by the Pontine Marshes. The Volsci were a brave and warlike people, who, frequently in alliance with the Æqui, were incessantly at war with the Romans for a long period previous to B.C. 383, about which time they appear to have been finally subdued. Their territory was incorporated into Latium, and they themselves created Roman citizens.

VOLSK, vôl′y'sk. A town in the Government of Saratov, Russia, situated on the right bank of the Volga, 91 miles northeast of Saratov (Map: Russia, G 4). It has extensive iron works, tanneries, etc. Population, in 1897, 27,039.

VOLSUNGASAGA, vŏl′zụng-ȧ-zä′gȧ. A thirteenth century mythical history of the renowned old Germanic family of the Volsungs, descendants of Odin. Sigurd or Siegfried, son of Sigmund, is the most noted hero of the race.

VOLT (from It. *Volta*, name of the discoverer of the voltaic cell). A unit of electric motive force, being 10^8 C. G. S. electromagnetic units. (See ELECTRICAL UNITS.) The electromotive force of two cells, the Clark and the Cadmium (or Weston), are known fairly accurately; and so for practical purposes the electromotive force of a Clark or a Cadmium cell is used as the standard, and its value substituted in the result. Consult the paper by Gouy in the *Reports* of the International Congress of Physics (Paris, 1901). See VOLTAIC CELL OR BATTERY.

VOL′TA. A river of Western Africa. It is formed in the northern part of the British Gold Coast Colony by the confluence of the Black and the White Volta, flows southeastward, partly on the boundary of German Togoland, and empties into the Gulf of Guinea, 300 miles west of the mouths of the Niger. Its total length, including the Black Volta, is about 900 miles. The headstreams rise in the savanna regions of French Sudan, but the main river flows within the forest belt. It is broken in several places by rapids, which, together with the bar at the mouth, are impassable at low water; but during the floods large vessels can ascend it about fifty miles, and smaller vessels 250 miles.

VOLTA, vôl′tȧ, ALESSANDRO, Count (1745-1827). A celebrated Italian physicist, born at Como. While a youth he exhibited a considerable taste for letters, but as he grew older he devoted himself exclusively to science, especially to the study of electricity. In 1774 he was appointed professor of natural philosophy at the gymnasium of Como and in 1779 he became professor in the University of Pavia. At intervals between 1777 and 1782 he visited Switzerland, Tuscany, Germany, Holland, France, and England, and is said to have introduced the culture of the potato into Lombardy. Napoleon, when First Consul, invited him to Paris to exhibit to the members of the Institute the 'pile' which he had invented, and later created him Count and Senator of the Kingdom of Italy.

Volta proposed the theory, which was at variance with the 'animal electricity' doctrine of Galvani, that the electric power resides in the metals and was due to their contact, although in turn he fell into the error of supposing that the chemical action of the different kinds of metal on each other was only incidental. Volta is most famous as the inventor of the first electric battery. (See VOLTAIC CELL.) He also invented the electrophorus (q.v.), the condensing electroscope, the electrometer, and also the hydrogen-lamp and the electrical pistol. Most of his important discoveries were communicated by him directly to the Royal Society and were published in the *Philosophical Transactions*. A collection of Volta's works, in five volumes, was published in 1816 at Florence.

VOLTAIC CELL or **BATTERY.** As early as 1760 Johann Sulzer announced to the Berlin Academy of Science the discovery that a peculiar bitter taste is perceived when two metals are placed on the tongue and touched at their edges. The significance of this observation was not appreciated till Volta had described his 'crown of cups' in 1800. The two metals, copper and zinc, for example, and the saline saliva compose, as is now known, a voltaic couple or cell.

While pursuing his experiments to explain Galvani's discovery (see GALVANIC BATTERY), Volta, of the University of Pavia, was led to the invention of the voltaic pile, where two dissimilar plates, as zinc and copper, were placed the one on the other. Then followed a piece of cloth moistened with a weak solution of common salt. The cloth was surmounted by another pair of metal plates in the same order as the first, and so on, each pair being separated from adjacent ones by moist cloth.

Volta's 'couronne de tasses,' or 'crown of cups,' was in principle essentially the same as a single couple of the pile. A series of cups contained brine or dilute acid; into the liquid dipped metallic strips, half zinc and half copper. The zinc end of a strip dipped into one cup, and the copper end into the next one. An electric current was taken from the terminal wires of the series. Such was the first voltaic cell on record. In the words of Sir Humphry Davy, "the voltaic battery was an alarm bell to experimenters in every part of Europe." On April 30, 1800, Nicholson and Carlisle discovered that water could be decomposed by the electric current, and this important discovery was followed by Davy's production of the electric arc light between two pencils of carbon, the source of the current being a large voltaic battery; and in 1807 he accomplished the electrolysis of the fixed alkalis, potash and soda, and discovered the corresponding metallic elements, potassium and sodium.

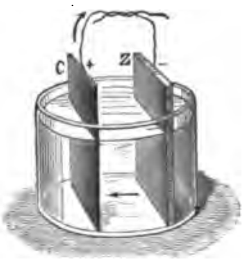


FIG. 1. SIMPLE VOLTAIC CELL.

Volta's battery will be best understood by considering a single simple cell. If a plate of zinc be placed in sulphuric acid, diluted with about twenty times its volume of water, bubbles of hydrogen will at first collect on the zinc, but visible chemical action will soon cease. If now a plate of copper be placed in the same solution no change will be observed so long as the two metals are kept out of contact; but as soon as they are made to touch or are joined by wires (Fig. 1), vigorous chemical action sets in, the zinc wastes away, and hydrogen gas is freely liberated from the surface of the copper plate instead of the zinc. This chemical action goes on only so long as the two plates are electrically connected. Such a combination of two conductors, immersed in a compound liquid, called an electrolyte, which is capable of reacting chemically with one of them, is a voltaic cell or element. Several such cells joined together compose a battery. If the zinc and copper plates are connected with a wire an electric current flows around in a circuit, from the copper to the zinc through the wire, and from the zinc to the copper through the liquid. The copper plate, or its equivalent, is accordingly now called the positive electrode, or cathode, and the zinc plate the negative electrode, or anode.

The modern theory of dissociation furnishes an explanation of the manner in which an electric current is conducted through a liquid. It is briefly as follows: When an alkali, a salt, or an acid, such as hydrochloric acid (HCl), is dissolved in water, some of the molecules, at least of a binary compound, split into two parts ($\overset{+}{H}$ and $\overline{Cl}$, for example), one part having a positive electric charge and the other a negative one. The two parts of the dissociated substance with their electric charges are called *ions*. An electrolyte is a compound capable of such dissociation into two or more ions. It conducts electricity only by means of the migration of the ions resulting from the splitting in two of the molecules. The separated ions convey their charges with a slow and measurable velocity through the liquid. Electro-positive ions, such as zinc and hydrogen, carry positive charges in one direction; electro-negative ions, such as chlorine and sulphion ($\overline{SO_4}$), carry negative charges in the opposite direction; and the sum of the two kinds of charges carried through the liquid in a second is the measure of the current. The appearance of the hydrogen at the cathode only is thus explained. See ELECTRO-CHEMISTRY.

LOCAL ACTION. When acid is used in a cell as the electrolyte, with commercial zinc, there is always evidence of chemical action which contributes nothing to the current, for it goes on when the circuit is open. This is known as *local action*. It is probably due to particles of carbon, iron, etc., in the zinc; these form with the zinc itself miniature voltaic cells, the currents flowing in short local circuits between the foreign particles and the zinc. For this reason the zinc is eaten away locally with the formation of pits in its surface. The remedy for this local action was found in 1830 to be amalgamation of the zinc, that is, the formation on its surface of a mercury-zinc amalgam. The amalgam brings pure zinc to the surface, covers the foreign particles, and, above all, forms a smooth surface to which a film of hydrogen adheres and protects it from chemical action, save when the circuit is closed. If this protecting film of hydrogen be removed by exhausting the air above the liquid, the acid will attack the amalgamated plate as if it were impure zinc. Hydrogen is found to afford a similar protection from chemical action in other cases.

POLARIZATION. If a simple voltaic cell is put in circuit with a galvanometer it may be observed that the current gradually diminishes. If now the adhering film of hydrogen be brushed off the copper plate with a glass rod, the current will increase to nearly its original value. This decrease of the current is due to several causes which are included under the term *polarization*. The hydrogen at the positive electrode is the chief agent in decreasing the electromotive force of the cell, by means of the negative or counter-electromotive force which it produces.

To prevent polarization means are adopted to replace the hydrogen ions with others, such as copper or mercury, which do not produce polarization; or else the positive electrode is surrounded with a chemical which furnishes oxygen or chlorine to unite with the hydrogen before it reaches the electrode.

THE DANIELL CELL, invented by Professor Daniell, of London, in 1836, was the first successful attempt to prevent polarization by chemical methods. It consists of a glass jar containing a saturated solution of copper sulphate ($GuSO_4$), and in it a cylinder of sheet copper (C, Fig. 2), which is usually cleft down one side. Within the copper cylinder is a porous pot of unglazed earthenware containing dilute sulphuric acid, or preferably a dilute solution of zinc sulphate ($ZnSO_4$). The porous pot contains also the zinc prism, Z. The object in using the unglazed pottery to separate the two solutions is to prevent their rapid admixture, while the ions readily pass through.

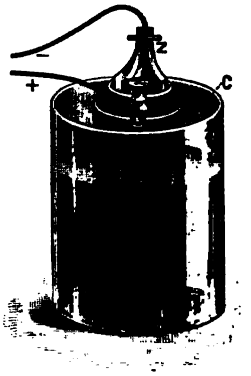


FIG. 2. DANIELL CELL.

With sulphuric acid in the porous pot, the hydrogen ions are intercepted at the porous partition by the copper sulphate. The positive copper ions then migrate toward the copper electrode, and are there deposited as metallic copper. The SO_4 ions go to the zinc electrode with their negative charges, as in the case of the simple voltaic cell.

When the zinc is immersed in dilute zinc sulphate, both sulphates undergo partial dissociation, and no hydrogen ions are then present. Only zinc and copper ions travel toward the copper electrode. The zinc ions are not deposited on the copper plate, because zinc in copper sulphate invariably replaces the copper, forming $ZnSO_4$ in place of the $CuSO_4$. Zinc sulphate is formed at the negative, and metallic copper is deposited on the copper electrode. At the same time there is a loss of copper sulphate corresponding exactly to the increase of zinc sulphate. The Daniell cell is one of the most constant elements yet devised, for in it polarization by hydrogen is entirely avoided.

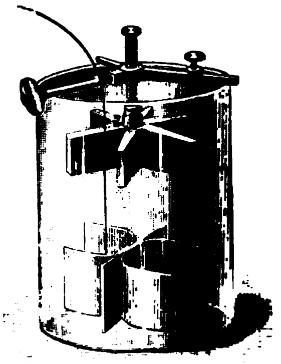


FIG. 3. GRAVITY CELL.

THE GRAVITY CELL is a modified Daniell (Fig. 3). The porous pot is omitted, the partial separation of the liquids being secured by difference in density. The copper electrode is placed at the bottom in saturated copper sulphate, while the zinc is suspended near the top in a weak solution of zinc sulphate. The zinc should never be placed in the copper sulphate solution. The saturated copper sulphate is more dense than the dilute zinc salt; it therefore remains at the bottom, except as it slowly diffuses upward.

The Bunsen Cell, devised by Bunsen in 1841, consists of a glass jar containing dilute sulphuric acid, and a hollow cylinder of amalgamated zinc immersed in it (Fig. 4). Within the zinc cylinder is a porous pot containing strong nitric acid (HNO_3) and a prism of dense carbon. The hydrogen ions from the sulphuric acid are intercepted on their way to the positive electrode by oxygen from the nitric acid, and are oxidized with the production of water. The nitric acid molecule is broken up and yields a brownish-red gas which is very corrosive and irritating.

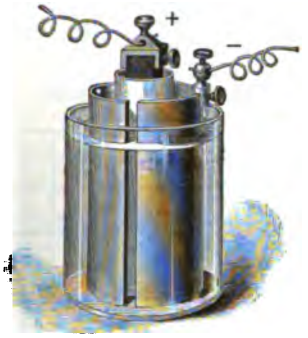


FIG. 4. BUNSEN CELL.

The Chromic Acid Cell usually consists of a plate of zinc between two of carbon dipping into a vessel containing dilute sulphuric acid, to which is added either chromic acid, or the bichromate of potassium or sodium. The sodium salt is much to be preferred to the potassium salt. When the bichromates are used an additional quantity of sulphuric acid is needed to liberate chromic acid, which is the real depolarizer. Fig. 5 illustrates one form of this cell, which is very convenient, but is open to the objection that since the carbon plates are usually left standing in the solution, the liquid soon works upward and attacks the connections at the top. The zinc is attached to a sliding brass rod, A, so that it may be lifted out of the liquid when the cell is not in use. The hydrogen coming from the ionized acid is oxidized to water by the chromic acid, and polarization is prevented.

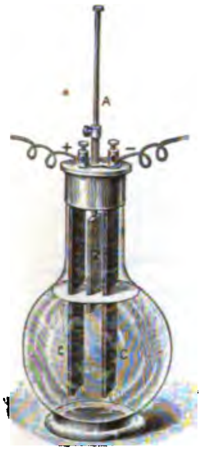


FIG. 5. GRENET CELL.

Fig. 6 illustrates a form of chromic acid battery, where the several cells composing it have their carbons and zincs suspended from a frame. It is known as a plunge battery, and is convenient for experimental work.

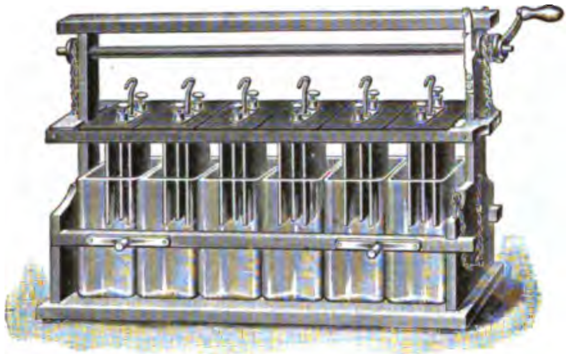


FIG. 6. PLUNGE BATTERY.

The Edison-Lalande Cell is an example of the use of a solid depolarizer, namely, black oxide of copper. It was originally due to Lalande. The electrolyte is a solution of caustic soda, one part of the alkali to three of water by weight. When the cell is working, the zinc forms with the alkali sodium zincate, which is soluble, while hydrogen is released at the cathode. Copper oxide readily gives up its oxygen to a reducing agent like hydrogen. In this cell the copper oxide is employed as a compressed plate, supported in a light copper framework, which is attached to the cover of the jar and forms the positive electrode. In the larger sizes two zinc plates are used, one on each side of the copper oxide slab. The solution is covered with a layer of heavy paraffin oil to prevent access of the carbon dioxide of the air, which would convert some of the caustic soda into a carbonate and shorten the useful life of the cell. The serious disadvantages of this cell are high first cost and low electromotive force. When freshly set up the cell may have as high an electromotive force as one volt, but the working value is only about three-quarters of a volt.

All of the preceding cells, except the simple one of Volta, are adapted to work on a closed circuit. They do not polarize very seriously and are able to furnish a fairly constant current for a long period.

The Leclanché Cell stands in quite a different class. It is unusually free from local action, but it polarizes easily and is therefore employed for domestic purposes requiring intermittent currents for short periods only. For such service it is good for months and even years, without replenishment of anything except water. The Leclanché cell consists of a glass jar containing a saturated solution of ammonic chloride (sal ammoniac) in which is immersed a rolled zinc rod (Fig. 7). The porous pot contains a bar of carbon tightly packed in a mixture of manganese

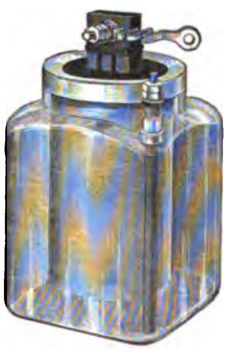


FIG. 7. LECLANCHÉ CELL.

dioxide and granulated carbon. When the circuit is closed, the sal ammoniac acts on the zinc, forming zinc chloride and liberating ammonia and hydrogen. The hydrogen is slowly oxidized by the manganese dioxide. On a closed circuit the hydrogen is liberated faster than it is oxidized, and the cell polarizes. If it is allowed to rest it recovers from polarization. The form shown in the illustration has a porous pot provided with a flange which fits the top of the glass jar. The zinc rod enters the jar through a small hole, which is closed by a piece of rubber tubing surrounding the rod at this point. The jar is thus practically closed for the purpose of preventing evaporation.

Investigation has shown that the manganese dioxide furnishes only about half the oxygen to effect complete depolarization in a cell worked intermittently. It can hardly be doubted that an additional source of oxygen is the gas absorbed by the carbon and dissolved in the electrolyte. With ready access of air and frequent intervals of rest, it is quite possible that nearly enough oxygen may be supplied from the air without any other depolarizer. It is for this reason that the carbon cell, which is the Leclanché with the porous pot and the manganese dioxide omitted, is quite effective for easy and intermittent service.

Dry Cells have come into extensive use in recent years for the purpose of securing portability, which is obviously lacking in a cell with a liquid electrolyte. The name is a misnomer, since a so-called dry cell is practically a Leclanché cell in which the electrolyte is in the form of a soft paste. The chief difficulty in devising a dry cell is to find an absorbing medium for the paste sufficiently hygroscopic to keep it wet. Dry cells deteriorate by local action and by loss of water. If worked hard they are liable to burst by gas pressure.

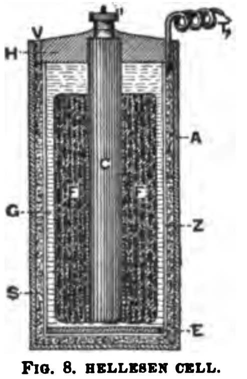


FIG. 8. HELLESEN CELL.

The Hellesen Cell is shown in section in Fig. 8. The Cylindrical containing vessel, Z, is the zinc electrode. It is covered with a cardboard case, A, and the space between the two is filled with sawdust, S. A thin layer of bituminous compound, E, in the bottom of Z insulates the carbon rod C from the zinc. Around the carbon is placed a depolarizing paste, F. It is held in position by a canvas bag. Outside this is the white paste G, containing the electrolyte. The cell is finished off with a bituminous seal, H, through which passes a small vent tube, V. The black paste contains manganese dioxide, and the white paste ammonic chloride. Both are reduced to a pasty condition by the addition of lime and ferric oxide or zinc oxide.

The Obach Cell is substantially the same as the Hellesen except that the electrolytic paste consists of about 85 per cent. plaster of Paris and 15 per cent. flour, moistened with a solution of sal ammoniac. These are good types of dry cells and they illustrate a whole class.

Figures 9 and 10 exhibit graphically tests of a Leclanché and an Obach dry cell respectively. Each cell was on a closed circuit through an external resistance of five ohms for one hour; the recovery from polarization was traced for the following hour, the data for the latter being plotted backward toward the starting point. The polarization of the dry cell was somewhat less than that of the Leclanché; but after the first five minutes the current through the Leclanché was more constant in value than that through the dry cell.

Standard Cells. A standard cell is employed as a standard of electromotive force. It is not intended to furnish any current, but only electric pressure. The first standard cell was invented by the late Latimer Clark in 1873. In 1894 it was made a legal standard in Great Britain and the United States; and, in accordance with the best determinations up to that time, its electro-

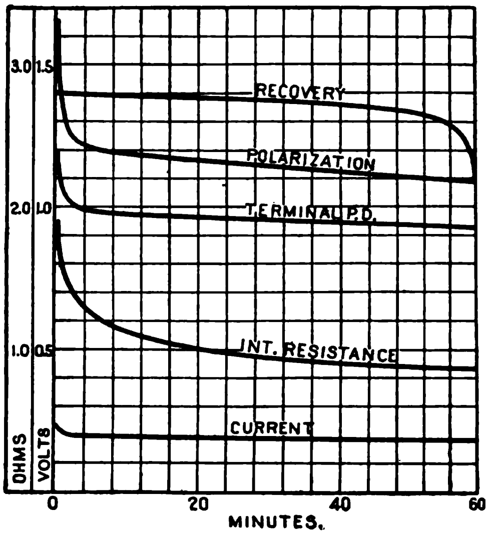


FIG. 9. DIAGRAM SHOWING TEST OF A LECLANCHÉ CELL.

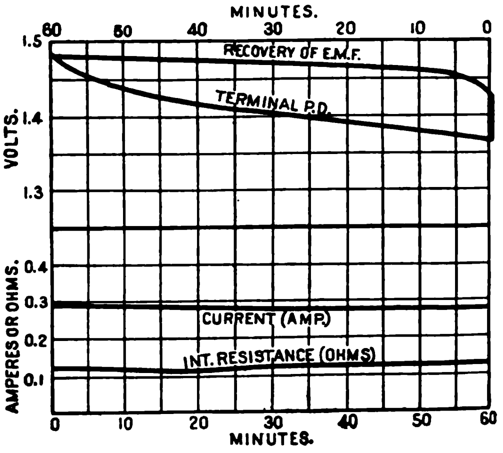


FIG. 10. DIAGRAM SHOWING TEST OF AN OBACH CELL.

motive force was assumed to be 1.434 volts at 15° C.

It consists of zinc in a saturated solution of zinc sulphate, and mercury in contact with a paste of mercurous sulphate mixed with zinc sulphate. All the materials must be neutral and specially prepared in accordance with standard specifications. The form specified in the legal adoption in the United States is the modified H-form (Fig. 11). Instead of metallic zinc, the negative electrode consists of a mercury-zinc amalgam containing 10 per cent. of zinc. This is covered to the depth of one centimeter with zinc sulphate crystals. The positive electrode is pure mercury, and on this is placed the mercurous sulphate paste; the paste in turn is covered with crystals of the zinc salt. The cell is finally filled with a saturated solution of zinc sulphate, and the vessel is closed by brushing over the upper edge of the ground glass stopper with shellac just before the stopper is inserted in the tube. The platinum wires sealed into the two limbs of the cell make connection with the zinc amalgam and the mercury respectively.

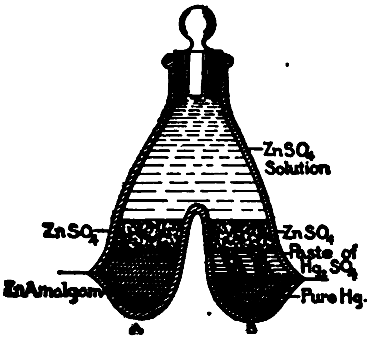


FIG. 11. UNITED STATES FORM OF STANDARD CELL.

The change of electromotive force with temperature is large in the Clark cell. The following is the formula of the Reichsanstalt in Charlottenburg to express the electromotive force of the cell at any temperature:

$$E_t = E_{15} - 0.00119\,(t-15) - 0.000007\,(t-15)^2.$$

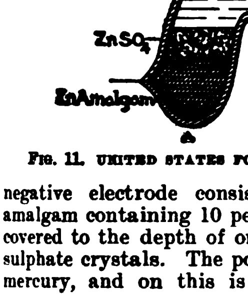


FIG. 12. CARHART-CLARK STANDARD CELL.

Thus near 15° C. a change of temperature of one degree C. changes the electromotive force about 0.0012 volt. This formula is good between 10° and 25° or 30° C.

To secure portability and a smaller temperature coefficient, Carhart has modified the Clark cell by adopting the form shown in Fig. 12, and by employing a solution of zinc sulphate of density 1.39, which corresponds to saturation at 0° C. An increase in the density of the zinc sulphate solution lowers the electromotive force of the cell. Hence when the temperature of a normal Clark cell rises, more of the zinc sulphate crystals dissolve, and the increase of density diminishes the electromotive force. This source of variation is removed by having no crystals in the cell. In the Carhart form the zinc is cast with a perforated foot and is separated from the paste by a diaphragm of good filter paper. The contents of the cell are in this way kept from mixing during transportation.

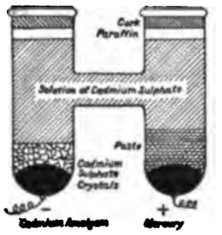


FIG. 13. WESTON STANDARD CELL.

The same form may be used for a normal Clark, but crystals of the zinc sulphate must then be added to the paste and must cover the exposed zinc. If the stem of the zinc electrode is covered with some appropriate insulating medium, the exposed part of the zinc will necessarily be in contact with the saturated solution of the zinc salt. The electromotive force of the Carhart-Clark cell is 1.440 at 15° C., and the fall of electromotive force per degree C. rise of temperature is 0.00056 volt.

The only other standard cell now employed to any extent is the cadmium cell invented by Weston. In it cadmium and cadmium sulphate take the place of the zinc and zinc sulphate of the Clark cell. The negative electrode of the Reichsanstalt form (Fig. 13) is cadmium amalgam, containing about 12.5 per cent. of metallic cadmium. The crystals of cadmium sulphate should cover the mercurous sulphate paste as well as the cadmium amalgam. This cell, as made by Weston, contains a solution of cadmium sulphate saturated at 4° C., but no crystals of the salt.

The electromotive force of the cell with crystals at any temperature is expressed by the following formula:

$$E_t = E_{20} - 0.000038\,(t-20) - 0.00000065\,(t-20)^2.$$

The cadmium cell has several advantages over the Clark, the chief one being its very low temperature coefficient. For many purposes the change of electromotive force with temperature may be neglected.

The legal value of the electromotive force of the Clark cell is 1.434 volts at 15° C. Recent determinations have shown that the probable value is nearer 1.433 volts. The older determinations were made by means of the silver voltameter, but the electrochemical equivalent of silver is not known with any greater degree of accuracy than the electromotive force of the Clark cell. A number of very careful determinations have been made of the ratio between the electromotive forces of the Clark cell at 15° C. and the cadmium cell at 20° C. The mean of these determinations, made at the German Reichsanstalt, due weight being given to each determination, is as follows:

Clark at 15° : cadmium at 20° = 1.40670.
Also Clark at 0° : cadmium at 20° = 1.42280.

These two relations give Clark 0° — Clark 15° = 0.01641 volt. Hence, if the electromotive force of the Clark cell at 15° is 1.4333, that of the cadmium cell at 20° is 1.0189 volts. If the Clark be put at 1.433, the cadmium will be 1.0187. The electromotive force of the cadmium cell as made by Weston is 1.0192, at 20° C.

From the point of view of energy a voltaic cell is a device for the direct conversion of potential chemical energy into the energy of an electric current. Long ago the question arose whether all the chemical energy transformed in a voltaic cell is thus converted in its entirety into electrical energy. The chemical processes going on in the cell involve a loss in the intrinsic energy of the materials. Does this loss equal the energy which takes the form represented by the electric current? Lord Kelvin and Helmholtz at first answered the question in the affirmative. According to this view it is a simple matter to calculate the electromotive force of any given voltaic combination from the heats of formation of the compounds undergoing chemical change. The quantity of electricity transported through a cell, when a gram equivalent of zinc enters into solution, and a gram equivalent of other substances undergoes a concurrent change, may be obtained by dividing the atomic weight of zinc by its electrochemical equivalent. The result is 96,540 coulombs. This quantity multiplied by the electromotive force of the cell must equal the electrical energy given out while one gram equivalent of zinc goes into solution. If this product is placed equal to the algebraic sum of the heats of formation of all the chemical changes involved in the cell, the value of the electromotive force is readily obtained from the equation. Thus the heat of formation of a gram equivalent (32.5 grams) of zinc as $ZnSO_4$ is 121,000 calories; of copper (31.7 grams), as $CuSO_4$, is 95,700 calories. The difference is 25,300 calories. In other words, the reaction in the Daniell cell may be written

$$CuSO_4 + Zn = ZnSO_4 + Cu + 25{,}300 \text{ calories.}$$

Then $Eq = 25{,}300 \times 4.19$ watts, where q is the quantity of electricity (96,540 coulombs) corresponding to one gram equivalent. From this equation E is 1.098, the electromotive force of the Daniell cell. This value agrees very closely with the observed value. It was soon found, however, that other cells did not show equally good agreement with the theory. In some the electromotive force is smaller than the value calculated from the heats of formation, and in a few it is larger. Finally, Willard Gibbs in America, and Helmholtz in Germany, independently expressed the true relationship between the chemical energy transformed and the electrical energy developed. The Helmholtz equation may be written as follows:

$$E = \frac{H}{q} + T\frac{dE}{dT},$$

in which H is the sum of all the heats of formation expressed in mechanical measure, q is the quantity of electricity transported through the cell by one gram equivalent of any substance, T is the absolute temperature (on a scale whose zero is —273° C.), and dE/dT is the temperature coefficient of the electromotive force of the cell. From this equation it is obvious that the actual electromotive force is smaller than the value calculated from thermal data alone whenever the temperature coefficient of the cell is negative, and it is larger when the temperature coefficient is positive. In the former case, only a portion of the transformed chemical energy appears as the energy of the current; the remainder heats the cell. In the latter case, the electrical energy given out by the cell is in excess of the chemical energy transformed, and the cell converts some of its heat into electrical energy and so cools in action. The Gibbs-Helmholtz equation represents our most assured knowledge of the relations between the chemical, electrical, and thermal quantities involved in a voltaic cell, and it has been fully established by experiment. See Walker, *Introduction to Physical Chemistry* (London, 1891), and Carhart, "Thermodynamics of Voltaic Cell," in *Physical Review* for July, 1900.

It has been demonstrated also by experiment that the change in the electromotive force of a cell per degree of temperature is equal to the sum of all the thermal electromotive forces per degree, taken with their proper sign, at all contacts of dissimilar substances in the cell. The thermo-electromotive force between zinc and a solution of zinc sulphate is directed from the solution to the metal. The same is true of copper and copper sulphate, while the thermo-electromotive force between equidense solutions of the sulphates of zinc and copper is practically zero. If a Daniell cell be so constructed that one side or electrode may be heated independently of the other, it will have a positive coefficient if the positive electrode and the solution about it be heated, and a negative coefficient if the negative side be heated. Since both zinc and copper, each in a solution of its sulphate, tend to become positive when heated, or to play the rôle of copper in a simple voltaic element, it follows that the thermo-electromotive force at the copper electrode of a Daniell cell is in the same direction as that of the cell itself, while that at

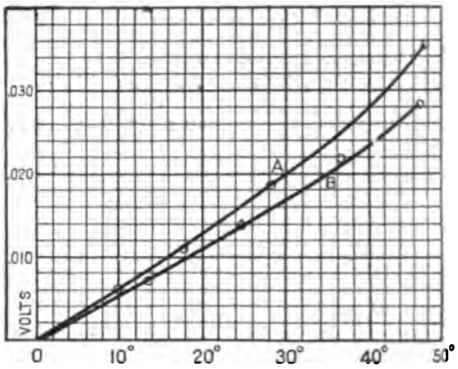


Fig. 14.

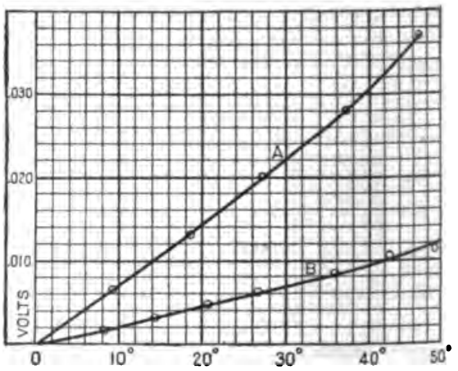


Fig. 15.

the zinc electrode is in the opposite direction. These two thermo-electromotive forces per degree C. are very nearly equal to each other, and the temperature coefficient of the Daniell cell is accordingly very small. The curves of Fig. 14 represent the changes in the electromotive force of a Daniell cell produced by heating the two sides separately. Curve A is for the zinc side, and curve B for the copper side. The two changes have opposite signs, but both are plotted as positive ordinates in the figure, since their *difference* expresses the change of electromotive force when the whole cell is heated.

In Fig. 15 curve A is again the curve for zinc (zinc sulphate), and curve B is the curve for mercury (mercurous sulphate), in the same solution of zinc sulphate. In other words, the cell was set up as a Clark standard cell without any crystals of the zinc salt. The difference in the values of these thermo-electromotive forces for say 10° and 40°, divided by the temperature difference, 30°, gives the change in electromotive force of this type of Clark cell for 1° C. It is 0.00055 volt. The actual change determined by heating the whole cell, as already stated, is 0.00056 volt; and if a much smaller term, depending on the square of the temperature difference, be taken into account, the result will be identical with that obtained from the curves of Fig. 15.

The same method of synthesis applied to a cell composed of zinc in a solution of zinc chloride and mercury in contact with mercurous chloride (calomel), which has a small positive temperature coefficient, again gives a result agreeing perfectly with the coefficient obtained by direct measurement.

It thus appears that the heat generated or absorbed by a voltaic cell, corresponding with the sign of the temperature coefficient, may be localized in the cell. In the Daniell cell, the passage of a current generates heat at the zinc electrode, where the current flows against the thermo-electromotive force at that point; at the same time heat is absorbed at the copper electrode, because the thermo-electromotive force there is in the same direction as the current, and energy is given to the circuit. This energy is supplied by the heat of the cell itself. On account of these two opposite heat effects, a difference of temperature is established between the two sides of the cell proportional to the quantity of electricity that has passed through it. If a current is passed through the cell from some outside source, in the opposite direction, the heat effects at both electrodes will be reversed. These results have been established by experiment. If heat is generated on one side and absorbed at the other in equal quantities, then the temperature of the cell as a whole will remain unchanged, the temperature coefficient is zero, and the chemical energy transformed equals the electrical energy given out.

NERNST'S THEORY. The modern theory of dissociation has given rise to another view of voltaic cells in the hands of Nernst and his school. Van't Hoff accounts for the phenomena of osmotic pressure by the theory that the molecules and ions in a solution exert a pressure which conforms in all respects to the laws of Boyle and Gay-Lussac for gases. According to this view, the ions are forced out of the solution against the electrodes in a voltaic cell and give up their charges to them.

Further, it is assumed that metals exhibit a tendency to go into the ionic state when immersed in an electrolyte. This tendency is known as electrolytic solution pressure. It is analogous to vapor pressure, and measures the tendency of a metal to pass into the state of free ions in an electrolyte. Let P denote the solution pressure, and p the osmotic pressure due to the metallic ions present in the electrolyte. If now P is greater than p, some of the metal will go into the solution as positively charged ions, leaving the metallic mass negatively charged. If P equals p, no more ions are formed and the metal does not become charged. If P is less than p, the osmotic pressure drives the positive ions out against the smaller solution pressure, and the metal to which they give up their charges becomes positively charged. The charging of the metal is equivalent to the production of a difference of potential between the metal and the solution.

Starting from the well-known gas equation, $pv = \mathrm{RT}$, and assuming that when the ions pass from the pressure P to the pressure p, work is done to the same extent as if the ions were in the gaseous state, Nernst found that the electromotive force between a metal and an electrolyte may be expressed by the following formula:

$$\mathrm{E} = 0.0002 \frac{\mathrm{T}}{n} \log \frac{\mathrm{P}}{p}.$$

In this equation n is the valence of the metal. Taking into consideration the potential difference at both electrodes, we have as the equation for the electromotive force of a voltaic cell, neglecting the small potential difference at the contact of the two electrolytes,

$$\mathrm{E} = 0.0002\ \mathrm{T} \left(\frac{1}{n} \log \frac{\mathrm{P}}{p} - \frac{1}{n'} \log \frac{\mathrm{P}'}{p'}\right).$$

The Gibbs-Helmholtz and the Nernst formulas denote two methods of viewing the action taking place in a voltaic cell. They are not antagonistic, but complementary. Nernst's formula gives perhaps a more detailed insight into the mechanism of a cell; Helmholtz's, especially when the heat effects are localized, considers a voltaic cell entirely from the point of view of the chemical and thermal energy involved. The Nernst formula gives no definite account of the temperature coefficient of a cell, nor of the relation of this coefficient to the electrical energy evolved. The thermodynamic method of Gibbs and Helmholtz furnishes the most secure foundation for the investigation of the transformations of energy in a voltaic cell, without exposing to view, however, the exact mechanism beyond the application of thermo-electromotive forces to the problem.

CONCENTRATION CELLS. In the extreme case in which there is no chemical energy to convert into work, the cell becomes a device for the conversion of heat alone into the energy of the current. It is then known as a concentration cell. Thus, when two electrodes of the same metal are immersed in a solution of a salt of this metal, the concentration of the solution at one electrode being greater than at the other, the cell has a small electromotive force which will produce a current. When the solutions are so dilute that there is no further heat of dilution, this electromotive force is the residual obtained from the Gibbs-Helmholtz equation, or T × dE/dT. It is proportional to the absolute temperature of the cell. Fig. 16 represents a Zn-$ZnSO_4$ concentration cell. The direction of the electromotive force within the cell is shown by the long arrow in the solutions. The short arrows show the direction of the thermo-electromotive forces at the two electrodes. This thermo-electromotive force increases in value with an increase in the concentration of the electrolyte, and the relation between the two is a perfectly definite one. Hence the origin of the electromotive force in a concentration cell may be regarded as thermal entirely and equal to the difference of the two thermo-electromotive forces on the two sides of the cell. There is also probably a small electromotive force at the contact of the two solutions. Such a cell converts the heat of its surroundings into the energy of a current, but it does not contradict the second law of thermodynamics, because the process involved does not constitute a cycle of operations. Such a system as this cannot by repeated cooling convert into work the heat of neighboring bodies, because the concentrations are equalized by the flow of current, and then there is no further electromotive force.

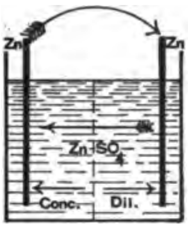


FIG. 16. CONCENTRATION CELL.

On the Nernst theory the formula for the electromotive force of a concentration cell becomes

$$E = 0.0002 \frac{i}{n} \cdot \frac{2v}{u+v} \cdot T \log \frac{c_1}{c_2} .$$

In this formula i expresses the degree of dissociation of the dissolved salt, u and v are the migration velocities of the positive and negative ions respectively, and c_1 and c_2 are the two concentrations.

Nernst has applied his theory to a concentration cell consisting of silver electrodes in solutions of silver nitrate, the concentrations being as 1 to 10. The measured electromotive force was 0.055 volt at 18° C., and the calculated value, 0.0574. The two are in very satisfactory agreement.

Similar concentration cells may be made by employing a single solution and amalgams in contact with it, the two amalgams containing the metal ion in different degrees of concentration. For example, zinc-mercury amalgams in contact with a solution of zinc sulphate give an electromotive force from the concentrated to the dilute amalgam through the cell. When a current flows the zinc goes into solution from the more concentrated amalgam, and zinc ions are set free at the surface of the weaker amalgam. In this case the larger thermo-electromotive force is at the junction of the less concentrated amalgam and the solution; and more heat is absorbed at the cathode than is generated at the anode. As in the other case, therefore, this cell converts heat into electric energy.

BIBLIOGRAPHY. Carhart, *Primary Batteries* (Boston, 1891); Benjamin, *The Voltaic Cell* (New York, 1893); Lehfeldt, *Physical Chemistry* (London, 1899); Walker, *Introduction to Physical Chemistry* (ib., 1899); Cooper, *Primary Batteries* (ib., 1901); Arrhenius, *Electrochemistry* (ib., 1902); Jaeger, *Die Normalelemente* (Halle, 1902); Nernst, *Theoretische Chemie* (Stuttgart, 1900).

VOLTAIRE, vōl'târ'. The assumed name of JEAN FRANÇOIS MARIE AROUET (1694-1778). A French philosopher and a versatile author, born in Paris in February, 1694. He belonged to a good middle-class family, his father being first a notary and afterwards a treasurer attached to one of the high courts of the kingdom. Jean François was educated first at the Collège Louis le Grand, then by the Jesuits, of whom he was soon one of the most brilliant scholars. His education was directed partly by his father, partly by a worldly ecclesiastic, the Abbé de Châteauneuf, who introduced him to the most brilliant society of the last years of Louis XIV. His school days were followed by a few years of rather dissipated life, which ended when he was taken to The Hague as secretary by the French Ambassador to Holland, the Marquis de Châteauneuf, a kinsman of the Abbé. Having fallen into a dangerous love intrigue with a young lady of a refugee Huguenot family, Olympe Dunoyer, he was sent back to Paris, and his father determined to ship him off to the colonies, but relented on the young man's promise to reform and to study procedure in an attorney's office. In the freer life of the Regency, he soon became known as one of the most brilliant and most sarcastic wits of the period. His light and caustic repartees more than once brought him into trouble. He had twice to leave Paris by order of the Regent, and finally, on account of something he had written, and of other things wrongly ascribed to him, he was imprisoned in the Bastille, where he remained eleven months (1717-18). His release was soon followed by the performance at the Théâtre Français of his first tragedy, *Œdipe*, based on the *Œdipus Tyrannus* of Sophocles. The play was received with great applause, and the author was at once hailed as the legitimate heir of the great masters of French tragedy. About this time Arouet assumed the name of Voltaire, the origin of which has never been satisfactorily explained.

The production of *Œdipe* (1718) may be considered the beginning of his extraordinary literary career. For a long time he was considered mainly a dramatic poet; yet even then he had conceived the idea of an epic poem devoted to the glory of Henry IV., and intended as a eulogy of the principle of religious toleration, and he had planned a great historical work relating the events of the reign of Louis XIV. From 1719 to 1726 he was occupied mainly with the production of plays, none of which repeated the success of his *Œdipe*, and with the composition of his epic poem, which, under the strict laws then governing the printing of literary works, he was unable to publish. This poem, known first as the *Poème de la Ligue*, was printed in Geneva (1723) and issued secretly, but met with considerable success. In his first philosophical poem, *Le pour et le contre*, both his anti-Christian views and his deistic philosophy found clear and eloquent expression. This period of Voltaire's life is also marked by the beginning of his enmity toward a man who was then considered the greatest lyric poet of France, Jean Baptiste Rousseau. A quarrel with a member of a very high family, the Chevalier de Rohan, led in 1726 to a second imprisonment in the Bastille, which was ended in a few days by his promise to leave the kingdom forthwith and to move to England. He remained there twenty-six months, during which he acquainted himself with the social and intellectual life of the country. His visit had been preceded by his acquaintance with Bolingbroke, through whom he was introduced to the greatest literary men of the time, Pope, Congreve, Young, and Chesterfield. He soon mastered the language, and, in order to prepare the British public for the appearance of an enlarged edition of his epic poem, wrote in English two remarkable essays, one on epic poetry, the other on the history of civil wars in France. The poem itself, under its permanent title of *La Henriade*, soon followed. Although the French Government took the greatest precautions to prevent the introduction of the book into France, its success all over the Continent of Europe was unprecedented. Voltaire, already considered the most brilliant dramatic poet of the age, was proclaimed a not unworthy rival of Homer and Vergil. This judgment is far from having been indorsed by posterity. The success of *La Henriade* was due to temporary circumstances and conditions, and especially to its eloquent presentation of the idea of religious toleration.

Permission to return to France was granted to Voltaire in 1728. Until 1732 he resided in Paris, and it is not too much to say that all that he did during this period bears witness to the deep influence exerted upon him by his stay in England. His chief works during these active years were dramatic. The tragedies of *Brutus* (1730), Zaïre (1732), and *Sémiramis* (1748) show the influence of Shakespeare, *Zaïre* being, to a certain extent, an adaptation of the theme of *Othello* to the French stage. Voltaire wrote also a series of letters, very likely based upon actual letters sent by him to his friend Tiariot during his stay in England, and tending to make the intellectual life of England known to the French public, and he composed a *Histoire de Charles XII., roi de Suède*, the elements of which were received by Voltaire from the Swedish Ambassador to England. The publication of the letters just mentioned forms one of the most curious incidents in Voltaire's career. After having had them printed, he feared the effect of their publication. He therefore decided to defer the publication of the work, at least in French, and it appeared first in England, in an English translation entitled *Letters Concerning the English Nation* (1734). A spurious edition of the French version, however, due to the purloining of some of the volumes printed by order of Voltaire, soon found its way to the public, and brought about a wrangle between the author and his intended publisher, Jore. There was even some danger of Voltaire's being sent for the third time to the Bastille. This was averted only by his clearly demonstrating that he had had nothing to do with the publication of the work. It is now known as *Lettres philosophiques*, and is considered not far from the first of what may be called Voltaire's revolutionary works. They touch upon various subjects as to which he thought the French sorely needed enlightenment: the system of religious toleration followed in England; the guarantees for individual freedom enjoyed by British subjects; liberty of speech and of the press; the political life manifested in the existence of a free Parliament; the esteem in which literary men were held; a literature unknown to France and one which gloried in the names of Shakespeare and Milton; the scientific and philosophic labors of Newton and Locke, destined soon to supplant in the minds of Frenchmen the theories of the illustrious Descartes; the practice of inoculation against smallpox, etc. Few works ever published contain so much matter as these letters, which led every Frenchman who read them to think about the conditions under which he was compelled to live and to question whether the French political and social system was as perfect as it had been held to be by the men of the preceding century.

A new period now began in Voltaire's life, owing to his peculiar association with a woman of high aristocratic rank, Madame du Châtelet, with whom, by the strange moral code then accepted in high French society, he was permitted to live in the closest intimacy until her death in 1749, without even bringing about a break between her and her husband. These years were spent mostly at Madame du Châtelet's château at Cirey on the boundaries between Champagne and Lorraine. Voltaire was then wealthy, having been enriched by several speculations, some of them of a rather dubious character, during the years just preceding, and this improvement in his fortune was manifested by the style of the life thenceforth led by him. His years in Cirey in companionship with a woman of high intellectual gifts and scientific attainments, to whom the French were indebted for the first translation in their language of Newton's *Principia*, were years of prodigious intellectual activity. Play upon play was sent by him from the Château de Cirey to be performed in Paris. He worked on his history of Louis XIV. and on a still more ambitious historical work, the composition of which was undertaken at Madame du Châtelet's request, a universal history from the death of Charlemagne to the accession of Louis XIV. He published the *Eléments de la philosophie de Newton*, intended to acquaint the French public more thoroughly with the system, only a glimpse of which had been given them in the *Lettres philosophiques*. His lighter productions, tales, novels, satires, light poetry, are almost numberless; one, belonging to the latter class, the poem *Le mondain* (1736), a defense of refined and luxurious life, brought him into serious trouble, as he was accused of having cast ridicule upon religion by the way in which he had spoken of Adam and Eve. To the same period belongs in part the composition of another and longer poem which Voltaire's admirers wish he had never written, the celebrated *La pucelle* (1739; first pub. 1755) the mock heroine of which is no other than the purest incarnation of French patriotism, Joan of Arc. In truth Voltaire never intended in this poem to cast ridicule upon the historical figure of the Maid of Orleans, as is shown by the pages devoted to her in his historical writings. His satire is directed only against the absurdly mystical idea of her career presented in Chapelain's *Pucelle* (1730 or 1731). Voltaire's stay in Cirey was not continuous. He often went from there to Paris, and to Versailles, where through the influence of Louis XV.'s famous mistress, Madame de Pompadour, he even became a Court character. His first step in this direction was his appointment as historiographer of France and then as one of the gentlemen of the King's bedchamber, which were soon followed by his election to the French Academy (1746). His *Poème de Fontenoy* (1745), describing a battle won by the French over the English during the War of the Austrian Succession, and his *Précis du siècle de Louis XV.*, as well as his two dramatic Court entertainments, *La princesse de Navarre* and *Le triomphe de Trajan*, were the outcome of the connection of Voltaire with the Court of Louis XV. The performance of the *Triomphe de Trajan* marked the end of Voltaire's favor at Court. While still holding his Court offices, Voltaire returned to Cirey, meaning to spend there the remainder of his life. There should also be mentioned the comedy *L'enfant prodigue* (1736) and the tragedies *Mahomet* (1742) and *Mérope* (1743). All his plans were upset in 1749 by the death of Madame du Châtelet, who had formed a new and secret connection with the poet Saint-Lambert; and he returned to Paris, where he tried to make himself a home, kept by one of his nieces, a young widow, Madame Denis. He found the French public somewhat estranged; rivals had arisen during his absence from Paris, and he determined to fight them upon their own ground and to put on the stage dramas written on themes already treated by them.

This is one of the most unsatisfactory periods of Voltaire's life. He was dissatisfied with himself as well as with the rest of the world, and therefore determined to accept the offers made to him of a total change of existence by Frederick II., King of Prussia. His intercourse with this great man had begun in 1736, when Frederick had asked him to become one of his regular correspondents. Both as Prince Royal and after 1740 as King of Prussia, Frederick overwhelmed the great writer with all sorts of flatteries. After his accession he used every effort to induce Voltaire to live permanently at the Court of Prussia, but at first all these endeavors failed. There were meetings between the two men, however, visits of Voltaire to Berlin and Potsdam, during one of which he performed an important diplomatic mission in behalf of the French Government. The death of Madame du Châtelet removed the greatest obstacle that kept Voltaire from accepting Frederick's offers. He managed to get the permission of the King of France for this important step, and in 1750 went to Berlin. He was received with demonstrations of the deepest affection; but the opposition of their characters soon manifested itself in quarrels due largely to Frederick's autocratic temper and to the freedom with which Voltaire ridiculed, not without good reasons, the president of the Royal Academy of Berlin, the French scientist Maupertuis. Less than two years after reaching Berlin, Voltaire left it, never to return. His stay in Prussia, however, had not been barren of literary results. While there he completed and had published in Leipzig (1751) his *Siècle de Louis XIV.*, the success of which was greater than that of any other history previously published. An epilogue of Voltaire's stay with Frederick happened in Frankfort, where, by order of Frederick, he was arrested and made to suffer harsh and insulting treatment, under the pretext of his having carried away a volume of Frederick's poems. This only added to his rage, and made Frederick exceedingly unpopular for a time among men of letters.

Voltaire returned to France and for a while he was without abode. Louis XV. had been offended by Voltaire's request to leave France for Berlin while holding the title of Gentleman of the King's Bedchamber, and would not permit him to return to Paris. Seeing him unwelcome at the Court, the men in power in other places also declined to welcome him, and finally he determined again to move out of France, and in 1754 settled in the Republic of Geneva, where he bought a house. He also bought a small estate in the Vaud country, then under the government of the Republic of Bern. But he soon discovered that he was not likely to enjoy much more freedom under republican and Protestant governments than under the King of France, and conceived the idea of being, as it were, his own sovereign. He bought, for his lifetime, two estates in France near the boundaries of the Republic of Geneva, the estates of Tournay and of Ferney. This purchase gave him the possession of feudal rights, transferred to him and secured through the good offices of the Duke of Choiseul, who had recently become the Prime Minister of Louis XV. and by whom he was greatly admired. He settled in Ferney in 1758, there to spend the last twenty years of his eventful life. In the interval between his return from Berlin and his settlement at Ferney, he had published his most ambitious historic work, *Essai sur l'histoire générale et sur les mœurs et l'esprit des nations*, the title given to the universal history already mentioned above.

When Voltaire settled in Ferney, all his extensive works, with the exception of his *Dictionnaire philosophique*, had been published; but his work was not yet half done. In Ferney he felt secure; persecution could hardly reach him. He therefore assumed a much more aggressive attitude toward all the abuses which he desired to destroy. Instead of undertaking large compositions, which he considered unwise for a man then over sixty years of age, who had always been of a sickly disposition, he sent forth hundreds of short writings issued under all sorts of names, seldom under his own, printed in many different places and finding their way to the public in spite of the severe restrictions placed upon the production of literary works. His main theme was the fight against religious intolerance and religious fanaticism, against belief in miracles, and in favor of the sovereignty of reason. Every man who suffered on account of his belief found in him an eloquent and, as the event demonstrated, a powerful defender. The clearest demonstration of this fact was given by him in his labors in favor of the Calas family. (See CALAS, JEAN.) A touching episode of this period of Voltaire's life is his conduct toward a grand-niece of the great tragic poet, Pierre Corneille, of whose poverty he had heard and whom he invited to Ferney, acting to her as a father and educator, and preparing, in order to secure a dowry for her, a complete edition of Pierre Corneille's works. Every person of note in Europe, from the King of France down, showed the greatest eagerness to subscribe. The romance *Candide* appeared in 1759 and the tragedy *Tancrède* in 1760.

In the year 1778 his friends besought him to pay a visit to Paris. Louis XV. was dead and Louis XVI. had not energy enough to forbid what he disliked. In spite of the opinion of his physician, the celebrated Tronchin, who told him that an oak cannot be transplanted when more than eighty years old, Voltaire yielded to the temptation. The Parisians received him with every demonstration of the greatest enthusiasm. His bust was crowned in his own presence at the Théâtre Français on the occasion of the first performance of his tragedy of *Irène;* the French Academy held a special meeting in which he heard nothing but eulogies of his own deeds and writings. He was visited by every person of note. Benjamin Franklin, then residing in Paris as the agent of the newly founded Republic of the United States, took to him his own grandson, on whom he asked Voltaire to pronounce a blessing. Voltaire placed his hand upon the young man's head, uttering at the same time in English, "God and Liberty." Voltaire has been represented as an atheist, but without warrant as far as his written or spoken utterances are concerned.

To the success of his fight for liberty a comparison between the condition of things at the time of his death and at the time when he began to write bears sufficient witness. His exertions while in Paris had the effect which Tronchin had foreseen, and he died there on May 30, 1778. His body, which was first carried away from Paris by his nephew, Abbé Mignot, was afterwards taken to the Panthéon, where, in spite of various statements that it had been disinterred, it is believed still to be resting.

As a writer, Voltaire is not, perhaps, the author of a single great masterpiece; but every one of his productions, at least in prose, presents to us an unsurpassed example of clearness, perspicuity, and wit. He wrote in order to convince, and so far succeeded that many of his writings have to a certain extent lost their interest because of the very destruction of the abuses against which they were directed. One who wishes to appreciate his greatness must look upon him more as a man of action who used literature as a weapon than as a mere literary man.

The best editions of his works are those published at Kehl (70 or 80 vols., 1784-89); the Beuckot edition (70 vols., Paris, 1839 et seq.); the Moland edition (50 vols., ib., 1875 et seq.). The best collection of selected works is the one edited by Georges Bengesco and published in Paris by the Librairie des Bibliophiles (13 vols.). Consult, especially: Desnoiresterres, *Voltaire et la société française au XVIIIème siècle* (Paris, 1867-76); Bengesco, *Voltaire; Bibliographie de ses œuvres* (ib., 1882-90); and the biographies by Strauss (ib., 1876), Morley (London, 1878), Parton (Boston, 1881), Schumacher (1898), Espinasse (London, 1892), and Faguet (Paris, 1897); also Lounsbury, *Shakespeare and Voltaire* (New York, 1902).

VOLTAMETER (from *voltaic*, from It. *Volta*, name of the discover of the voltaic cell + Gk. *μέτρον*, *metron*, measure). An instrument designed to compare the intensities of electric currents by means of their effects when passed through electrolytes. (See ELECTRICITY.) It has been shown by Faraday and others that when an electric current is passed through an electrolyte the quantity of matter liberated at either of the electrodes—anode or cathode—varies directly as the *quantity* of current carried, that is, as the product of the intensity of the current and the time. Therefore, if different currents are passed through any one electrolyte, their intensities may be compared by noting the quantities (number of grams) of matter liberated in given intervals of time. It has been observed, however, that this law of Faraday is true only if the same specifications are followed in the use of the apparatus for containing the electrolyte and obtaining the literature of the matter. Such an apparatus is called a 'voltameter.' There are various forms of voltameters in use; one is so arranged as to collect any gases that may be liberated at the electrodes, which in this case are made of platinum, and the electrolyte is generally dilute sulphuric acid; another consists of a solution of copper sulphate in water, having two copper plates as electrodes; in another the electrolyte is a solution of silver nitrate in water contained in a platinum bowl which serves as the cathode, the anode being a disk of silver. (For the specifications adopted by the National Academy of Sciences for the preparation and use of a silver voltameter, see AMPÈRE.) There is an excellent résumé of our present knowledge of the subject in a paper by Leduc in the *Reports of the International Congress of Physics*, vol. ii., p. 440 (Paris, 1900).

VOLTERRA, vôl-tĕr'rȧ. A town of the Province of Pisa, Italy, on a conspicuous hill, 51 miles by rail southeast of Leghorn (Map: Italy, E 4). The vicinity is of interest to the geologist and chemist. Volterra is very irregular in outline, the main portion being grouped on the southern side of the hill. It is surrounded by a high, massive, and remarkable wall, four and a half miles in circumference. Outside this wall is the ancient necropolis. The notable cathedral, consecrated in 1120, was enlarged and embellished by Niccola Pisano. The superb Palazzo Municipio, dating from 1208, contains a few good pictures. In the Palazzo Tagassi is the fine National Museum, founded in 1731 and including a library of more than 13,000 volumes, and the municipal archives. It contains, in addition, a wonderful collection of Etruscan cinerary urns, also sculptures, bronzes, gold ornaments, coins, etc. The imposing citadel is now used as a prison.

The leading industries are alabaster working—for which the town is famous—and the manufacture of salt from the brine springs at Leopoldo, five miles south of the town. The salt industry supplies all Tuscany. The chemical products are of importance. There are also iron works. Population (commune), in 1901, 14,433.

Volterra, the Etruscan Velathri (Roman Volaterræ), was one of the twelve league cities of Etruria. During this period it was a large and important town. It was destroyed during the tenth century. It was for a time a free town. It came under the rule of Florence in 1361.

VOLTERRA, DANIELE RICCIARELLI DA (1509-66). An Italian painter, born at Volterra, in

Tuscany. He was first a pupil of Sodoma, whom he followed so closely that early works, like his "Justitia," in the Palazzo Pubblico at Volterra, might be taken for the latter's works. After distinguishing himself as sculptor as well as painter, he became a follower of Michelangelo, occupying himself with painting after his designs. A more ungrateful task was the clothing of the nude figures in Michelangelo's "Last Judgment," from which he derived his nickname, *Il Braccatone* (breeches-maker).

His best picture, "Descent from the Cross," after Michelangelo, in Trinità de' Monti, at Rome, is a great composition, full of emotional power; and in the same church are his frescoes of the "Life of the Virgin." Another well-known "Baptism of Christ," in San Pietro in Montorio (Rome), like most of his works, is well composed, but somewhat inexpressive. His double picture on both sides of a slate panel in the Louvre, representing "David Killing Goliath," is a cúrious effort attaining the effects of a statue group. The "Massacre of the Innocents," a celebrated picture in the Uffizi at Florence, containing more than seventy figures, is cold and artificial. Volterra also executed many façade paintings of Roman palaces, now lost; subjects from the history of Judith in the façade of the Massimo Palace are ascribed to him. He belongs to the group of mannerists who adopted the forms of Michelangelo, without being able to rise to his conceptions.

VOLTIGEURS, vôl'tê'zhĕr'. Light infantry forming at one time a part of the French Army. The voltigeurs were picked companies to which small and active men who were good shots were assigned for open-order fighting, being placed on the left wing. The voltigeurs organized by Napoleon I. in 1804 were independent picked companies assigned to the different battalions, one company to each. In 1868 the voltigeurs were formed into four special regiments, which endured until the end of the Empire.

VOLTMETER. An instrument used to measure the difference of potential between two points on an electric circuit. The voltmeter is usually a galvanometer of portable form so arranged with pointer and scale that volts may be read directly. For direct current work the most satisfactory voltmeters are based on the principle of the Darsonval galvanometer (see GALVANOMETER) and have the movable coil mounted on jeweled bearings and kept in position by a fine spiral spring. In experiments with the galvanometer it is readily demonstrated that with a high resistance in the circuit the current will be proportional to the difference of potential. This idea is the basis of the Weston and similar voltmeters and the resistances are so adjusted that the pointer deflects over an evenly divided scale. Any ammeter if given sufficient resistance can be used as a voltmeter. And there are different types of the latter which may depend on the movement of a small piece of soft iron on a coil or of one coil with respect to another. A voltmeter based on still another principle is that devised by Cardew where the difference of potential is indicated by the expansion of a long fine platinum wire which is heated on the passage of a current. Voltmeters for alternating currents are either a form of dynamometer or based on the principle of the quadrant electrometer. (See ELECTROMETER.) Where the dynanometer principle is employed the current passes through two coils connected in series, but one being arranged so that it may rotate within the other. The attraction of one coil for the other produced by the current enables the difference of potential to be measured. See AMMETER; ELECTRICITY.

VOLTRI, vôl'trê. A town in the Province of Genoa, Italy, 9 miles west-southwest of Genoa, on the Gulf of Genoa (Map: Italy, C 3). Confetti, jute, and wool are manufactured. Population (commune), in 1901, 14,719.

VOLTUM'NA. A goddess of the Etruscans The deputies from the twelve divisions of the Etruscans met at her temple in the territory of Volsinii. She can scarcely be separated from the Roman god Vortumnus (or Vertumnus, see POMONA), whose temple on the Aventine seems to have been built in B.C. 264, at the time of a war with Volsinii. The god is expressly called the chief god of that city, and his temple seems to have been vowed to induce him to desert to the Romans.

VOLTURNO, vôl-tụr'nô. A river of Southern Italy, flowing westward past Capua, and emptying, after a course of 115 miles, into the Tyrrhenian Sea (Map: Italy, J 6). On its banks Garibaldi defeated the Neapolitan army in 1860.

VOLUME. See MENSURATION.

VOLUM'NIA. The mother of Coriolanus in Shakespeare's drama of the latter name.

VOLUNTARY ASSOCIATION. An organization of individuals for moral, benevolent social or political purposes, or for any object other than pecuniary profit. Such associations are not legal entities as are corporations, nor have they the legal status and incidents of partnerships. In order to bind any member of a voluntary association for debts and liabilities incurred by another member or by a committee thereof it must be shown that a relation of principal and agent existed between them, and this relation will not be presumed from the mere fact of the association, except where the liability contracted was for something absolutely necessary for the preservation of the association. Therefore, a member of such an association acting without authority becomes personally responsible for debts contracted for its benefit. An association organized to carry on some business scheme for profit is for legal purposes subject to the law governing partnerships and cannot correctly be termed a voluntary association in the above sense. Consult *Lindley on Partnership.* See CORPORATIONS; PARTNERSHIP, and authorities there referred to.

VOLUNTARY CONVEYANCE (Lat. *voluntarius*, willing, from *voluntas*, will, from *velle*, to will, wish). In law, a conveyance made without valuable consideration therefor. No consideration is necessary to make a valid transfer of lands or chattels, and a person may legally make a gratuitous transfer of all his property provided his act does not prejudice his creditors. Fraudulent intent is implied from the fact that the creditors suffer loss as a result of the transfer.

VOLUNTARYISM. The principles or system of polity advocated by those who believe in the complete separation of Church and State, the cessation of State endowments and State grants for religious purposes, and, in general, of all interference, patronage, or exercise of authority on the part of the civil power in the religious and ecclesiastical affairs of the citizen. The term voluntaryism first came into use in the early part of the nineteenth century in connection with discussions between churchmen and dissenters in Scotland, although there had been advocates of the principle long before this, notably the Quakers. (See FRIENDS.) The principle is held to be based on the express law of Christ respecting the Church, as well as on conscience, the nature of civil government, and considerations of general equity and policy. See ESTABLISHMENTS, ECCLESIASTICAL; NONCONFORMISTS.

VOLUNTEER FIRE DEPARTMENTS. See FIRE PROTECTION, MUNICIPAL.

VOLUNTEER, MILITARY. A member of a military organization, serving of his own free will. He may belong to a trained reserve for national defense, as in England or the United States, or to an auxiliary force of the regular or standing army. The modern volunteer movement had its origin in England, the oldest organization of which there is any reliable knowledge being the Honorable Artillery Company of London. The volunteer movement proper may be said to have had its inception in the call for 40,000 Protestants of Ireland to repel the threatened invasion of that country by the French and Spaniards in 1779. The fear of an invasion of England by Napoleon brought about the volunteer legislation of 1805, resulting in the creation of a volunteer establishment closely approaching 450,000, of whom fully one-fifth were Irish. The militia were organized locally and in each county were under the command of a lord lieutenant (q.v.). With the advent of peace began the neglect of the system, an error which was heartily repented of during the periods of the Crimean War, the Indian Mutiny, the French hostility of 1857, and the difficulty with the United States over the San Juan boundary. The comparatively small regular army was used exclusively for the reënforcement of foreign and colonial garrisons, so that a volunteer force was an imperative necessity. The volunteer regiments of this period were made up of tradesmen, clerks, and farmers, officered by locally prominent professional men, or employers of labor, each officer and man paying the entire expense of his service —uniform, equipment, drill-hall, instruction, etc. Wealth was almost a necessity on the part of the officer, owing to the custom of enlisting employees to complete the strength of the command, the employer paying all the expenses. Prohibitive almost as such regulations were, the preference of a free people for a volunteer army rather than a huge regular army led to the assembling under arms of 100,000 men. The moment the war stimulus ceased, however, the organization again showed signs of decay, so much so that the Government, in order to keep alive the system, finally placed it on a firm national basis by establishing it as a recognized form of national defense, defraying its expenses, and bringing it in actively close touch with the regular army. In 1872 was commenced the system of joint manœuvres, volunteer regiments taking an equal share of the work and training with the regulars. English volunteers are enlisted under the Volunteer Act (1863), and the Volunteer (military service) Act of 1896. They are organized for service at home, but may offer themselves either individually or en masse for service in the regular army. Under the Volunteer Act of 1900 new regulations were formulated as follows: (1) A member of a volunteer corps may contract to come out for actual military service at specified places in Great Britain whenever summoned by order of the Secretary of State for War, and to serve for a period not exceeding one month in the absence of a royal proclamation, calling out the volunteers generally. (2) A member of a volunteer corps or regiment may contract to proceed upon active service to any part of the world in a unit or company formed of volunteers, on special conditions as defined by the terms of this contract.

The Boer War of 1899-1902, in which large bodies of volunteers and yeomanry did valuable service, demonstrated the value of volunteers to the British Empire, a fact which has resulted in a similar organization and equipment to the regular and militia battalions of the regimental districts to which they belong.

The volunteer system of the United States was originally formed along the same lines as in England. The Ancient and Honorable Artillery Company of Boston, like its British prototype, enjoys the distinction of seniority as a volunteer organization. In 1792 Congress recognized the existence of volunteer organizations not included in the regular State militia, and has from time to time, as occasion arose, or necessity demanded, raised volunteers for temporary purposes, but in such cases they have invariably been Federal rather than State forces, the commissioned officers being appointed by the President. Volunteer officers while in service rank with regular officers and are entitled to the same honors and privileges as regular officers of the same grade. Their uniform is essentially the same as that of the regular establishment except that the letters U.S.V. are used instead of the U.S. on the collar.

In the War of 1812, besides 458,463 militia, there were 10,110 volunteers, and 3049 mounted rangers (q.v.). About 73,500 volunteers were enlisted for the Mexican War, the State militia not being called upon, owing to doubts as to the legality of their employment in a foreign country. The Civil War was practically fought by volunteers, the regulars engaged numbering only about 67,000. Periods of enlistment were from three months to three years, or for the war. Colonel Dodge, in *A Birdseye View of Our Civil War* (Boston and New York, 1897), gives the actual enlistments at 2,708,000 for the armies and navies; or, reduced to a three years' term, i.e. counting three one-year men as one three-year man, and estimating as a full man only one who enlisted for a term which could have lost him three full years (men who enlisted in January, 1865, for three years, could actually serve only four months, and would count as one-ninth of one man each), there were furnished in the North about 1,700,000 men. In the South, counting in the same manner (a man enlisted for four years was a man and a third), there were furnished about 900,000 men. Over two-thirds of the Northern volunteers were American born, and in the South practically all were such.

The Spanish-American War of 1898 was fought by regulars and volunteers, the President issuing the first call on April 23d of that year for volunteers to the aggregate number of 125,000, apportioned as far as practicable among the States and Territories of the Union. The period of enlistment was for two years, unless sooner discharged; and a marked feature of the call was the individual enlistment of every volunteer, independent of any militia connection. Late in May a second call for 75,000 additional volunteers was made, the men being obtained by open enlistments instead of through the National Guard, as had largely been the case previously.

In Germany young men are allowed to serve as one-year volunteers provided they pass a scientific examination, or produce a certificate of maturity issued by one of the specially authorized educational institutions. Certificates of maturity certify the holder's qualification for one of the upper classes of a high school or college. After enlistment he has the option of serving in any corps open to such volunteers, or, if he so desires, with the pharmacists of the sanitary corps. If the volunteer is a medical student desiring to enter the sanitary corps, he is required to serve six months under arms, and after graduation six additional months as a non-commissioned officer, or under-sergeant. Such volunteers are then elected military surgeons and pass into the reserve. Other volunteers, irrespective of their civil calling or profession, and so far as they are qualified by general education and military efficiency, are trained and destined for commissioned officers of the reserve or Landwehr. At the expiration of their term of service they undergo examinations in subjects both theoretical and practical, and are posted to the reserve, as *reserve officers aspirants*, and render active service in two exercises of eight weeks each. To secure such an appointment *aspirants* must have a civilian occupation or profession, in no way derogatory to the rank of a commissioned officer. They must also be elected by their comrades. Although allowance is made for a few volunteers to be supported at public expense, the great majority serve at their own charge, which is estimated as approximately 1500 marks in the infantry and 2000 in the mounted branches. See MILITIA; ARMIES; section on *United States Army* under UNITED STATES.

VOLUNTEERS OF AMERICA. An organization for religious work in America formed in New York City in 1896. At that time Ballington Booth (q.v.), Commander of the American Province of the Salvation Army, and his wife, not approving certain of the orders of General Booth for conducting operations in America, withdrew from the Army, and, with a few other officers, organized the Volunteers. The general aims and methods are the same as those of the Salvation Army, but certain modifications were introduced supposed to be better adapted to conditions in America. The organization of the United States Army is taken as the model, and the Commander-in-Chief is elected by the soldiers for nine years; he is assisted and advised by a Grand Field Council composed of those commissioned officers of and above the rank of major. The Volunteers observe the sacraments of baptism and communion, and seek affiliation with the churches.

The organization in 1903 included 6 regiments or districts, under the direction of as many sectional officers and their wives, embracing 14 chartered companies, besides nearly 100 self-supporting posts or societies, with outposts. These societies, in 1902, raised $86,819 for their maintenance and work, and attracted 3,920,893 to their indoor and outdoor meetings; while 30,522 families were visited by their officers. Homes for the destitute and for workingmen are maintained in many of the larger cities, where 252,760 people were lodged during 1902, and 344,450 persons were furnished meals at a nominal cost. There are houses of mercy for young women at Newark, N. J., and Boston, Mass., where 2760 beds were furnished. In the homes for unprotected and neglected children, 426 were provided for. In connection with the Volunteers' Prison Work leagues have been formed in 16 State prisons, embracing 14,000 prisoners leading reformed lives, correspondence has been carried on with about 22,000 men, and homes designated as 'Hope Halls' have been established at Chicago and at Flushing, N. Y. *The Volunteers' Gazette* is published weekly in New York.

VOL′VOX. A genus of fresh-water algæ belonging to the group Chlorophyceæ. It forms spherical 'colonies,' which are composed of many thousands of cells, often have a diameter of 0.5 mm. or more, and are visible to the naked eye. They have a rotatory movement, produced by numerous cilia on the periphery. There is a marked protoplasmic continuity between all the cells of the colony. Propagation is both sexual and asexual. See ALGÆ; CHLOROPHYCEÆ; CŒNOBIA.

VOLZ, fôlts, HERMANN (1847—). A German sculptor, born at Karlsruhe. He was first a student of architecture in that city, but afterwards took instruction in sculpture from Steinhäuser and completed his education abroad. His first noteworthy production was a soldiers' monument for Karlsruhe (1874-77), which brought him commissions for similar monuments in Hanover (1884) and Mannheim. In 1880 he was appointed professor in the Karlsruhe Academy. His more important works include a statue of Scheffel (1893), and a figure of Germania at Karlsruhe; an equestrian statue of William I. at Essen; the Geibel monument at Lübeck (1889); and a fine group entitled "Combat Between a Man and a Tiger" (1886).

VOMER (Lat., plowshare). In human anatomy, a bone which forms part of the middle partition of the nose, and the lower edge of which fits into grooves between the apposed surfaces of the palatine processes of the upper jaw and palate-bones. It consists in reality of two fused bones, springing side by side from the roof of the mouth. See SKELETON.

VOMITING (from *vomit*, from Lat. *vomitus*, pp. of *vomere*, to vomit; connected with Gk. *ἐμεῖν*, *emein*, Skt. *vam*, to vomit). The emptying of the stomach by way of the mouth through its own spasmodic contraction. In a conscious person vomiting is preceded by a feeling of nausea, an increased flow of saliva in the mouth, and moistness of the surface due to breaking out of cool perspiration; the face is pale, weakness or absolute prostration follows, the pulse becomes slower and feeble. The individual may faint. At first the stomach contents are vomited, consisting of food, mucus, and thin serous fluid. If persistent and violent, the vomiting causes the ejection of bile which has regurgitated from the duodenum into the stomach under the pressure of the diaphragm, and rarely of fæces from the intestine. In cirrhosis of the liver blood is vomited, as also in phosphorus poisoning. The 'black vomit' in yellow fever owes its color to blood which escapes into the stomach. In mild attacks of vomiting, such as simply empty an overloaded stomach, the normal state returns immediately. In young infants the act may be simply the revolt of an over-full stomach, and resembles an overflow, without systemic disturbance. In severer attacks of vomiting deep inspiratory efforts are made, during which the diaphragm is thrust down very low against the stomach, while the lower ribs are drawn in. A sudden, violent expiration and contraction of the abdominal wall succeed, adding to the pressure upon the stomach. Besides this, the longitudinal fibres of the œsophagus are shortened and the cardiac orifice of the stomach is somewhat dilated, and the contents are ejected. The vomiting centre in the medulla may be excited by reflex irritation due to peripheral causes, such as tickling the throat, or obstruction of the intestine; or to the presence of renal or biliary calculi. It may be excited by poisons, or by impulses from parts of the cerebrum, due to smells, tastes, and emotions, or by cerebral disease. Some emetics act directly on the vomiting centre, for they are efficient if the stomach be cut out and replaced by a bladder filled with water, as in Claude Bernard's celebrated experiment. Others act reflexly by irritating the mucous lining of the stomach. Still others develop a nauseating taste, thus affecting a higher centre in the cerebrum.

The treatment of vomiting must be conditioned upon the cause and the accompanying disease. In different conditions mustard applied to the epigastrium, darkness, and the supine posture, or the administration of hot water, aromatic spirit of ammonia, nux vomica, small doses of ipecacuanha, arsenic, soda, ice, whisky, creosote, chloroform, or coffee will relieve. Calomel frequently is efficacious. Sudden and violent vomiting in a healthy person is cause for suspicion of a poisonous agency at work either fermentation of improper food or a drug.

VONDEL, vôn′del, JOOST VAN DEN (1587-1679). An eminent Dutch dramatist, born in Cologne. His life was mainly spent quietly in Amsterdam. It was devoted to letters, its chief outward events being Vondel's conversion to Catholicism (1640). He was given a place as bookkeeper in the Public Loan Office, a post from which he retired in 1668. His literary work begins with a drama, *The Pasha* (1612), and some lyrics, aided by study of the classical drama and the *Poetics* of Aristotle. Thereafter Vondel's dramas were classic in form; they observed the unities, employed the chorus, and tended generally to lyricism, though often didactic and sometimes controversial. His classical imitations or adaptations (*Hecuba*, 1625; *Hippolytus*, 1628; *Electra*, 1638; *King Œdipus*, 1660; *Hercules in Trachis*, 1663; *Iphigenia in Tauris*, 1666; *The Phœnician Iphigenia*, 1668), and others were accompanied by a parallel series of original tragedies (*Jerusalem Laid Waste*, 1620; *Palamedes*, 1625; *Gijsbrecht van Amstel*, 1637; *Maria Stuart*, 1646; *Lucifer*, 1654; *Jephtha*, 1659; *Adam in Banishment*, 1664; *Zungchin*, 1666; *Noah in the Deluge*, 1667, and others). Of these *Lucifer* is famous as presenting parallels with *Paradise Lost*, supposed by some critics to be the result of imitation, but hardly more striking than the resemblance between Milton's work and the poem attributed to the Anglo-Saxon Cædmon. Vondel wrote also many lyrics, some perfunctory, others very characteristic of Dutch national and political ideals and the joy of life, with a plentiful lack of taste and strange limitations of genius. He also translated the *Metamorphoses* of Ovid. Vondel's *Works* were edited by Lennep (12 vols., Amsterdam, 1850-69; reprinted 1888). There are *Lives* by Baumgartner (Freiburg, 1882) and Hæk (Hamburg, 1890), and studies by Looten, *Etude littéraire sur Vondel* (Brussels, 1889), and Müller, *Ueber Milton's Abhängigkeit von Vondel* (Leipzig, 1891). See also the *Bibliography*, by Unger (Amsterdam, 1888).

VON HOLST, fôn hôlst, HERMANN EDUARD. See HOLST, HERMANN EDUARD VON.

VON′NOH, ROBERT WILLIAM (1858—). An American portrait, figure, and landscape painter, born in Hartford, Conn. He studied at the Massachusetts Normal Art School in Boston, and in Paris under Boulanger and Lefebvre from 1881 to 1883 and again in 1886-91. Between these dates he taught at the Museum of Fine Arts, Boston. While in Paris he was influenced by the prevailing realism, to which in his own figure compositions he added dramatic feeling. Many of his landscapes include figures and are treated impressionistically with daring color and light effects. After his return to America he devoted himself to portraiture, and was very successful. He was principal instructor in portrait and figure painting at the Pennsylvania Academy of the Fine Arts from 1891 until 1896. His works include, "A Poppy Field," "Sad News," "Miss Mildred Blair" (1900), and "Little Louise" (1900).—His wife, BESSIE (POTTER) (1872—), a sculptor, was born in Saint Louis. She studied at the Art Institute of Chicago under Taft, whom she also assisted in his work on the Agricultural Building at the World's Fair of 1893. Afterwards she studied in Paris, where she was influenced by Rodin, and in Italy. Her work began to be known about 1896, and attracted considerable attention because of its unusual form and technique. Her subjects are groups of children, or young women, sometimes in polychrome, and she is said to have chosen this form for her art after seeing the Tanagra figurines. They are portrait statuettes in modern dress, modeled with a sympathetic and sensitive appreciation, in a naturalistic style with very little detail. There are several examples of her work in the Chicago Art Museum.

VOODOO, vo͞o′do͞o, or **VAUDOUX** (perhaps a dialectic form of Fr. *Vaudois*, Waldensian, the

Waldensians, as heretics, being suspected of sorcery). A term referring to certain beliefs and practices currently considered to be prevalent among the negroes of the West Indies and the Southern United States. Careful research has made it certain, however, that there is no recognized set of beliefs and ceremonials which could properly be regarded as constituting a Voodoo religion. According to the view formerly generally accepted, the Voodoo cult was an importation from West Africa, the term itself being the name of an all-powerful being, incarnate in the form of a snake, who communicates with his worshipers only through a priest and priestess, also known as 'king' and 'queen,' or 'papa' and 'mamma,' who are held in the greatest veneration by the devotees. The alleged ceremonies of the worship are always held at night, are secret, and are characterized by prayer to the snake, who is exhibited during the rite, by hysterical manifestations by the priest and priestess, by a dance for the initiation of novices which is said to be marked by the wildest debauchery and indecency, and especially by the sacrifice and eating of a human child. Careful examination of apparently circumstantial accounts of the Voodoo rites and orgies has eliminated the more shocking phases in practically every instance. If cannibalism has occurred, it has probably been merely sporadic. The other reported features are nothing more than those common to shamanistic and magic practices the world over.

VOOR'HEES, Daniel Wolsey (1827-97). An American politician, born in Butler County, Ohio. He graduated at Indiana Asbury (now De Pauw) University in 1849, studied law, and in 1851 began the practice of his profession in Covington, Ind. He became at once interested in politics, and gained a wide reputation as a Democratic campaign speaker. He was United States District Attorney for Indiana from 1858 to 1861, and was a member of Congress from 1861 to 1867 and again from 1869 to 1875. In 1877 he was appointed United States Senator to fill the unexpired term of Oliver P. Morton, and was regularly elected in 1879, 1885, and 1891. In both Houses of Congress he was active in the debates and was for many years one of the acknowledged leaders of the Democratic Party.

VŌPADĒVA, vō'pȧ-dā'vȧ. A noted Sanskrit grammarian of India, who lived between the twelfth and thirteenth centuries A.D. He was the author of a grammar entitled *Mugdhabōdha*, or Enlightenment of the Ignorant, which is especially esteemed among the natives of Bengal and has an independent value. It is drawn up on different lines from the great work of Pānini (q.v.) and departs from it in terminology as well as in arrangement. A special commentary on it was composed by Durgadasa. Besides several Calcutta editions (e.g. 1826, 1861), there is a European edition by Böhtlingk (Saint Petersburg, 1847).

VORA'GINE (or **VARAIGNE**), Jacobus de. See Golden Legend.

VORARLBERG, fōr'ärl-bĕrk. The smallest and most western crownland of Austria-Hungary, bordered on the north by Bavaria, on the east by Tyrol, on the south by Switzerland, on the west by Liechtenstein, Switzerland (the Rhine River forming this boundary), and Lake Constance (Map: Austria, A 3). Area, 1000 square miles. The Arlberg chain lies on the east of this mountainous territory. In the south, on the boundary, tower the Rhætian Alps, crowned by the Silvretta mass, the highest point in the crownland (about 11,300 feet). The Ill valley crosses the southwestern portion. In the north part are the Bregenzerwald and Lechthal Alps, with the Bregenzer Ach Valley in the extreme north. The Rhine Valley from the Ill to Lake Constance is the feature on the west. A small section of Lake Constance belongs to Vorarlberg. About one-third of the area is in Alpine meadow and over one-fourth in productive forests, the tilled land being small. The cattle of Vorarlberg are superior. Some coal is mined and the manufacturing industries are conspicuous. There are shipbuilding plants, paper industries, cotton and weaving mills, and dye works. Embroideries are largely produced as the house industry. Vorarlberg has its own Constitution (since 1861) and Landtag, but is administratively and judicially combined with the Tyrol. The Landtag consists of the General Vicar (Prince Bishop) at Feldkirch and 19 Deputies. The crownland sends three members to the Reichsrat. The capital is Bregenz. The population in 1901 was 129,816, nearly all Germans and Catholics.

VORONEZH, vȧ-rō'nyĕzh. A government in the southern part of Central Russia. Area, 25,450 square miles. Its surface is mostly undulating and hilly in the west and the north (Map: Russia, E 4). It is watered principally by the Don and its tributaries. The climate is continental and comparatively mild, but the rainfall is scanty. Voronezh has a very fertile soil. The ordinary cereals, flax, hemp, and sugar beets, are produced. The cultivation of fruit is widespread. Stock-raising is extensively carried on. Horses of high breed are exported. The manufactures have an annual value of over $10,000,000 and consist principally of sugar, spirits, flour, tobacco, and various animal products. Population, in 1897, 2,546,255.

VORONEZH. The capital of the Government of Voronezh, in Russia, on the river Voronezh, five miles above its confluence with the Don, 332 miles south-southeast of Moscow (Map: Russia, E 4). It is a well-built town. The industrial establishments include flour mills, oil presses, machine works, and railway shops. Population (including suburbs), in 1897, 84,146.

VÖRÖSMARTY, vẽ'rēsh-märt-y', Mihály (1800-55). An Hungarian poet. He was born at Nyék, County of Stuhlweissenburg, and studied law in Pesth, but devoted himself to letters, and became one of the most important of the authors who regenerated Hungarian literature. Of his epic poems, *Zalán Futása* ("The Flight of Zalán," 1825) and *Eger* (1827), and of his dramas, *King Solomon* (1821) and *Kont* (1825) are the best. His national anthem, *Szózat* (1845), was immensely popular in the Revolution of 1848. At the time of his death he was translating Shakespeare into Hungarian. Consult the second edition of his works in 12 volumes (ib., 1884), by Gyulai, who also wrote an excellent account of his life (4th ed., Budapest, 1896).

VORPARLAMENT, fōr′pär′lȧ-mĕnt. A 'preliminary' Parliament which met at Frankfort-on-the-Main from March 31 to April 4, 1848, to devise ways and means for calling a national German Parliament to deal with the widespread demand for reorganization of the Germanic political system on the basis of a closer national unity. The Vorparlament, which consisted of some five hundred Liberal leaders, decided that a national assembly, elected by direct vote of the people without distinction of property, rank, or religious belief, and endowed with sovereign powers, should meet at Frankfort for the purpose of drawing up a constitution for the German nation. Great dissensions prevailed in the Vorparlament between the monarchical and republican factions. The latter, headed by Hecker and Strune (qq.v.), finding themselves outnumbered, seceded from the Parliament, and with the aid of Polish and French radicals stirred up an insurrection in Southern Baden, which was suppressed in a short time. After the dissolution of the Vorparlament its work was continued by a committee of fifty until the assembling of the National Parliament on May 18th. See GERMANY.

VORSPIEL, fōr′shpēl. The German word for introduction or prelude (qq.v.). Beginning with *Lohengrin* Wagner abandoned the word 'overture' for his dramatic works and designated the orchestral introductions, both to the entire drama and the separate acts, as Vorspiel. Several later operatic composers have also adopted this term. Bach wrote a series of preludes for organ which he called *Choral-Vorspiele.* These are intended as introductions to a chorale. Of course the chorale is made the basis of these Vorspiele, which treat certain phrases in canonic or fugal writing.

VORSTERMAN, fōr′ster-mȧn, LUCAS, the Elder (c.1595-c.1675). A Flemish engraver, born in Bommel (Gelderland). He was a pupil of Rubens, who turned him from painting to engraving and for whom he reproduced many pictures. Afterwards he went to England, where he worked for Charles I. and the Earl of Arundel (1624-31). About 225 of his plates remain, among which "The Adoration of the Magi" and "The Descent from the Cross," after Rubens, are the most important. While in England and after his return to Antwerp Vorsterman executed numerous portraits after Van Dyck.—His son, LUCAS (1624-c.67), was admitted to the Guild in 1651. He engraved Newcastle's *Art of Mounting the Horse,* Sanderus's *Chorographia Sacræ Brabantiæ* (1659-60), Teniers's *Teatro de Pinturas* (1660), and single plates after Lowland and Italian masters.

VORTEX, VORTEX RING. A mass of fluid rotating about a closed curve as an axis; a motion similar to that of the particles of a rubber ring (such as a bicycle tire) when it is so turned that the inside of the ring is becoming the outside, and vice versa. The most familiar form of vortex ring is that of a smoke ring produced intentionally by a smoker, or accidentally by the discharge of a gun, or by the exhaust of an engine. Vortices are usually circular, but may be of other and complicated shapes, the essential condition being that the axis around which the whirl takes place must be either a closed curve, or a curve both ends of which rest upon a boundary surface of the fluid. Such rings are very persistent and have many interesting properties. They may be projected to considerable distances and exhibit mutual attraction and repulsion. Such smoke or air rings have been shot into the clouds to disturb the unstable equilibrium of an approaching storm, thus precipitating the rain before hail develops and the crops are injured. See MATTER.

VOR′TICEL′LA (Neo-Lat., diminutive of Lat. *vortex,* whirl, whirlpool). A genus of Infusoria (q.v.), notable for the highly contractile stalk by which they are ordinarily attached. They are inhabitants of both fresh and salt water and often occur in large numbers together, although those which form actual colonies are now separated from the true vorticellas, as other genera. These minute creatures are very graceful in all their movements and under normal conditions are constantly extending and contracting their stalks. Under unfavorable conditions, and occasionally at other times, they detach themselves, draw in the stalk, and swim about freely. When fully expanded the body is somewhat bell-shaped, the flaring end forming the oral disk, which is surrounded with long cilia, and at one side of this is the mouth. The opposite end of the body tapers into the stalk, which may be two or three times the length of the body itself. They are able to contract with great rapidity and force, when irritated, until they become a mere globule. The cilia surrounding the oral disk are in constant motion when the animal is expanded, and by their movement cause a miniature whirlpool the vortex of which is right at the animal's mouth. Consult Calkins, *The Protozoa* (New York, 1901).

VOR′TIGERN AND ROWENA, rō-ē′nȧ. A drama by William Henry Ireland, who pretended that it with other forgeries was the work of Shakespeare. It was produced in 1796 and gave rise to considerable controversy.

VOS, vōs, CORNELIS DE (1585-1651). A Flemish painter, born in Hulst. He was a pupil of David Remeeus, and in 1619 became dean of the Guild at Antwerp. Among his own pupils were Jean Cossiers and Simon de Vos. With the latter he has often been confused. One of the most famous contemporaries of Rubens, he remained untouched by the influence of that master, merely carrying the old school to a further refinement of execution. His portraits are more valued than his religious and mythological paintings. His works include: "The Saint Norbert," and "The Descent from the Cross" (Cathedral at Antwerp); the portrait of the artist with his family, at Brussels; "The Hutten Family" (Munich); and "The Anointing of David" (Vienna).—A second CORNELIS DE VOS is known to have been a member of the Guild in 1633 and to have painted backgrounds in the works of other masters.

VOS, GEERHARDUS (1862—). An American theologian, born in Heerenveen, Holland, and educated in Amsterdam at the Seminary of the Holland Christian Reformed Church, at the Presbyterian Theological Seminary in Princeton, and at Berlin and Strassburg. He taught theology at the Holland Christian Reformed Seminary in Grand Rapids from 1888 to 1894, and then in

Princeton Theological Seminary. His works include: *The Mosaic Origin of the Pentateuchal Codes* (1886); *Die Kämpfe und Streitigkeiten zwischen den Banu Umajja und den Banu Haschim von Takijj addin al-Makrizijj* (1888); *The Doctrines of the Covenant in Reformed Theology* (1891).

VOS, Maerten de, the Elder (1532-1603). A Flemish painter, born in Antwerp. He was the son of Pieter de Vos, under whom and De Vriendt he studied. He was also a pupil of Tintoretto in Venice. In 1558 he opened a school in Antwerp which became highly successful. He was elected Dean of the Guild in 1571. His numerous paintings and drawings were popularized by more than 600 engravings. Mention may be made of "The Temptation of Saint Anthony" (1594; Antwerp Museum), and "The Marriage at Cana" (Cathedral), in Antwerp; and of "Samson and Delilah" (Madrid). His son, Maerten (1576-1613), is known to have become a member of the Guild in 1607.

VOSE, George Leonard (1831—). A civil engineer and author, born in Augusta, Maine, and educated there, at Salem, Mass., and at the Lawrence Scientific School at Harvard. He was professor of civil engineering at Bowdoin College from 1872 to 1881, and at the Massachusetts Institute of Technology from 1881 to 1886. His works include: *Handbook of Railroad Construction* (1857); *Orographic Geology, or the Origin and Structure of Mountains* (1866); and *Bridge Disasters in America; the Cause and the Remedy* (1887).

VOSGES, vōzh. A northeastern department of France, bordering on Alsace, and forming part of the former Province of Lorraine (Map: France, N 3). Area, 2303 square miles. The eastern part belongs to the west slope of the Vosges Mountains, and rises to a height of over 4000 feet. The Moselle rises in this department, and the Meuse crosses its western end. The greater part of the improved land is pasture, and dairying is more important than tillage. The chief crops are oats and potatoes. The most important manufactures are of textiles. Population, in 1896, 421,412; in 1901, 421,104. Capital, Epinal.

VOSGES MOUNTAINS (Ger. *Vogesen,* Fr. *Les Vosges*). A mountain range on the southwestern frontier of Germany. It rises from the Belfort depression (*Trou de Belfort*), which separates it from the Jura Mountains, and extends in a north-northeast direction on the west side of the Rhine Valley, parallel with the Schwarzwald (Map: Germany, B 4). In the southern portion the main ridge forms the boundary between France and Alsace, but the northern portion is wholly within German territory, partly within Alsace, partly on the boundary of Lorraine, while a northern continuation known as the Hardt Mountains extends through the Rhine Palatinate into Hesse. North of the Rhine-Marne Canal the elevations are generally less than 2000 feet, the southern portion being much the higher and the more rugged. The western or French slope falls somewhat gradually toward the plateau of Lorraine, but the eastern slope falls very abruptly into the Rhine Valley, while the sides of the many transverse branch valleys of the latter are especially steep, and the spurs separating them are in some places higher than the main ridge. Indeed, the highest point in the whole range, the Sulzer Belchen, with an altitude of 4668 feet, is in one of these eastern spurs. Other high points are the Honeck, 4472 feet; the Kleinkopf, 4373 feet; and the Rheinkopf, 4327 feet. The range is composed mainly of crystalline schists and Paleozoic sedimentary rocks. chiefly Devonian and Carboniferous; mining has long been abandoned. The climate is rather mild, though snow remains for six months on the highest summits. Large forests in which wolves and wild boars are found still exist on the mountains, but the valleys are very populous and contain many important industrial centres.

VOSS, fôs (Lat. *Vossius*), **Gerhard Johannes** (1577-1649). A Dutch classical scholar and author, born near Heidelberg, and educated at Dordrecht and Leyden. In 1600 he was called to be rector of the school at Dordrecht, and fifteen years later was made director of the theological school at Leyden. In four years, however, the opposition aroused by his work, *Historiæ Pelagianæ Libri IV.* (1618), cost him his place; but in 1622 he was appointed professor of oratory, an office he held for eleven years until he was called from Leyden to be professor of history at the Athenæum in Amsterdam. There he remained until his death. In 1624 he had declined a call to Cambridge, England, but in 1629 he accepted a position from Archbishop Laud as prebendary in Canterbury Cathedral and visited England to be installed. He wrote: *Grammatica Latina* (1607); *Aristarchus, sive de Arte Grammatica* (1635); *De Vitiis Sermonis et Glossematis Latino-Barbaris* (1640). His other writings include his great work, *Commentariorum Rhetoricorum sive Oratoriarum Institutionum Libri VI.* (1606); also his *Ars Rhetorica* (1623); *De Historicis Græcis* (1624); *De Historicis Latinis* (1627). His collected works were published in six volumes (Amsterdam, 1695-1701). The numerous valuable manuscripts which he gathered together are now in the Library at Leyden.

VOSS, Isaac (1618-89). The youngest son of Gerhard Johannes Voss, born at Leyden. In 1648 he accepted the invitation of Queen Christine to Stockholm, but ten years later, owing to differences with Salmasius, he returned to Holland. In 1670 he went to England, and in 1673 was made a canon of Windsor by Charles II. This office he held until his death. He edited the works of the geographers Scylax and Mela; also Justin, Catullus, etc. His other important writings were: *De Septuaginta Interpretibus* (1661); *De Poematum Cantu et Viribus Rhythmi* (1673); *Variæ Observationes* (1685). Consult De Crane, *De Vossiorum Iuniorumque Familia* (Franeker, 1820).

VOSS, Johann Heinrich (1751-1826). A German poet, translator, and classical philologist, born in Sommersdorf, Mecklenburg. He studied at Göttingen, and after editing for a time the *Göttinger Musenalmanach,* was made rector of the Gymnasium at Otterndorf (1778). He translated the *Odyssey,* was promoted in 1782 to the rectorship of the Gymnasium at Eutin, and here in 1789 published a translation of Vergil's *Eclogues* and *Georgics,* his classical version of the Homeric poems (4 vols., 1793), and two volumes of controversial letters addressed to Heyne (*Mythologische Briefe,* 1794). In 1802 he moved to Jena, and in 1805 was made professor of classical literature at Heidelberg. Here he translated Horace, Hesiod, Theocritus, Bion, Moschus, and Tibullus, and attempted Shakespeare, Ovid, and Aristophanes with less success. Of his original poems in four volumes (1825) the idyl *Luise* (1795) is alone noteworthy. His later works, *Wie ward Fritz Stolberg ein Unfreier?* (1819) and *Antisymbolik* (1824-26), are painstaking and dignified, but dreary. Voss's *Letters* are in three volumes (Halberstadt, 1829-33). Consult the *Lives* by Paulus (Heidelberg, 1826) and Herbst (Leipzig, 1872-76); also Prutz, *Der Göttinger Dichterbund* (Leipzig, 1841).

VOSS, RICHARD (1851—). A German author, born at Neugrape, in Pommerania. He studied at Jena and Munich, and in 1884 became librarian of the Wartburg. His best known dramas are: *Pater Modestus*, dealing with the problem of religion (1882); *Alexandra* (1886); *Brigitta* (1887); *Eva*, patterned after Ibsen's *Nora* (1889); *Schuldig* (1890); *Zwischen drei Herzen* (1896); and *Die Patrizierin*, a classical drama, which won the Schiller prize in 1896. His novels include: *Die Sabinerin*, remarkable for its beautiful descriptions of Italian country (1890); *Villa Falconieri*, the story of a successful poet who lost confidence in his powers (1896); *Amœa*, a story of Rome in Nero's time (1901); and *Römisches Fieber* (1902).

VOSTOKOFF, vŏs-tō'kôf, ALEXANDER CHRISTOFOROVITCH (1781-1864). A Russian philologist. He was born in the island of Osel, in the Gulf of Riga, studied architecture in the Saint Petersburg Academy of Arts, and then devoted himself to philology and paleography. In 1808 he published his preliminary study of Slavic linguistics; in 1815 became assistant in the department of manuscripts in the Imperial Library; and in 1820 was chosen member of the Russian Academy of Sciences. Vostokoff published in 1820 *Razsuždeniye o slavyanskom yazyke*, a treatise which outlined the development of language, the nature of the pre-Slavic dialect, and the peculiarities of the Old Church Slavic; a descriptive catalogue of Slavic manuscripts (1842); and a lexicon (1861) and a grammar (1863) of the Old Church Slavic. His *Russian Grammar* appeared first in 1831, reached a twelfth edition in 1874, and is the basis of the modern scientific treatment of the subject. Vostokoff contributed to the great lexicon of the Russian Academy (1847). His minor works were edited by Sresnevsky in 1865.

VOTE (from Lat. *votum*, wish, engagement, vow, from *vovere*, to wish, promise, dedicate, vow). A formal declaration or expression of the will or preference of a person in regard to a question or issue submitted to him together with others for action. The term is perhaps most commonly applied to the means whereby an elector or citizen expresses his choice of candidates for public offices and to the expressions of assent or dissent of legislators to the enactment of proposed measures, but is also correctly employed to describe the voice of a member of a corporation or any association of individuals in declaring his will as to any question submitted. The word is also used collectively to include the combined action of a number of individuals upon a given question. Various methods of voting have been devised, but practically only two are in use: by ballot (q.v.), and *viva voce*, by voice. Where the voting is by ballot one or more judges must be appointed to canvass or count the ballots which have been deposited in some receptacle by the voters. Where the more simple method of having each voter announce his will orally is adopted, a secretary is usually appointed to note the name and choice of every one entitled to vote.

In all political elections and legislative bodies in the United States every person entitled to vote must do so personally. However, in corporations and associations voting by proxy is usually permitted.

In order to secure a fair election and freedom of choice on the part of the voters, various means of voting have been devised. The Australian system, which practically insures absolute secrecy, is the most in favor. This system prohibits any marking of ballots for identification, and as all the tickets which may be voted are printed upon one sheet of paper and marked and folded in a closed booth, there is perhaps no method of determining absolutely how a person votes. See BALLOT; ELECTORAL REFORM.

VOTER. One entitled to a vote or voice in the determination of a question before a number of individuals. The term implies some qualification. For example, to entitle a person to vote for candidates for public office he must be a citizen of the jurisdiction in which the election is held, and, of course, no one can vote on any question before a private corporation or association unless he is a member.

The character of the qualifications required of voters in political elections varies somewhat in the different States. However, there are certain general requirements in all States, which may be summarized as follows: (1) Citizenship; (2) residence for a certain time in the State, county, and election district; (3) that the voter shall have attained his majority (21 years); (4) that the voter shall be of sound mind; (5) that he shall not be a convicted felon under sentence. Registration is also required in many States. Some of the States have established either property or educational qualifications. This has been done in most of the Southern States in order to exclude the negro vote. As these tests might bar some of the 'poor whites,' a provision that any one whose father or grandfather was a soldier in the Confederate Army has been introduced. These ingenious devices are rendered necessary by the Fifteenth Amendment to the United States Constitution, which provides that the "right of citizens to vote shall not be abridged by the United States or any State on account of race, color, or previous condition of servitude." Except for this provision the States have power to fix their own qualifications. A few States permit women to vote.

The election laws of most States contain provisions under which a person who suspects that another is illegally attempting to vote may challenge the latter's right to do so. Under such circumstances the person challenged is generally permitted to 'swear in' his vote, that is, state under oath that he possesses the qualification which the challenger denies, and his vote is counted subject to rejection later if the courts subsequently decide that he had no right to vote. See Electoral Reform; Vote.

VOTING MACHINE. A mechanical device which automatically records and counts votes. Besides preventing repeating and other fraud, an ideal voting machine has the additional advantages over the paper ballot system of greater secrecy, simplicity, rapidity, and cheapness.

The first State law authorizing the use of automatic machines was passed by New York in 1892, allowing towns to use the Myers automatic ballot cabinet at elections of town officers. In 1893 Michigan and Massachusetts permitted the use of voting machines at local elections, and in 1894 New York authorized their use at all elections. Michigan passed a similar law in 1895, Massachusetts in 1896, Minnesota in 1897, Ohio in 1898, and Indiana and Nebraska in 1899. During 1900 Rhode Island created a voting machine commission to examine machines and make regulations for their use by cities and towns. In Iowa the use of voting machines has been authorized at all elections, and a commission to examine voting machines created. In 1895 Connecticut authorized the use of McTammany and Myers machines at local elections. The first permanent State voting machine commission was established in New York in 1897. Massachusetts and Ohio followed in 1898. In California a constitutional amendment adopted by the people allows voting by other means than by ballot.

During the Presidential election of 1900, 78 *United States voting machines* were in use, and they had been used at five preceding annual elections. This machine has the party lines arranged in horizontal rows, the candidates in each row being numbered consecutively. To vote the straight ticket a key is pulled out, but the vote is not registered until the voter swings the gate on the voting machine. Before he swings his gate he can rearrange his ballot to any extent he desires.

The Bardwell votometer consists of a series of sections of interchangeable form, except in the sections designed for the questions 'Yes' and 'No,' or for the 'selective' or 'multiple' votes, which differ only as to the interlocking or safety devices. The voter finds before him the complete ballot, and he is at liberty to make any selection of names he sees fit. If he desires to cast a vote for all the nominees of any one party at a single motion, he makes his selection in the 'Straight Ticket' column, and, inserting the key in the hole in the centre of the card bearing the party name, he gives it a turn to the right. This actuates a register at the back. Simultaneously with the turning of the key a blank disk, or indicator, located at the right of and one inch from the keyhole changes, and a cross or × appears, indicating his vote. It is now impossible to turn the key in any other hole in that column—that is, to vote for an additional 'Straight Ticket'—and it is likewise impossible to vote for any individual on the chosen ticket or any other ticket. But the 'Optional Column' remains open, and in it the voter is free to make any choice he may desire. The affirmative and the negative of a question have corresponding keyholes.

After having voted the straight ticket and on the questions, all one can now do is to correct any mistakes that become evident upon inspection. If the voter finds that he has turned the key in the wrong hole, he can reinsert the key and by turning it back cancel his vote. He may now make a new choice with the same limitations as before. The voter leaves the machine at the opposite end to which he entered. In passing out he raises a bar, which resets the machine and at the same time locks it. The bar at the entrance end of the machine cannot be raised till the exit bar has been operated, so that it is impossible for two to have access to the machine at the same time.

The *Standard voting machine* is about 4 feet square and 10 inches deep, and is supported by legs. The top is a little over 6 feet from the floor. A semicircular bar projects from the upper corners, on which is hung a curtain which forms a booth. An operating lever extends from the centre of the top of the machine, the outer end of which is attached to the curtain. When the voter advances to vote he throws the lever by a dependent handle to the opposite side of the machine, thus carrying the curtain behind him and inclosing himself in a booth.

The voter first selects his party ticket, and by pulling the straight ticket knob over the party emblem down to the right, moves all the pointers for that ticket. If he desires to split his ticket, he can move the pointer back from over the name that does not suit him, and in the same office line move the pointer over the name he wishes to vote for. He now registers his vote by throwing the curtain open by means of the operating lever with which he closed it, thus casting and counting his vote in perfect secrecy.

The *Standard machine* had its first trial April 12, 1898, in a town election. During the Presidential election of 1900 it was used in a large number of cities and towns in New York State, including Buffalo, Rochester, Utica, Ithaca, and Poughkeepsie. Consult "The Voting Machine," in *Municipal Journal and Engineer* (New York, December, 1900).

VOTKINSKY ZAVOD, vôd'kên-skê zȧ-vôd'. An industrial settlement in the Government of Vyatka, East Russia, 380 miles southeast of Vyatka. It has extensive crown iron works and machine shops. There are also manufactures of agricultural machinery and other iron and steel products, and a mining school. Population, in 1897, 21,000.

VO'TYAKS. A Finno-Ugrian tribe, neighbors of the Permiaks, living between the Vetluga and Kama, tributaries of the Volga, in Northeastern Russia. Other groups are found in the governments of Ufa, Kazan, and Samara. They number about 360,000, and are skillful husbandmen, stock-breeders, and apiarists. Their height is 1.619 meters and their cephalic index, 82.0. They have high cheek bones, straight, small nose, small lips, blue or gray eyes, blond or red hair and beard, and a slender, thin-muscled physique. Their intellectual culture is undeveloped and they are given to drink. Polygamy is practiced, and, though nominal Christians, they still secretly continue their pagan cult. Their speech is closely allied to that of the Zyrians (q.v.), and they have some little Russian admixture. Consult: Buch, *Die Wotjaken* (Helsingfors, 1882); De Baye, *Notes sur les Votiaks* (Paris, 1897);

Bonmariage, *La Russie d'Europe* (Brussels, 1903); Wiedemann, *Grammatik der wotjakischen Sprache* (Reval, 1851); Wichmann, *Wotjakische Sprachproben* (Helsingfors, 1893).

VOUCHER (from *vouch*, from OF. *voucher*, *vocher*, from Lat. *vocare*, to call, from *vox*, voice). In law, a written or printed instrument which records the particulars of a payment of money, or which entitles a person to receive a sum of money. It is something more than a receipt, as it sets forth more fully the essential facts of the transaction, and may operate as an order as well as an acknowledgment. The term was also formerly employed to describe a person who was called into court by a tenant to defend the latter's title on a general warranty.

VOUSSOIRS. The individual stones forming an arch, and of which the central one is the keystone. They are always of a truncated wedge-form.

VOW (OF. *vou*, *vo*, *veu*, Fr. *vœu*, from Lat. *votum*, wish, engagement, vow). A promise made to God of a certain thing or action good in itself, and within the dominion and right of the person promising. The practice of vows appears to have formed part of the religious observance of almost all races in any degree civilized; and it largely pervaded the whole ceremonial system of the Mosaic dispensation (Gen. xxviii. 20; Lev. xxvii. 2; Num. xxx. 2; Judges xi. 30). The stringency of the obligation of fulfilling a vow when once made is distinctly laid down (Deut. xxiii. 21; Eccles. v. 4, 5); but it is equally clearly stated, that it is by no means a matter of obligation to make a vow (Deut. xxiii. 22). The practice of making vows continued among the Jews in the time of Christ; and Saint Paul, after his conversion to Christianity, continued to conform to this usage (Acts xviii. 18). Vows, while discarded as a religious observance by the Reformers, enter largely into the system of the Roman Catholic Church. The objects of these engagements among Catholics are various; but they are drawn, for the most part, from what are called the evangelical 'counsels,' in contradistinction to 'precepts' or 'commands'—the most ordinary subject of vows being the so-called 'evangelical' virtues of poverty, chastity, and obedience. Pilgrimages, however, acts of abstinence, or other self-mortifications whether of the body or of the will, special prayers or religious exercises, are frequently made the object of vows; and there is another large class of more material objects, as the building of churches, monasteries, hospitals, and other works of public interest or utility, to which mediæval Europe was indebted for many of its most magnificent memorials of piety and of art. Vows in the Church law are either 'simple' or 'solemn.' The principal difference between them consists in the legal effects of the 'solemn' vow which, where the subject of such vow is chastity, renders not merely unlawful, but null and void, a marriage subsequently contracted. A 'simple' vow of chastity makes it unlawful to marry, but, except in the Jesuit society, does not invalidate a marriage, if subsequently contracted. Catholics acknowledge in the Church a power of dispensing from vows; bishops are held to possess the power of dispensing from simple vows generally; but the power of dispensing from solemn vows and certain simple vows, as, for example, that of absolute and perpetual chastity, and of the greater pilgrimages, is reserved to the Pope. The practical operation of the canon law regarding vows has evidently been much modified, even in Catholic countries, since the French Revolution, and the subsequent political changes; but this must be understood to regard chiefly their external and purely juridical effects. So far as concerns their spiritual obligation, the modern Catholic theology recognizes little if any change.

VOWELS AND CONSONANTS. See PHONETICS.

VOX CLAMANTIS (Lat., voice of one crying). A Latin poem by John Gower, completed in 1384, but never printed. It is the second of the three parts of Gower's great work, and describes allegorically the rising under Wat Tyler in 1381.

VOYAGE AUTOUR DE MA CHAMBRE, vwä′yäzh′ ō′tōōr′ *de* mȧ shäɴ′br′ (Fr., journey around my room). A prose work by Xavier de Maistre (1794) written during an enforced confinement to the barracks. It consists of a series of little descriptions of the furniture about him, flights of imagination suggested by the different articles, and memories of his mistress, his servant, and other acquaintances.

VOY′NICH, Mrs. ETHEL LILLIAN (1864—). An English novelist, daughter of George Boole (q.v.). She passed several years on the Continent, and married Wilfrid Michael Voynich, a native of Lithuania, who settled in England, owing to his dislike of the harsh government of the Czar. She began her literary work by translating, from the Russian, tales and plays, published under the title of *The Humour of Russia* (preface by Stepniak, 1895). Her first novel, *The Gadfly* (1897), met with instant success, and was followed in 1901 by *Jack Raymond.*

VOYSEY, voi′zĭ, CHARLES (1828—). An English clergyman, founder of the 'Theistic Church.' He was born in London, graduated at Oxford (1851), and was curate of Hessle, Yorkshire (1852-59); of Craighton, Jamaica (1860-61); of Saint Mark's, Whitechapel, London (1861). He was ejected on account of a sermon against endless punishment. He was vicar of Healaugh, Yorkshire (1864-71). In 1865 he published, in *The Sling and the Stone*, sermons preached at Healaugh on the atonement, justification, incarnation, and inspiration, which were deemed at variance with the Bible and the Thirty-nine Articles. The secretary of the Archbishop of York prosecuted him in the Chancery Court of the diocese. From the sentence of condemnation he appealed to the judicial committee of the Privy Council, which confirmed the sentence, deprived him of his living, and required him to pay the costs (1871). He afterwards preached and lectured in Saint George's Hall, London, a fund having been raised by men of wealth called the 'Voysey establishment fund,' the outcome of which was the "Theistic Church.' Many of his discourses have been published.

VOZNESENSK, vŏz′nyĕ-syĕnsk′. A town in the Government of Kherson, South Russia, situated on the Bug, 100 miles northwest of Kherson (Map: Russia, D 5). It has extensive warehouses for the storage of grain and salt and manufactures brick and iron products. Population, in 1897, 14,178.

VRANIA, vrăn′yȧ, or **VRANJA**. The capital of a department in Servia, 37 miles east by south of Prishtina, Turkey, on the Morava River (Map: Balkan Peninsula, D 3). It is an important railway and commercial centre, and is noted for the manufacture of rope. Hemp and flax are the principal products of the vicinity. There are numerous sulphur springs. Population, in 1900, 11,921.

VRATZA, vrät′sȧ. The capital of a department in Bulgaria, 59 miles north by east of Sofia (Map: Balkan Peninsula, D 3). It manufactures leather, wine, and jewelry and carries on an important trade. There is a school of sericulture here. Population, in 1900, 13,749.

VRAZ, vräs, Stanko (1810-51). A Serbo-Croatian poet, born at Zerovec, in Lower Styria. He was educated at Gratz and joined the movement to fuse the Slovene and Serbo-Croatian languages under the name of Illyrian. This attempt was not successful; but Vraz (who is also known as Jacob Fraz) wrote many graceful lyrics and made collections of national songs which are of great value. His work has a strong Oriental coloring and he himself ranks as one of the four important Serbo-Croatian poets. His collected works, *Djela*, were published at Agram in four volumes (1863-64), and a fifth volume containing his letters was added in 1877.

VRIES, vrēs (or **FRIES**), Adriaen de (1560-c.1627). A Dutch sculptor, born at The Hague In his boyhood he went to Florence and there studied under Giovanni da Bologna. He made many copies of the antique in bronze, notably a "Farnese Bull," now in Gotha. Many of his original works were done in wax, one of which was a "Rape of the Sabines" for Rudolph II., who invited the sculptor to Prague. There De Vries made a statue of the Emperor and thence he went to Augsburg, where his greatest works were made and remain, the most famous being the Mercury Fountain (1599) and the Hercules Fountain (1602). Both are beautiful examples of the Italian Renaissance, with much profusion of figure and fine detail. Consult the monograph by Buchwald (Leipzig, 1899).

VRIES, Hugo de (1848—). A Dutch botanist, born in Haarlem and educated at Leyden, Heidelberg, and Würzburg. In 1871 he became a teacher in the Commercial High School of Amsterdam and in 1877 lecturer in the University of Amsterdam, where in 1880 he was professor of vegetable anatomy and physiology. Since 1897 he has been professor at Würzburg. He has made important studies on the structure of plant-cells and wrote: *Untersuchungen über die mechanischen Ursachen der Zellstreckung* (1887); *Intracellulare Pangenesis* (1889); *Monographie der Zwangsdrehungen* (1892); and in the *Leerboek der Plantkunde*, which he edited with Oudemans, the first volume on vegetable physiology (2d ed. 1885).

VRIES, Matthias de (1820-92). A Dutch philologist, born in Haarlem, and educated at Leyden, where in 1853 he became professor of Dutch language and literature. His most important publication was *Woordenboek der Nederlandsche taal* (1864 et seq.), which he began with Te Winkel and continued with the assistance of Cosijn and Verwijs, but was unable to complete. Another great lexicographical labor, also uncompleted, was the *Middelnederlandsch Wordboek* (1864-65). It was in Middle Low German that his most typical work was done, mainly editions of Van Hooft's *Warenar* (1843), of Boendale's *Lekenspieghel* (1844-48), and of Von Maerlant's *Spieghel historiæl* (with Verwijs, 1863, concluded by Utenbroeke, 1879). Mention should be made as well of his orthographical work, *De grondbeginselen der Nederlandsche spelling* (with Te Winkel, 1865), which introduced the method now in common use, and of his many pamphlets on linguistic problems in general, of which *De Nederlandsch taalkunde* (1849) and *De heerschappij der taal, het beginsel der welsprekendheid* (1850) are most important.

VUILLEFROY, vụ′y'-frwä′, Dominique Félix de (1841—). A French painter of landscape and animals—particularly the latter. He was born in Paris and studied under Bonnat and Hébert. His first picture at the Salon was "The Coast of Grâce at Honfleur" (1867). Later pictures were: "Free Market in Picardy" (1875); "Return of the Herd" (1880; Luxembourg Gallery, Paris); "In the Meadows" (1883; Luxembourg); "The Brook" (1886).

VULCAN (Lat. *Vulcanus, Volcanus;* connected with Skt. *ulkā*, firebrand), or Hephæstus. In classical mythology, the god of fire. In Greek legend Hephæstus was the son of Zeus and Hera. Deformed at birth, he was hurled by his mother from Olympus. He fell into the sea, and was cared for by Thetis and Eurynome. Another story represents him as hurled from heaven by Zeus for interfering in behalf of Hera. He fell on Lemnos and was cared for by the Sintians. In the *Iliad* his wife is Charis (Grace), but later legend united him with Aphrodite, apparently for the contrast between the lame, awkward, and grimy smith and the goddess of beauty. His detection of her infidelity with Ares is told in the *Odyssey*. In spite of his prominence in legend, the cult of Hephæstus was very limited. At Lemnos and in Sicily (both volcanic regions) he enjoyed honor, but in Greece proper his cult is scarcely known outside of Attica. Here he was the god of artisans, especially workers in metal, and was joined in worship with Athena Ergane, in a temple in the Ceramicus, identified by some with the so-called Theseum. In the suburb of the Academy in the sacred precinct of Athena was a common shrine of Hephæstus and Prometheus (q.v.), a very similar personage. The god seems to have developed from the conception of divinity in fire conjoined with local demons or gnomes honored or feared by smiths and potters. In Rome we find among the early Roman gods Volcanus, with a festival on August 23d, and a sacred place, the *Volcanal*, not far from the Comitium. He seems to have been a god of the destructive fire, who was appeased by the offering of living fishes, and in whose honor the captured weapons were burned. He certainly was especially invoked against danger from conflagration, and his worship became more prominent under Augustus, who had redistricted the city and provided special protection against fires. The poets of course identified him with

Hephæstus, and we find him paired with Vesta and otherwise honored by the Greek ritual as early as the third century B.C. This did not, however, penetrate deeply into the common cult, and he does not seem to have been held in special honor by Roman artificers.

VULCAN. A hypothetical planet once supposed to be revolving around the sun within the orbit of Mercury. In 1859 Leverrier found certain perturbations in the motions of Mercury which indicated the existence of another body in the vicinity. Such a body could be no other than another planet. Soon afterwards a certain Lescarbault announced that he had witnessed the transit of the planet across the sun's disk. It was thought for a time that Lescarbault's observation was a correct one; but astronomers are now agreed that he mistook some small sun-spots for the supposed planet. Vulcan is not now believed to have a real existence.

VULCANIZING. See RUBBER.

VULCANO, vụl-kä′nō, or **VOLCANO.** The southernmost island of the Lipari group, in the Mediterranean Sea, 12 miles north of the coast of Sicily. It is seven miles long, three miles wide, and contains the crater of a volcano 1200 feet high, from which issue sulphurous gases and vapors. The soil is fertile, producing grain, fruit, and grapes. The islet of Vulcanello, lying off the northern coast, containing two craters, is connected with it by a neck of land.

VULGATE. See BIBLE.

VULNED (from *vuln*, from Lat. *vulnerare*, to wound, from *vulnus*, wound). A heraldic term, applied to an animal or part of an animal wounded, and with the blood dropping from it. A pelican is sometimes described as vulning herself.

VULPIUS, vụl′pē-ụs, CHRISTIAN AUGUST (1762-1827). A German novelist and dramatist, born at Weimar. He studied at Jena and Erlangen, and, possibly through Goethe's influence, obtained a post in the Weimar Library in 1797. In Weimar he published the typical 'penny dreadful' of the period, *Rinaldo Rinaldini, the Robber Captain*, often translated and imitated, but still unrivaled on its bad eminence. He published a large number of romantic operas, dramas, and tales, and was active also as editor. He died at Weimar. His sister, CHRISTIANE (1765-1816) became the wife of Goethe. See GOETHE.

VULTURE (Lat. *vultur*, *voltur*, vulture, from *vellere*, to pluck). A representative of a group of carrion-eating rapacious birds classified in two distinct families. The vultures proper constitute the Old World family Vulturidæ: the other family, Cathartidæ, comprises the condors, turkey-buzzards, and the like. The former group, true vultures, have a long straight beak, slightly or not at all hooked at the tip, and the head and neck bare or downy, a ruff or collar of soft feathers surrounding the lower part of the neck, into which the most of the head can be withdrawn for warmth. The legs and feet are large, but the claws are not nearly so large and strong as in the falcons. Vultures have long wings, great powers of flight, and soar out of human sight. Their plumage is dense, and usually black and white, often with the naked parts of the head red. They are mostly found in warm climates, and many of them are inhabitants of mountainous regions. They feed on carrion. They seldom attack a living animal, but may put to death wounded or ill ones; and some of them regularly seek their food in the streets and environs of Eastern towns, where they are suffered as scavengers. Vast numbers have been seen feeding upon battlefields. They gorge themselves excessively when food is abundant, till their crop forms a great projection, and sit long in a sleepy or half-torpid state to digest their food. They do not carry food to their young in their claws, but disgorge it for them from the crop. The bareness of their head and neck adapts them for feeding on putrid flesh, by which feathers would be defiled; and they are very careful to wash and cleanse their plumage. The question has been much discussed whether vultures discern dead animals by the eye or are attracted to them by the smell. It is certain that they possess great powers of vision, but the reasonable conclusion appears to be that the sense of smell is also of service in directing them to their prey. The rapidity with which they congregate about a carcass has been remarked with admiration. It is explained by their practice of soaring to a great height. Each one observes any sign of excitement on the part of another, and flies toward it, and so numbers are lured, following one another toward the feast discovered by the first one.

Among notable species of vulture are the tawny vulture or griffon (*Gyps fulvus*), found in the south of Europe, the north of Africa, and the west of Asia. It makes its nest on the most inaccessible rocks of high mountains, as in the Alps and Pyrenees, and sometimes in tall forest trees. It is a very large bird, more than four feet in length. Its plumage is yellowish brown, the quills and tail-feathers blackish brown, the down of the head and neck white, the ruff white. When it has found a carcass on which to feed, it remains on the spot, gorging and torpidly resting by turns, till no morsel remains. The mountains and forests of the south of Europe, as well as of the north of Africa, and great part of Asia, are also inhabited by the cinereous vulture (*Vultur monachus*), another large species, which departs from the typical character of the vultures in having the greater part of the neck feathered, and comparatively large and powerful claws. Various species are known in Africa and Eastern Asia, of which a familiar one in India is the rather small Pondicherry vulture (*Otogyps calvus*), which is black, and noted for its enormous nest.

The American vultures of the family Cathartidæ differ from those of the Old World technically rather than in appearance or habits. This family includes the huge condor, king, and California vultures of the genus Sarcorhamphus (see CONDOR), and several other species, among them the smaller carrion-crow (q.v.) of the tropics, and the more familiar turkey-buzzard (*Cathartes aura*) of the southern part of the United States; this bird is occasionally seen, however, in all parts of the United States, and occasionally beyond the Canadian line. It is about 30 inches in length, with an alar spread of about 75 inches; in color dingy brown; the tail is long, the wing is bent at a salient angle, and the tips of the longest quills spread apart and bend upward. No birds are better flyers or more expert and enduring in soaring. Their only utterance is a sort of hiss. They breed sometimes in communities and sometimes in separate pairs, depositing the eggs on the ground, on rocks, or in hollow logs and stumps, usually in thick woods. Where a rookery is established the foulness of the place soon becomes beyond description. The eggs are one or two in number, roundish, about 2¾ inches in longest diameter, and yellowish white blotched with brown and purplish tints. These birds are of very great service as scavengers, especially in the hotter parts of their habitat.

Consult general works cited under BIRD. See Plate of VULTURES.

VYĀSA, vyä'sȧ (Skt., separation, distribution, arrangement). A legendary Hindu sage to whom is ascribed the authorship, compilation, or coördination of a large body of ancient Sanskrit literature. The redaction of the Vedic hymns and the authorship of the *Mahābhārata* (q.v.) are attributed to him, while his name is attached to the *Purāṇas* (q.v.), to a *Brahmasūtra* (see VÉDÁNTA), and to several other works. According to tradition his father was the Vedic sage Paraśara (q.v.), and his own sons were Pandu and Dhritarashtra, the famous kings of the *Mahābhārata*. His full name is given as Krishna Dvaipayana Vyasa, and legend accounts for the title *kṛiṣṇa*, 'black,' by his dark complexion, and for the attribute *dvāipāyana* by a story of his birth on an island in the Yamuna or River Jumna. As the immense mass of literature ascribed to him is so varied in character and so different in point of age, it is impossible to regard the whole as the production of a single individual. For that reason Vyasa is understood to typify the literary activity which brought order into the heterogeneous mass of Sanskrit literature.

VYATKA, vyät'kȧ. A government of Northeastern Russia. Area, nearly 59,400 square miles. It is largely a plateau, somewhat elevated in the northeast, with hills reaching an altitude of 1400 feet. The chief rivers are the Kama and its tributary the Vyatka (Map: Russia, G 3). The climate is characteristically continental, with a mean annual temperature of about 35°. Agriculture is the principal occupation and is favored by a fertile soil, but is carried on by primitive methods. Stock-raising is also an important industry, Vyatka being noted in Russia for its good horses. About one-half of the area of the government is under forests, but they are unequally distributed. Over 300,000 persons are engaged in household industries. The mineral and smelting industries employ about 40,000 persons and produce chiefly iron and steel. The manufacturing industries are gradually developing and the annual value of their products is about $14,000,000. The chief manufactures are leather, flour, spirits, hardware, and machinery. There is an extensive Government factory of arms. Population, in 1897, 3,082,788. The Russians form about 78 per cent. and the remainder is composed of Votyaks, Tcheremisses, and Tatars.

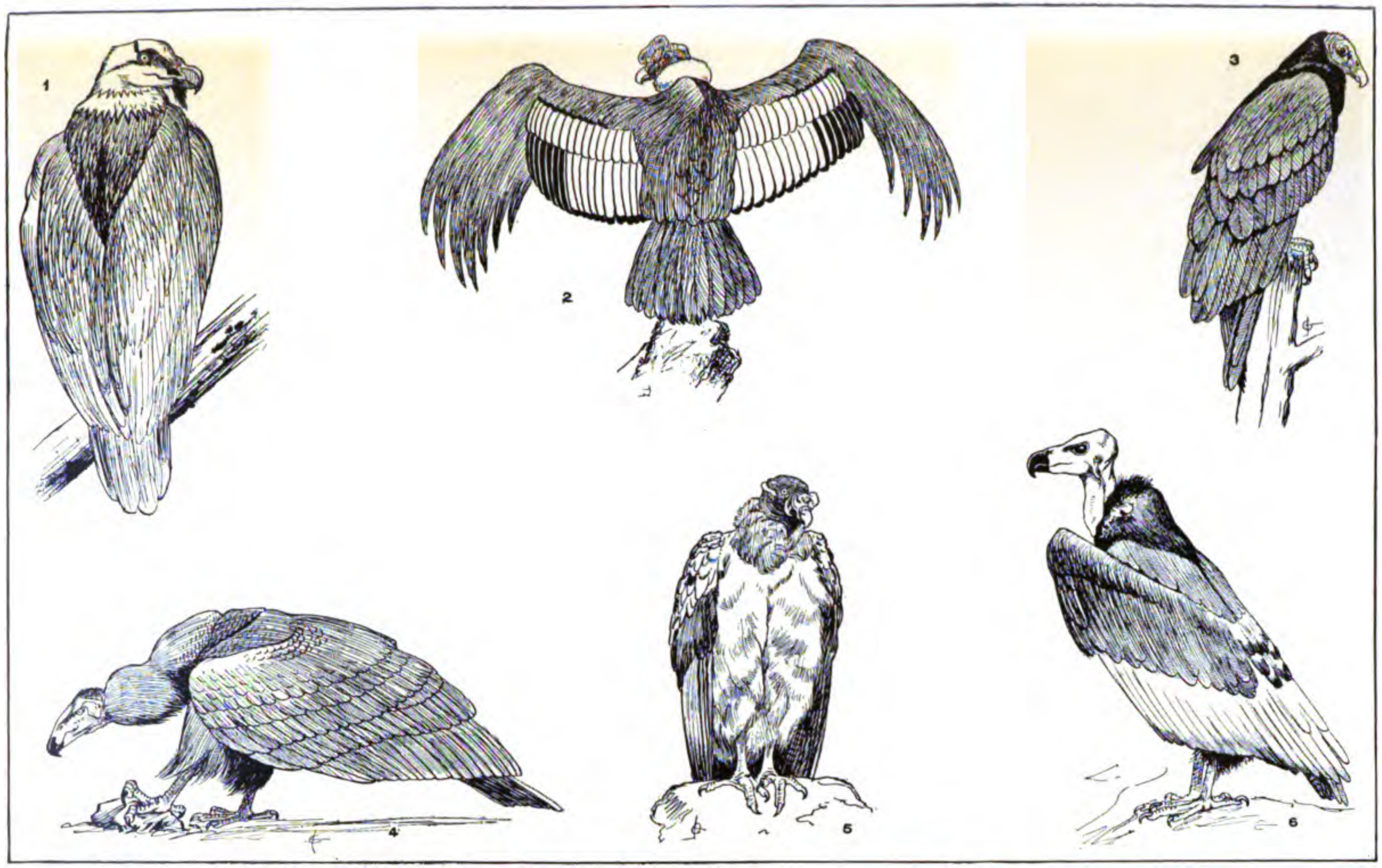
VYATKA. The capital of the Government of Vyatka, in Russia, situated on the river Vyatka, 660 miles northeast of Moscow (Map: Russia, G 3). The trade in grain and animal products with Saint Petersburg, Moscow, Archangel, and Siberia is extensive. Population, in 1897, 24,782. Vyatka, formerly Khlynov, dates probably from the twelfth century. It was an important commercial city practically independent in its administration, and differing from Novgorod (q.v.) in that it had no princes. It was annexed to Moscow in the fifteenth century.

VYAZMA, vyäz'mȧ. A district town in the Government of Smolensk, Russia, situated on the river Vyazma, 151 miles east of Moscow (Map: Russia, D 3). Flax and oil are the chief products. Population, in 1897, 15,776. The town was founded in the eleventh century and was an important place in the Principality of Smolensk. In 1812 it was the scene of an engagement between the Russians and the French, in which the former were victorious.

VYERNY, vyĕr'nĭ. The capital of the Territory of Semiryetchensk, Russian Turkestan, situated at an altitude of 2430 feet, 2690 miles southeast of Moscow (Map: Asia, G 4). It is strongly fortified. Population, in 1897, 22,982. The town was founded on the site of a Kirghiz settlement in 1854. It has suffered greatly from earthquakes, that of 1887 having almost entirely ruined the place and killed over 330 persons.

VYSHNI VOLOTCHEK, vĭsh'nyĕ vô-lô-chĕk'. The capital of a district in the Government of Tver, Russia, situated near the Tsna River, 224 miles southeast of Saint Petersburg (Map: Russia, E 3). It has considerable commercial importance. The chief manufactures are cotton goods. Population, in 1897, 16,722.

VULTURES



1. LAMMERGEIER (Gypaëtus barbatus).
2. ANDEAN CONDOR (Sarcoramphus gryphus).
3. TURKEY BUZZARD (Cathartes aura).
4. CALIFORNIA CONDOR (Pseudogryphus Californianus).
5. KING VULTURE (Gyparchus papa).
6. PONDICHERRY VULTURE (Otogyps calvus).

W

W The twenty-third letter in the English alphabet. As its name in English indicates, the character is formed by a doubling of single *v*'s or *u*'s into a ligature. This composite letter was first employed to transliterate the Latin semi-vocalic *v* (*w*) and the earliest recorded instance of its occurrence is in a diploma of Clovis III. at the end of the seventh century. It appeared in English usage in the eleventh century, although *uu* or *vv* (without ligature) had already occasionally been employed.

Sound and Philological Value. As a phonetic character *w* is a labial spirant, corresponding very nearly to *u* in the position of its formation, which gives it its semi-vocalic quality, In words beginning with *wh*, like *white, what, wheel*, where the more original Anglo-Saxon had *wh*, the *w* is pronounced voicelessly, and with the aspiration preceding. The older spelling *hw* (Anglo-Saxon *hwīt, hwæt, hwōol*) was transposed after the twelfth century and *wh* became the generally accepted orthography. In some words now beginning with *wh*, the *w* is not original, but has been adopted since the fifteenth century, thus *whole* (Anglo-Saxon *hāl*), *whoop* (Middle English *houpen*). The silencing of *w* before *r*, as in *wrath, wrestle*, and also in *sword, answer*, is a later development since the Norman Conquest. The representation of the intermediate *w*-sound in *quell, queen*, where *qu* stands for an older *cw* (Anglo-Saxon *cwellan, cwēn*), is likewise of later date. (See Q.) The labialized *w* in the form *ow* at the end of *sorrow, arrow*, and similar words is evolved from an earlier guttural *g* or *h* (Anglo-Saxon *sorg, earh*, etc.). In *cow, now, how* (Anglo-Saxon *cū, nū, hū*) the *w* is graphic. The labio-guttural character of the letter is also evinced in such interchanges as French *Guillaume, guerre*, English *William, war*, which gives rise also to such doublets in English as *guard* and *ward, warranty* and *guarantee*. The strongly marked labial character of *w* tends furthermore to color adjacent vowels, as in English *two* (*tu*), Anglo-Saxon *twā;* English *who*, Anglo-Saxon *hwā*. Philologically English *w* may represent (1) Indo-Germanic *v* (*u̯*), as English *new*, German *neu*, Latin *novus*, Sanskrit *navas*, Indo-Germanic **neu̯os;* (2) Indo-Germanic *gh*, as in English *warm*, Latin *formus*, Greek *θερμός*, Sanskrit *gharmas*, Indo-Germanic **ghu̯armas;* (3) English *wh* stands for Germanic *hw* (Indo-Germanic *ku̯*), as Sanskrit *kas*, Anglo-Saxon *hwā*, English *who*.

As a symbol in chemistry W stands for *tungsten* (from the Latinized German designation *Wolframium*).

WAAGEN, vä′gen, Gustav Friedrich (1794-1868). A German art-historian, born at Hamburg. He studied at the universities of Breslau and Heidelberg, took part in the War of Liberation in 1813-14, and finally settled in Munich. His name became at once favorably known through his work *Ueber Hubert und Johann von Eyck* (1822), one of the landmarks in modern art-history, which led to his being called to Berlin in 1823, to assist in the establishment of the new museum. From 1830 until his death he was director of the picture gallery. In 1844 he was appointed professor at the University of Berlin, and in 1862 he published his *Handbuch der deutschen und niederländischen Malerschulen*. His best known works are: *Kunstwerke und Künstler in England und Paris* (1837-39), afterwards revised and extended under the title *The Treasures of Art in Great Britain* (1854), and supplemented by *Galleries and Cabinets of Art in Great Britain* (1857); and *Kunstwerke und Künstler in Deutschland* (1843-45). His *Kleine Schriften* were collected and edited with a biography, by Woltmann (Stuttgart, 1875).

WAAHOO, wä-hōō′. See Spindle Tree.

WAAL, väl. The southernmost and largest arm of the Rhine delta. It flows westward through the Dutch Province of Gilderland, and is joined by the Meuse (q.v.) near Gorinchem (Map: Netherlands, D 3).

WABASH, wạ′bäsh. The chief river in Indiana and the largest north tributary of the Ohio (Map: Indiana, D 2). It rises in and around the Grand Reservoir in western Ohio, and flows first northwest, then southwest across Indiana to Covington, in the western part of that State, where it takes a more southerly direction, finally forming for 120 miles the boundary between Indiana and Illinois until it enters the Ohio River at the extreme southwestern corner of the State. Its length is about 550 miles, and it is navigable for steamers 300 miles to Covington, at high water as far as Lafayette. Its middle course, from Terre Haute to Huntington, is followed by the Wabash and Erie Canal, which connects the river with Lake Erie. The chief tributary of the Wabash is the White River (q.v.).

WABASH. The county-seat of Wabash County, Ind., 42 miles southwest of Fort Wayne, on the Wabash River, and on the Cleveland, Cincinnati, Chicago and Saint Louis and the Wabash railroads (Map: Indiana, D 2). It has public and high school libraries and the Wabash City Library, and a Woman's Orphan Home. Other features include Memorial Hall, and the Masonic Temple, City Park, and Charley Falls and Park. Wabash is surrounded by a rich farming section and is extensively engaged in manufacturing. The principal industrial establishments are railroad shops of the 'Big Four,' bridge and iron works, and manufactories of paper, cabinets, hats, church and school furniture, leather, shaft holders, harness, etc. Under the charter of 1866, the government is vested in a mayor, elected every two years, and a unicameral council. Wabash was settled in 1837, and was incorporated the same year. Population, in 1890, 5105; in 1900, 8618.

WABASH COLLEGE. A college for young men at Crawfordsville, Ind., founded in 1832. It has no organic connection with any ecclesiastical body, but is closely affiliated with the Presbyterian Church. Students are admitted on examination or by certificate from accredited schools. All undergraduate courses lead to the degree of B.A. The master's degree is given for approved work three years after graduation, or on completion of one year's graduate work at the college. The college grounds consist of 40 acres in the heart of the city, valued, with the buildings, at $500,000. In 1903 the total attendance was 200, the faculty numbered 14, and the library contained 40,000 volumes. The endowment was $500,000.

WACE (c.1100-c.1175). An Anglo-Norman poet. He was born on the island of Jersey, about 1100. When a boy he was taken to Caen, in Normandy, where he learned Latin in preparation for the Church. He then studied 'a long time' at Paris, returning between 1130 and 1135 to Caen, where he became 'a clerc lisant' in the royal chapel, and a man of letters to eke out his income. Promotion came to him in old age, when (apparently in 1169) Henry the Second made him a prebendary at Bayeux. As there is no trace of him after 1174, it may be inferred that he died in that or the next year. Wace was the author of two great poems. The first of them, the *Geste des Bretons* or the *Roman de Brut*, was completed in 1155, and presented with a dedication to Queen Eleanor some time before 1160. It is a long poem, comprising more than fifteen thousand lines in the prevailing octosyllabic couplet. The narrative begins with the settlement of Britain by Brut, or Brutus, the great-grandson of Æneas, and closes with Cadwalader, the last of the shadowy kings of Britain. The poem is based mainly on the Latin *History of the British Kings* by Geoffrey of Monmouth (q.v.), but Wace had at hand other Kymric traditions. He describes, for example, the round table, which was unknown to Geoffrey. The *Brut* was translated into English with changes and additions by Layamon (q.v.). Wace's second great poem, somewhat longer than the first, is the *Roman de Rou*, composed between 1160 and 1174. It is partly in Alexandrine verse and partly in octosyllabic couplets. After giving a summary of the history of the Norman kings and dukes from Henry the Second back to Rolf, Wace reverses the order for a more detailed account. To an English reader the most interesting section is a description of the Norman Conquest, which seems to have been based upon the best traditions. But he never completed his chronicle, for old age was rapidly approaching and he became discouraged on hearing that his patron had asked Benoît de Sainte-More to write on the same theme. Belonging to Wace's middle life are three minor poems: the *Vie de St. Nicolas* (edited by Delius, Bonn, 1850); the *Vie de la Vierge Marie* (edited by Luzarche, Tours, 1859); and the *Vie de St. Marguerite* (edited by Joly, Paris, 1879). The *Brut* has been edited by Le Roux de Lincy (Rouen, 1836-38), and the *Roman de Rou* by Andresen (Heilbronn, 1877-79). For the life and work of Wace, consult Gaston Paris, *Littérature française au moyen âge* (Paris, 1888).

WACE, Henry (1836—). A scholar of the Church of England. He was born in London, and graduated B.A. at Oxford in 1860. He was curate in London, 1861-69; lecturer of Grosvenor Chapel, 1870-72; chaplain of Lincoln's Inn, 1872-80; preacher at the same, 1880-96, when he became rector of Saint Michael's, Cornhill. He was professor of ecclesiastical history in King's College, 1875-83; principal, 1883-96. In 1881 he became a prebendary of Saint Paul's; in 1896 examining chaplain to the Archbishop of Canterbury; and in 1900 a rural dean. He became an honorary royal chaplain in 1884; chaplain in ordinary in 1889. He was Boyle lecturer, 1874-75; Bampton lecturer, 1879. His chief literary work is his *Dictionary of Christian Biography, Literature, Sects, and Doctrines from the Time of the Apostles to the Age of Charlemagne* (1877-87) prepared in coöperation with William Smith. He also edited the Apocrypha for the *Speaker's Commentary* (1886), and with Professor Buchhein edited, in English, *The Primary Works of Luther* (1896). His popular reputation rests upon his controversy with Professor Huxley upon religious matters, particularly Gospel interpretation.

WACH, väᴋ, Karl Wilhelm (1787-1845). A German historical and portrait painter. He was born in Berlin, and studied in the Academy at that city, as well as under Karl Kretschmar. Later he became the pupil of David and Gros at Paris. He founded a school in Berlin, in 1820 became professor of the Academy of Arts and in 1840 was appointed vice-director. He was commissioned with four others to arrange the new museum (Berlin) and restore pictures. His works are chiefly in Berlin. They include: "Portrait of Queen Louise" (1811); "The Crucifixion" (1815; Garrison Church); "Cupid and Psyche" (1827; National Gallery); and "The Last Supper" (1819; Church of Saint Peter and Saint Paul, Moscow).

WACHENHUSEN, vä′ᴋen-hōō′zen, Hans (1823-98). A German author, born at Trèves. During the Crimean War was a war correspondent of several prominent papers, embodying his observations afterwards in such books as *Von Widdin Nach Stambul* (1855), *Ein Be-*

such im türkischen Lager (1855), and those of later campaigns in *Tagebuch vom italienischen Kriegsschauplatze* (1859), *Halbmond und Doppeladler* (1860), *Freischaren und Royalisten* (3d ed. 1867), *Vor den Düppeler Schanzen* (1864), *Tagebuch vom oesterreichischen Kriegsschauplatz* (6th ed. 1867), and *Tagebuch vom französischen Kriegsschauplatz* (1871), all of which form a faithful and spirited history of these modern campaigns. In the meanwhile he had lived repeatedly in Paris, where he wrote *Das neue Paris* (1855), *Die Frauen des Kaiserreichs* (7th ed. 1872), and a trip through Spain to Africa he described in *Reisebilder aus Spanien* (1857). He also published several novels and tales, notably *Rom und Sahara* (3d ed. 1867), *Unter dem weissen Adler* (2d ed. 1885), based upon the Polish insurrection of 1863, *Die bleiche Gräfin* (6th ed. 1894), but his most interesting works are his memoirs, which appeared under the title *Aus bewegtem Leben* (2d ed. 1895).

WACHSMUTH, väGs'mụt, Gottlieb (1784-1866). A German historian, born at Hildesheim. After studying philology and theology at Halle, he taught in various positions at Magdeburg, Zerbst, and Halle until 1820, when he was called as professor of history to Kiel. Thence he went to Leipzig in 1825, and there published his most important work, *Historische Darstellungen aus der Geschichte der neuern Zeit* (1831-39), besides *Hellenische Altertumskunde* (2d ed. 1843-46); *Europäische Sittengeschichte* (1831-39); *Geschichte Frankreichs im Revolutionszeitalter* (1840-44); *Allgemeine Kulturgeschichte* (1850-52); *Geschichte deutscher Nationalität* (1860-62), and many others.

WACHT AM RHEIN, väGt äm rīn, Die (Ger., The Watch on the Rhine). A famous German patriotic song, the words by Max Schneckenburger (1819-49), and the music by Karl Wilhelm (1815-73). The song was written in 1840, when the left bank of the Rhine seemed threatened by France. The music, which is a part-song for men's voices, was composed and first sung in 1854.

WACHTEL, väG'tel, Theodor (1823-93). A German dramatic tenor, born in Hamburg. He was the son of a livery-stable keeper, and for a period after his father's death carried on the business for himself. His first important appearance outside his own country occurred in London in 1862, when he was at once accepted as one of the world's greatest dramatic tenors. After this he made many successful tours. In the United States he first appeared at the New York Stadt Theatre (1871), and again in 1875. He possessed a voice of singular volume and brilliancy, which, owing to the perfection of his method and training, permitted the most exacting demands upon it. Singularly enough, with all his advantages and qualifications, his one attempt in Wagnerian opera (Leipzig, 1876) was a complete failure. His greatest successes were in the *Postillon de Longjumeau, La dame blanche, Trovatore, Martha, William Tell,* and *Les Huguenots.*

WACHUSETT (wạ-chū'sĕt) **MOUNT.** An isolated monadnock in the central part of Massachusetts, 7 miles southwest of Fitchburg (Map: Massachusetts, D 2). Its altitude is 2108 feet, and its summit affords a fine view.

WACKENRODER, vak'en-rō'dĕr, Wilhelm Heinrich (1773-98). A German author of the Romantic school. He was born at Berlin, and was educated at the universities of Erlangen and Göttingen. While a schoolboy he became the friend of Ludwig Tieck, and was closely associated with him till his death. Tieck contributed one or two sketches to his friend's *Herzensergiessungen eines kunstliebenden Klosterbruders* (1797), and after his death published two works which were the fruit of their joint authorship: *Franz Sternbalds Wanderungen* (1798) and *Phantasien über die Kunst* (1799). In these books the two young men expressed for the first time the principles of æsthetics which were to govern the Romanticists. Consult "Tieck und Wackenroder," edited by J. Minor in Kürschner's *Deutsche Nationallitteratur*, vol. cxliv. (Berlin, 1882-99).

WACKERNAGEL, väk'er-nä'gel, Jakob (1853—). A Swiss Hellenist and comparative philologist, son of Wilhelm Wackernagel, born in Basel, and educated there, in Göttingen, and in Leipzig. He became professor of Greek at Basel in 1881 and in 1902 was called to Göttingen. Wackernagel's publications include: *Der Ursprung des Brahmanismus* (1877); *Das Dehnungsgesetz der griechischen Komposita* (1889), an historical sketch of humanistic study in Switzerland, and the very important but incomplete *Altindische Grammatik*, vol. i. (1895).

WACKERNAGEL, Wilhelm (1806-69). A German scholar, born and educated at Berlin. In 1833 he was called to the University of Basel and in 1835 was made professor of German language and literature there. He was primarily a student of Germanics, though he wrote much on other subjects. His works include: *Deutsches Lesebuch* (1835-36); an edition of the *Schwabenspiegel* (1840); *Altfranzösische Lieder und Leiche* (1846); and *Geschichte der deutschen Litteratur* (1848-56). In 1873 appeared *Poetik, Rhetorik und Stilistik,* and in 1876 his *Altdeutsche Predigten und Gebete,* both edited by associates of Wackernagel.

WA'CO, or **HUECO.** A small tribe of Caddoan stock (q.v.) formerly residing on the middle Brazos River, about the present town of Waco, Texas, which takes its name from them. Like all the other tribes of the stock, they were agricultural and sedentary, living in conical houses of grass laid over a framework of poles, and cultivating an abundance of corn and pumpkins, in addition to the meat supply obtained from the buffalo. In 1855, with several other small tribes, they were gathered upon a reservation near Fort Belknap, but were driven off by the Texans, and in 1859 were removed to a new reservation established north of the Washita, near the present Anadarko, Okla., where they became incorporated with the Wichita (q.v.), whom they resemble except for a slight dialectic difference. During the Civil War they fled to Kansas, where they suffered greatly from disease and famine. They are still resident with the Wichita upon the same reservation, recently thrown open to settlement, but have been reduced by disease and removals from an estimated 400 in 1804 to about one-sixth that number.

WACO. The county-seat of McLennan County, Tex., 238 miles northwest of Galveston; on the

Brazos River, here spanned by a handsome suspension bridge, and on the Saint Louis Southwestern, the Missouri, Kansas and Texas, the San Antonio and Aransas Pass, the Waco and Northwestern, and the Texas Central railroads (Map: Texas, F 4). It is regularly laid out on ground rising gradually from the river, the residential sections occupying the more elevated region on the west and southwest. Numerous artesian wells with waters noted for medicinal properties have made the city a health resort. The leading educational institutions include Baylor University (q.v.), Paul Quinn College (African Methodist Episcopal), opened in 1881, Add-Ran Christian University, and the Academy of the Sacred Heart. Among other features are the Waco Natatorium, the United States Government building, and the county court-house. Waco is the centre of a cotton-growing, farming, and stock-raising country, and has woolen mills, grain elevators, cottonseed-oil mills, bottling works, flouring mills, and manufactories of iron and lumber products, etc. Population, in 1890, 14,445; in 1900, 20,686.

WADAI, wä-dī′. Formerly, one of the most powerful native States of the Sudan, and now in the French sphere of influence, situated in North Central Africa, east of Lake Chad. It is bounded on the north by the Sahara Desert, on the east by Darfur, on the south by the French Congo, and on the west by Bagirmi and the Sahara region (Map: Africa, F 3). Its area with dependencies is given as 170,000 square miles. It is a long, narrow, semi-civilized State, stretching from north to south. It largely possesses the character of a region of steppes, with here and there naked mountain groups. In the southwest lies a wild, broken, thick-forested region, where the Guere Mountains reach over 3000 feet. In the east is the Tir range, 2000 feet high. The watercourses dry up during the year, except the Aukadebbe in the south—an important tributary of the Shari. The most important oases are the Bahr-es-Salamat and the Batha. From the last the Fitri Lake, east of the mouth of the Shari, gathers its waters. Wadai is especially arid in the north. The flora and fauna are similar to those of Bornu. The region is fairly fertile. The main food crops are rice and wheat. The leading occupation is pastoral. Cattle, horses, and camels are raised of a superior kind. Ostrich feathers, ivory, and slaves are the prominent items in the trade. The population is about 2,000,000. The Mabas are the foremost race and form about one-seventh of the population—a negro people of the Mohammedan faith and belonging to the Senussi sect. Arabs are numerous. Market communities take the place of cities. Vassal States are Fitri, East Kanem, and Runga. Abeshe is now the Sultan's capital.

The Wadai kingdom was founded in 1635, and paid tribute to both Bornu and Darfur. The country has had powerful rulers. The Sultan Ali conquered, after about 1860, the territory of Runga, the east half of Kanem, and also Borku. The Sudanese Rabaj conquered Wadai during 1892-93, and extended his rule to surrounding States. The present native conditions of political rule are not definitely known. In 1901 a revolution occurred owing to local political feuds, and a new Sultan was enthroned. Eduard Vogel was the first European to enter the land, about the middle of the nineteenth century. Nachtigal explored it in 1873 and Matteuci and Massari in 1879. By the Anglo-French agreement of 1898-99 the region passed definitely to the French, but European influence is as yet scarcely known in the Wadai dominions.

WADDELL′, James Iredell (1824-86). An American naval officer, born in Pittsboro, N. C. He became a midshipman in the United States Navy in 1841, and a second lieutenant in September, 1855. In 1859 he was assistant professor of navigation at the Naval Academy, and in 1860 was at the China station. In November, 1861, he resigned from the navy, and in March, 1862, was commissioned lieutenant in the Confederate Navy. He commanded the ram *Louisiana* at New Orleans, and blew her up to prevent capture. In October, 1864, he took command, in England, of the *Shenandoah*, with which he made his way to the Northern Pacific and Arctic oceans by way of Australia, and almost destroyed the United States whaling fleet. Thirty-eight vessels were captured, and the amount of damage done was estimated at only $400,000 less than that done by the *Alabama*. (See Alabama Claims.) Most of this was done after the collapse of the Confederate Government, as Waddell did not hear of the end of the war until August 2, 1865. He at once made his way to Liverpool and surrendered his ship to the British Government, which afterwards turned it over to the United States. In 1875 he became commander of the *San Francisco* of the Pacific Mail Line.

WAD′DING, Luke (1588-1657). An Irish Franciscan friar and historian of the Order. He was born at Waterford, educated at the Irish Jesuit College at Lisbon, and entered the Franciscan Order there. He pursued his studies at the University of Coimbra, and was ordained priest in 1613. He taught theology at Salamanca for a while, and went to Rome, where the rest of his life was to be passed, in 1618, in the suite of the Bishop of Cartagena, sent by Philip III. to request the Pope to define the dogma of the immaculate conception. His account of this mission (1624) is his first important work. He founded the College of Saint Isidore, and another at Capranica, for the members of his Order; and the Irish College at Rome was founded by Cardinal Ludovisi on his advice. He was procurator of the Franciscans, and a member of the important Roman congregations; the revision of the breviary under Urban VIII. is largely the result of his work in the Congregation of Rites. His fame rests principally, however, on his historical studies: *Annales Ordinis Minorum* (1625-54; new ed., in 24 folio vols., 1731-1860); *Scriptores Ordinis Minorum* (1650; new ed. 1806).

WAD′DINGTON, William Henry (1826-94). A French statesman and archæologist, born of English parentage at Saint Rémy-sur-l'Avre, France. He was educated at the University of Cambridge, England, but on his return to France in 1849 became a naturalized citizen of that country. He engaged in important archæological expeditions in Asia Minor and Palestine, the results of which were published in his works, *Voyage en Asie Mineure au point de vue numismatique* (1852); *Mélanges de numismatique et* *de philologie* (1861). The work of Le Bas, *Voyage archéologique en Grèce et en Asie Mineure* (Paris, 1868-77), was also continued by him. With these should be named his other important publications within the same field, *Inscriptions grecques et latines de Syrie* (1870), and his *Edit de Dioclétien* (1864). His services to classical scholarship were recognized in 1865 by his election to the Académie des Inscriptions.

Waddington became prominent in political life in 1871, when he entered the National Assembly; in 1873 he was Minister of Public Instruction under Thiers for six days only; and in 1876 he was chosen Senator. On December 13, 1877, he became Minister of Foreign Affairs in Dufaure's Cabinet, and as such took part in the Berlin Congress (1878). In February, 1879, he was appointed by President Grévy to the presidency of the Council. He resigned in December of that year. From 1883 to 1893 he was the French Ambassador at the Court of Saint James's. Consult Mme. Waddington, *Letters of a Diplomat's Wife* (London, 1903).

WADE, BENJAMIN FRANKLIN (1800-78). An American political leader, born of humble parentage, near West Springfield, Mass. He removed to Ohio in 1821; largely supported himself, and finally studied law; was admitted to the bar in 1827, and in 1831 became the partner of Joshua R. Giddings (q.v.). He was elected prosecuting attorney of Ashtabula County in 1835, and State Senator in 1837 and 1841; and was chosen presiding judge of the third judicial district of the State in 1847. From 1851 until 1869 he was a member of the United States Senate. He was a Whig, and a strong opponent of slavery; voted for the repeal of the Fugitive Slave Law in 1852; and opposed the Kansas-Nebraska Bill (q.v.) of 1854, the purchase of Cuba, and the admission of Kansas under the Lecompton Constitution (q.v.). After the election of Lincoln in 1860 he opposed all compromise between the North and the South; was chairman of the Committee on the Conduct of the War in 1861-62, and advocated a more vigorous policy, urging a law to confiscate the property of the leading secessionists and to emancipate the slaves. In association with Henry Winter Davis and other radical Republicans, he caused, in the summer of 1864, an open breach with the President upon the proper method and policy of Reconstruction (q.v.), and issued the Wade-Davis Manifesto, condemning in strong language the policy of the President. It was he who reported in 1862, as chairman of the Committee on Territories, a bill to abolish slavery in all the Territories, and prohibit it in all future Territories. He was elected president of the Senate in 1867, and was sent in 1871 as one of the commission to Santo Domingo to report in regard to its annexation to the United States. Senator Wade was popularly known as 'Ben' or 'Old Ben,' and was greatly admired by his associates for his rugged, fearless manner, his honesty of purpose, and independence of thought. Consult Riddle, *Life of Benjamin F. Wade* (Cleveland, 1886).

WADE, THOMAS (1805-75). An English poet, born at Woodbridge, in Suffolk. He went to London at an early age with a competence, and began to publish remarkable verse under the inspiration of Shelley and Keats. He met with some success in the acting drama; but he eventually turned to journalism, becoming editor and part proprietor of *Bell's Weekly Messenger.* After losing much by this undertaking, he retired to the Isle of Jersey, where he edited the *British Press,* and continued to write verse until his death. Wade's first volume of poems, *Tasso and the Sisters* (1825), displaying rare imaginative qualities, especially in the piece called "The Nuptials of Juno," was followed by a collection strangely called *Mundi et Cordis, de Rebus Sempiternis et Temporariis, Carmina* (1835), and remarkable verse pamphlets: *The Contention of Death and Love* (1837), *Helena* (1837), *The Shadow Seeker* (1837), and *Prothanasia and Other Poems* (1839). In the meantime, he had written for the stage *Woman's Love* (Covent Garden Theatre, 1828), *The Phrenologists,* a farce (Covent Garden, 1830), and *The Jew of Arragon* (Covent Garden, 1830). The latter was damned owing to its exaltation of the Jew. Of two other dramas written at this period, *Elfrida* is lost, and *King Henry II.* exists only in manuscript. The manuscript of a series of sonnets inspired by his wife is in the possession of Buxton Forman; and likewise a translation (made in 1845-46) of Dante's *Inferno* in the original metre. Consult: Miles (ed.), *Poets and Poetry of the Century,* vol. iii. (London, 1896), which contains an estimate by Forman; Nicoll and Wise (ed.), *Literary Anecdotes of the Nineteenth Century,* vol. i. (London, 1895), which contains a specimen of the Dante, fifty sonnets, and the first two verse pamphlets cited above.

WADE, Sir THOMAS FRANCIS (1818-95). A British diplomat, born in London. He was educated at Harrow, and a year after matriculating at Trinity College, Cambridge, he entered the army (1838). Promoted lieutenant, he went to Hong Kong, becoming regimental interpreter in Chinese (1842); and he took part in the attack on Chinkiang, and in the operations near Nanking during the Opium War. In 1853 he was appointed vice-consul at Shanghai, and was chief of the commission that established the customs administration which developed into the Imperial Maritime Customs Service. He was attached to Lord Elgin's mission in 1857, and negotiated the treaty of Tien-tsin (1858). He assisted in establishing the legation at Peking (1861), where, after experience as chargé d'affaires, in which capacity he conducted the difficult negotiations arising from the Tien-tsin massacre of 1870, he became Minister in 1871. Largely through his effort, audience to Ministers was granted by the Emperor T'ungchih in 1873. As a result of the murder of A. R. Margary in Yun-nan, he negotiated with Li Hung Chang the Chifu convention of 1876. Made C. B. in 1862, Wade was advanced K. C. B. in 1883, and retired. In 1888 he was appointed first professor of Chinese at Cambridge. Among his publications, which include several valuable books for the study of Chinese, are : *The Hsin Ching Lu,* or *Book of Experiments* (1859); *Wenchien Tzu-erh Chi* (1867), dealing with documentary Chinese; and *Yü-yen Tzu-erh Chi* (1867; enlarged 1886), a progressive course in the colloquial Peking variety of the Mandarin dialect. Wade bequeathed his large Chinese library to Cambridge University.

WADHAM (wŏd'am) **COLLEGE.** A college at Oxford, England. It was founded by Nicholas Wadham, of Merifield, Sussex, and Dorothy, his wife, daughter of Sir William Petre, the great benefactor of Exeter College. Sir Nicholas dying in 1609, his plan was carried out by his wife. The site and ruins of the old priory of the Austin Friars were purchased, and the building of the college was begun in 1610, the society being founded by letters patent from James I., in 1612. The original foundation was for a warden, fifteen fellows, fifteen scholars, two chaplains, and two clerks. In 1882 there was a change in the statutes, which provided for a warden, eight fellows, several honorary fellows, two chaplains, college officers, a number of lecturers, eighteen scholars, and some one hundred undergraduates in all. The buildings, dating from the seventeenth century, are very attractive, though not specially remarkable. The garden is one of the most pleasant in Oxford. The college presents to ten livings. Among the distinguished men connected with the college have been Admiral Blake, Sir Christopher Wren, Bishop Ward, Dr. Kennicott, and Frederic Harrison.

WADI, wä'dê, or **WADY** (Ar. *wādī*, from *wadaya*, to flow). Properly, a river or water-course, but more generally a valley or ravine; sometimes also an oasis. These various meanings are due to the climatic and physical conditions of Arabia and Palestine, where all fertility is dependent upon the presence of water, and the streams are, for the most part, during the greater part of the year, mere beds with little or no water, although in the rainy season they frequently become raging torrents.

WADI HAL'FA (valley of grass). The chief town of the district of Wadi Halfa, Egyptian Sudan, on the right bank of the Nile, one mile below the second cataract, in latitude 21° 54′ N., or 6′ south of the Egyptian boundary (Map: Africa, H 2). Here the Sudan military railway branches, one line going to Kerma and the other to Khartum. There is a mosque. Population, with Dabrosa, in 1897, 2675.

WADING BIRDS. A group of birds, within the order Ciconiiformes, prominently characterized by having very long, naked legs, the feet partly webbed, the neck long and capacious, and the beak long, pointed, and strong. The group includes the herons and bitterns (suborder Ardeæ); the storks, ibises, and spoonbills (Ciconiæ); and the flamingoes (Phœnicopteri). Their associates in the order are the totipalmate seabirds (suborder Steganopodes). The waders haunt swamps and marshes, and walk about in the shallows, never swimming or diving, where they catch fish, frogs, reptiles, crayfish, and the like, by a darting of the bill, projected by the very muscular neck. Some are nearly terrestrial and live largely on insects; while the flamingoes (q.v.) are otherwise exceptional. Most of these birds are of large size and have white, gray, or brownish plumage, some developing ornamental plumes (see Aigret); the character and distribution of 'powder-down' patches are an important tribal feature. They are mainly migratory and gregarious, and most of them nest in companies on trees. All are precocial and lay unspotted eggs. See Heron; Stork; and similar titles; and Colored Plate of Wading Birds.

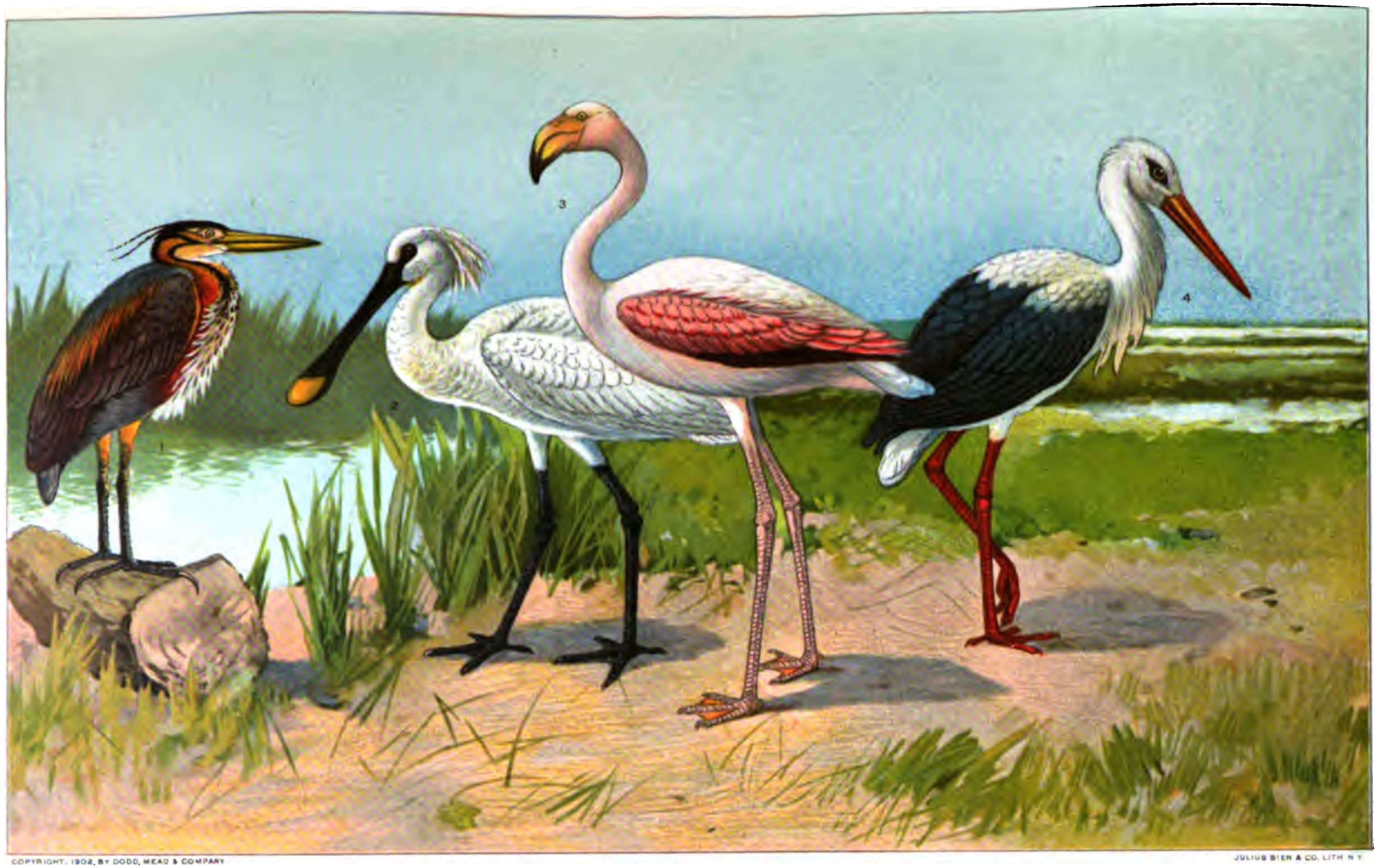
WAD'MAN, Widow. A designing, middle-aged woman in Sterne's *Tristram Shandy*, who seeks to captivate Uncle Toby.

WADS'WORTH, Frank Lawton Olcott (1867—). An American astronomer, born in Wellington, Ohio. He was educated at Ohio State University and at Clark University. In 1892 he became senior assistant in charge of the Astrophysical Observatory, Washington, in 1894 assistant professor of physics in the University of Chicago, in 1896 assistant professor of astrophysics at Yerkes Observatory, and in 1897 associate professor. In 1900 he was appointed director of Allegheny Observatory.

WADSWORTH, James Samuel (1807-64). An American soldier, born at Geneseo, N. Y. He was educated at Hamilton College, at Harvard, and at Yale, though he did not graduate at any of these institutions; studied law under Daniel Webster in Boston and under McKeon and Deniston in Albany, and in 1833 was admitted to the bar, but never practiced his profession, and until the Civil War was occupied with the management of the family estates, comprising altogether about 15,000 acres. He took an active interest in agricultural affairs, and in 1842 was president of the New York State Agricultural Society. In 1861 he was a member of the Peace Convention (q.v.), in which he opposed the granting of extreme concessions to the South, and in June, 1861, soon after the outbreak of the Civil War, he became a volunteer aide, with the rank of major, on the staff of General McDowell. He participated in the first battle of Bull Run; was promoted to the rank of brigadier-general of volunteers in August, 1861; and from March to December, 1862, was military Governor of Washington, D. C. In 1862, also, he was the Republican candidate for Governor of New York, but was defeated by his Democratic opponent, Horatio Seymour. He led a division, with great gallantry, at Fredericksburg and Chancellorsville, and at Gettysburg took a conspicuous part in the first day's fighting and then occupied Culp's Hill, where he helped to repel the Confederate assaults on the second and third days of the battle. Early in 1864 he made a tour of inspection through the Western and Southwestern States; and subsequently, while commanding a division in the battle of the Wilderness (q.v.), May 6th, was mortally wounded, dying two days later. He received the brevet of major-general of volunteers to date from May 6, 1864.

WAECHTER, vek'tẽr, Karl Georg von (1797-1880). A prominent German jurist, born in Marbach-on-the-Neckar, and educated at Tübingen and Heidelberg. The year he left the university for legal practice he was recalled to Tübingen as professor of law. There he stayed until 1833, and in 1836 returned thither after three years in Leipzig, to become professor and chancellor of the university, which he represented in the Estates. From 1839 to 1851 he was president of the Chambers. In 1852 he was called to Leipzig to become professor of the law of the Pandects. He was made a member of the Saxon Council of State in 1855, and privy councilor in 1872. As a jurist Waechter showed great range of knowledge, lecturing and writing on almost every branch of law with an equally remarkable grasp of theory and practice. His more important works are: *Lehr-*

WADERS



COPYRIGHT, 1902, BY DODD, MEAD & COMPANY

JULIUS BIEN & CO. LITH N.Y.

1 PURPLE HERON - ARDEA PURPUREA 1/12 NATURAL SIZE
2 SPOONBILL - PLATALEA LEUCORODIA 1/7 " "
3 FLAMINGO - PHŒNICOPTERUS RUBER 1/12 NATURAL SIZE
4 WHITE STORK - CICONIA ALBA 1/10 " "

buch des römisch-deutschen Strafrechts (1825-26); *Gemeines Recht Deutschlands* (1844); *Beiträge zur deutschen Geschichte* (1845); *Pandekten* (1880-81); and *Deutsches Strafrecht* (1881). Consult his *Life* by his son Oscar (Leipzig, 1881).

WAFER ASH. See HOP-TREE.

WAGER (from OF. *wager*, *guager*, *gager*, Fr. *gager*, to pledge, wager, from ML. *wadiare*, to pledge, from *wadium*, *vadium*, pledge, from Goth. *wadi*, OHG. *weti*, *wetti*, Ger. *Wette*, AS. *wedd*, obsolete Eng. *wed*, pledge; connected with Lat. *ras*, surety, bail, Lith. *vaduti*, to redeem, ransom, and probably with Gk. *ἄεθλον*, *aethlon*, *ἆθλον*, *athlon*, prize of contest). A promise or agreement to pay money or transfer property to another upon the happening or determination of an uncertain event. The promise is given in consideration of the payment of money or transfer of property by the other party to the wager, or a promise on his part to pay money or transfer property if the event fails to happen or if it happens in a particular manner specified by the agreement. The uncertainty of the event may arise either because it has not happened or because it is not known to the parties to the wager. Thus a wager may be made as to the outcome of a race which has not taken place or a wager may be made as to the weight or size of an existing object, the only uncertainty being in the knowledge of the parties to the wager. It will thus be seen that many common forms of commercial contracts are technically wagers. Thus contracts of insurance, contracts dealing in 'futures' in stocks or any commodity, are strictly speaking wagers. At early common law wagering contracts were held to be valid unless they involved some element in addition to the wager which rendered them contrary to public policy and therefore illegal.

There have been numerous statutes also affecting wagers in the form of commercial contracts. The act of 7 Geo. II., c. 8, made illegal all wagers upon the price of stocks by agreements 'to pay differences,' that is, to settle a contract for the sale of stocks for future delivery by paying the difference between the contract and market prices on the date of delivery. This statute was subsequently repealed.

For further consideration of the subject, see the titles GAMBLING; BETTING; OPTION; etc.

WAGER POLICY. In insurance law, a policy covering a risk on a person in whom, or property in which, the insured has no financial interest of dependency, technically known as an *insurable interest*. Such policies are void by the old English common law, and also by virtue of statutes in England, and in the United States where similar statutes have not been enacted, the English law is held to be a part of their common law and applied to such cases. The English insurance companies insure the life of the sovereign for the benefit of tradesmen, however, on the theory that the death of the former would cause a depression in trade and consequent loss to the latter; but this is very near to the border line of speculative insurance. See INSURANCE, and consult the authorities there cited.

WAGES. The reward of economic labor, i.e. exertion systematically directed toward the creation of goods or utilities. Popular usage tends to limit the application of the term to the earnings of hired labor, and frequently the meaning of the term is still further restricted so as to exclude the earnings of professional labor, such earnings being known as fees, honoraria, salaries, etc. Economic writers make no distinction between the rewards for the different classes of services, a prima donna's income being regarded as wages just as the income of the day laborer. Furthermore, economists treat as wages a part of the income of a man who works with his own instruments of production, as, for example, a small farmer. The same thing is true of a part of the 'profit' of the *entrepreneur* who performs the routine work of management. In this sense of the term wages are contrasted with interest (q.v.), rent (q.v.), and profit (q.v.). The four incomes, taken together, make up the whole of the social dividend.

NOMINAL AND REAL WAGES. Wages are most frequently paid in money; but sometimes they are paid partially in goods, privileges and advantages which possess a definite money value. In domestic service, for example, the money value of board, lodging, etc., must be added to actual money payments to give the true wage. Wages thus expressed in terms of money are called *nominal wages*. To estimate the true welfare of the laborer, given the rate of nominal wages, it is necessary to take into account the purchasing power of money. Nominal wages, reduced to terms of purchasing power, are termed *real wages*. The importance of the distinction becomes apparent when one attempts to compare the position of labor in different countries. Differences in money wages signify nothing, unless we are able to estimate differences in the purchasing power of money. The distinction is even more important in historical study. The nominal annual wages of a hind in the thirteenth century, according to Thorold Rogers, amounted to 35s. 8d., less than one-twentieth of the nominal wages of agricultural labor in modern England (£39 in 1891, according to the British Labor Commission). It is certain that real wages have not increased in anything like the same proportion.

THE THEORY OF WAGES. The earliest school of scientific economists, the Physiocrats (q.v.), taught that wages naturally afford the laborer no more than a bare subsistence. The competition of laborers and the strategic advantage of the employer, it was believed, made this result inevitable. Adam Smith advanced a similar view, admitting, however, that in societies in which wealth is increasing wages may exceed the minimum of subsistence. The effect of Malthus's *Essay on Population* was to confirm the view that wages are naturally limited to mere subsistence. The alleged tendency of population to outrun subsistence appeared to demonstrate conclusively that any temporary rise in wages above the necessary minimum would soon be overcome by increase in population. Ricardo held in the main a similar view, but he admitted that the comforts to which a laboring class had become accustomed could not be withdrawn without a slackening in increase of population. The natural price of labor Ricardo defines as "that price which is necessary to enable the laborers, one with another, to subsist, and to perpetuate their race, without either increase or diminution." This theory was adopted by the Socialists as a correct explanation of wages under a capitalistic régime, and has served as one of the chief arguments against the continuance of the present order.

James Mill, McCulloch, Senior, and John Stuart Mill, the followers of Ricardo and Malthus, developed a theory of wages which is known as the *wages fund* theory. It emphasizes the dependence of labor upon capital. Assuming that present wages are paid out of past accumulations, these writers argued that total wages must be limited by capital, or (in the completed theory) by that part of capital which is devoted to the subsistence of labor. Given the magnitude of the wages fund, the average rate of wages may be found by an arithmetical division, the number of laborers being the divisor. In order to increase wages, it was held to be necessary either to increase the wages fund or to decrease the number of laborers. According to this theory, attempts of the laborers to raise wages through combination would necessarily be unavailing, since such combination could affect neither dividend nor divisor. If some laborers succeeded in raising their wages, it would necessarily be at the expense of other laborers.

From about 1820 to 1870 the wages fund theory was generally accepted by English economists. In 1869 the theory was abandoned by John Stuart Mill as a result of Thornton's attacks upon it. The idea that a definite portion of capital is set apart for the support of labor was seen to be fallacious. To a considerable extent modern economists have adopted the so-called *productivity* theory, the ablest of the earlier exponents of which was Francis A. Walker. Wages are not paid out of capital at all; the product of labor is the natural reward of labor, and the money wage represents not an advance, but a price paid for a product already created. The same idea was ably defended by Henry George. Recent discussions of the wages question have largely turned upon the significance of the term 'productivity of labor.' Von Thünen demonstrated that it is the product of the laborer who is in the least advantageous situation that really determines wages. This theory has been still further developed by Professor J. B. Clark, whose work makes it clear that under free competition it is possible to discover units of labor which are virtually unaided by capital or land, and that the pure product of such units sets the standard for all units of labor.

Adherents of the productivity theory are under no necessity of believing that the wages of labor are incapable of substantial and indefinite rise. An increase in wages naturally increases the efficiency of labor, and hence its natural reward. High wages may thus be more economical from every point of view than low.

A revival of the old idea that wages depend on the cost of subsistence of the laborer appears in the modern theory of the dependence of wages upon the standard of living. As expounded by Gunton, this theory teaches that wages tend toward a standard which just covers the needs of labor; to raise wages, it is essential that needs should be increased. Labor of women and children is regarded as having a depressing influence on the wages of men, since the needs of the husband and father are reduced through the possibility of an income earned by other members of the family. Savings of laborers, resulting in an income through interest, result in a proportional decline of wages. If laborers eschew comforts and luxuries, with the hope of having a surplus of income above needs, the only result in the long run will be a fall in wages until they cover necessaries only. Critics of this theory point out that it would be true only if the Malthusian doctrine that population tends to outrun subsistence were correct; and at present no one would hold to that doctrine in its unqualified form. Employment of women and children may, indeed, depress wages of men, but that fact is due partly to the decline in efficiency of the population, and partly to the fact that an increase in labor supply renders necessary the resort to poorer opportunities of employment, and a consequent lowered standard of wages.

Causes Determining the Rate of Wages. If the standard of wages is set by the productivity of the laborer whose position is least satisfactory (as appears to be approximately true), the causes determining the productivity of labor must determine the rate of wages. An increase in the quantity of land available for cultivation through improvements in transportation will make it possible for labor to abandon employments which produce little, and devote itself to the cultivation of new lands of unimpaired fertility. The product of the laborer in the least advantageous position rises, and with it wages. On the other hand, an increase in population, attended by no other change must force labor to poorer and poorer positions, with a universal lowering of wages. An increase in capital, again, will give each laborer a more complete outfit of tools, etc., and thus increase his productivity, raising wages. Labor-saving inventions, it is generally believed, while they lower wages of certain classes of labor, increase in the long run the productivity of labor. But while productivity determines what the laborer will, in the long run, secure, it is not always the case that a laborer is able to secure his whole product. The laborer may be able to sell his labor to only one employer, who thereby is enabled to fix his own price. It is only when competition is active, or when labor and capital meet on equal terms, that the laborer is sure of getting exactly what he produces.

Trade Unions and Wages. A trade union, by preventing an employer from taking advantage of the weakness in bargaining of the individual workman, may raise the rate of wages to the level of productivity. By excluding labor from a certain occupation it may artifically raise productivity within that occupation, and so increase wages for its own members. The excluded labor, of course, is compelled to accept employment less remunerative than that of other labor, and so lowers the standard of wages for all outside of the union. For a general discussion of the effect of trade unions upon wages, see Trade Unions.

The Tariff and Wages. It has long been a disputed point whether a protective tariff (see Protection) raises wages in the nation as a whole. If the tariff withdraws labor from a highly productive industry and places it in a less productive one, it appears to be clear that the standard of wages is lowered. If, on the other hand, the protected industry, when once established, will be more productive than the average of other industries, the ultimate result of the policy of protection will naturally be to raise wages.

Restriction of Output and Wages. Many laborers believe that wages would be increased if the hours of labor could be reduced in number, or if laborers would systematically endeavor to produce as little as possible. Prices, they believe, would rise, and with them wages. The view is fallacious, since it fails to take into account the fact that rise in prices would force the laborer to pay more for everything which he buys, so that the apparent rise in wages would represent no net gain. Restriction of output in some one industry, however, may raise wages there, if other labor can be excluded from the industry. Such a raising of wages is largely at the expense of the excluded labor, the disadvantage to laborers as a class exceeding the advantages to special groups.

Time and Piece Wages. Time wages represent the price for a certain number of hours of the worker's time; piece wages a payment for a task accomplished. When labor consists in a series of definite operations, as in the making of certain portions of shoes, etc., the efficiency of labor can be accurately tested by quantity of product. Payment in proportion to product is likely to stimulate the workers to greater effort than payment in proportion to time. The plan is, however, unpopular with most laborers, because they believe that it results in a degree of strain which is injurious to the physical health of the worker; and, moreover, because of an alleged tendency of employers to reduce wages whenever the increased energy of the workers affords them much more than the average rate of pay. From the point of view of society, it is probable that every increase in the efficiency of labor increases the sum of wealth obtained by the working class as a whole; and, therefore, so far as the piece-wage system increases time efficiency, it is advantageous to labor.

Women's Wages. In most countries the average wages of women are much lower than those of men. An inquiry made in 1884 showed that in Great Britain the average earnings of women were 41 per cent. of those of men; in Massachusetts, 51 per cent. The percentage is probably slightly higher at present. In France, in agriculture the daily wages of women are about 60 per cent. of those of men; in manufactures, about 50 per cent. In only a few occupations do women earn as much per day as men. This is due in part to the fact that women do not possess the strength and endurance of men, partly to the fact that they are likely to be at a disadvantage in selling their labor, owing to their inability or reluctance to seek new employers. But the chief cause appears to be that there have hitherto been so few occupations open to women that they have overcrowded those which were open, reducing the productivity of labor and its reward. This view is supported by the fact that in industries which women enter the wages of men engaged in the same kind of labor frequently fall so low as to force most of the men to seek other forms of employment.

Wages in the United States. In his *Industrial Evolution of the United States* (1895) Carroll D. Wright, United States Commissioner of Labor, traces the course of wages in American industry during the progress of a century. From the nature of the case, these wages refer chiefly to the Eastern and Middle States. Wages rose rapidly after 1790 with the advent of the factory system. Thus carpenters were paid less than sixty cents a day in 1790, over seventy cents in 1800, one dollar and nine cents in 1810, one dollar and thirteen cents in 1820, and about one dollar and thirteen cents in 1830, reaching a maximum of one dollar and forty cents, however, in the northern parts of the country for the period from 1830 to 1840. From 1840 to 1860 there was little change in the wages of carpenters. The wages of laborers also rose from about forty-three cents a day in 1790 to over eighty-two cents a day in 1810-20. Similar increases are noted for the wages of printers, cotton and woolen operatives, and other wage-earners. From 1830 on the records of wages are more complete. "In 1831 daily wages for agricultural laborers ranged from 57½ cents to $1; blacksmiths received from $1 to $1.25 per day. The daily average for carpenters was $1.07, while masons received $1.26. Since 1873 wages in these staple occupations have more than doubled. . . . Considering the wages for the great mass of wage-earners, the common and agricultural laborers, during the entire period since 1633, the daily wages for the best laborers advanced from twenty-five cents to thirty-three and a third

YEAR	A. Prices in gold (1)	B. Prices (2)	C. 25 occupations wages gold, wages for 1891 being 100 (3)	D. Wages 192 occupations (4)	E. Wages of farm labor in gold per month without board (5)
1869.........	....	......	....	....	104.8
1870.........	119.0	......	84.64	....	
1871.........	122.9	......	94.00	....	
1872.........	121.4	......	96.26	....	
1873.........	114.5	......	92.13	....	
1874.........	116.6	......	90.46	....	
1875.........	114.6	......	88.11	....	
1876.........	108.7	......	85.65	....	92.9
1877.........	107.0	......	88.21	....	
1878.........	103.2	......	90.66	....	
1879.........	96.0	......	91.12	....	88.3
1880.........	104.9	......	91.94	....	
1881.........	108.4	......	94.59	....	
1882.........	109.1	......	96.16	....	101.7
1883.........	106.6	......	97.05	....	
1884.........	102.6	......	97.83	....	
1885.........	93.3	......	97.15	....	96.6
1886.........	93.4	......	97.15	....	
1887.........	94.5	......	97.93	....	
1888.........	96.2	......	98.52	....	98.0
1889.........	98.5	......	98.82	....	
1890.........	93.7	......	99.81	....	98.6
1891.........	94.4	95	100.00	100.00	100.00
1892.........	....	90	100.59	100.30	
1893.........	....	90	99.94	99.32	102.6
1894.........	....	82	97.98	98.26	95.4
1895.........	....	81	97.19	97.88	95.1
1896.........	....	77	96.60	97.93	
1897.........	....	73	96.11	98.96	
1898.........	....	79	95.62	98.79	104.2
1899.........	....	77	....	101.54	108.7
1900.........	....	90	... .	103.43	
1901.........	..... .	88	....	....	

(1) January 1. Aldrich Report, Senate Report, Fifty-second Congress.

(2) Year ending June 30th. Bureau of Economic Research.

(3) Year ending December 31st. Bulletin of Department of Labor, September, 1898.

(4) Year ending December 31st. Bulletin of Department of Labor, July 1900.

(5) Year ending December 31st. Department of Agriculture, Miscellaneous Series, 1901.

cents immediately before the Revolution, to forty-two and a half cents immediately after, and during June of 1891 the wages of common laborers ranged from $2.50 in Montana to 75 cents in the Carolinas and $1.25 in New York."

The preceding table, showing the relative movement of wages and wholesale prices in the United States for a series of years, is taken in its present form from the *Report of the Industrial Commission*, vol. xix. The original sources are appended. The wages in Column C are taken for twenty-five occupations representing building trades, machine trades, and the higher grades of railroad employees, together with street laborers and teamsters. The wages in Column D are for 192 occupations. In each case they have been averaged and compared with the wages for 1891, which are represented by 100.0. From these tables wages seem to rise rapidly from 1876 to 1893, and then to fall until 1898.

Bibliography. A large part of all systematic treatises on political economy is devoted to the theory of wages. Consult also Von Thünen, *Der isolirte Staat* (Rostock, 1842-63); Thornton, *On Labour* (London, 1870); Walker, *The Wages Question* (New York, 1876); Taussig, *Wages and Capital* (ib., 1896); Clark, *The Distribution of Wealth* (ib., 1899). For history of wages, consult: Rogers, *Six Centuries of Work and Wages* (London, 1894); Giffen, *Progress of the Working Classes* (New York, 1885); and Wright, *Industrial Evolution of the United States* (ib., 1895). Also Reports of the Labor Department of the British Board of Trade; Reports of the United States Department of Labor, and Reports of Massachusetts Board of Labor Statistics. See Political Economy; Trade Unions; Socialism; Labor.

WAGMÜLLER, väg′mṳ-lẽr, Michael (1839-81). A German sculptor, born near Regensburg. He attended the industrial school in Munich, and also the Academy of Arts. In 1868 he made the first of his many trips to London, where he executed busts of several noted persons. In all his sculpturing he showed a strong tendency toward the art of a painter, with his lifelike poses and flying draperies. Two of his most natural works are a maiden pursuing a butterfly, and a girl startled by the sudden appearance of a lizard. He executed a Liebig memorial in the Maximiliansplatz at Munich. After Wagmüller's death his bust of Liebig was perpetuated in marble by one of his pupils.

WAGNER, väg′nẽr, Adolf (1835—). A German economist, born at Erlangen. He studied jurisprudence and political science at Göttingen and Heidelberg; in 1858 became professor of political economy and finance at the Commercial Academy at Vienna; in 1865 was made professor of statistics at the University of Dorpat; in 1868 was called to the chair of political science at the University of Freiburg; and in 1870 became professor of political science at the University of Berlin. In the same year he was made a member of the Royal Statistical Bureau of Prussia. From 1882 to 1885 he was a member of the Prussian Lower House. He was one of the founders of the Verein für Socialpolitik.

Wagner's literary work began with studies in finance, his doctor's dissertation being a monograph on the science of banking (*Beiträge zur Lehre von den Banken*, 1857). In 1866 he published works on social and financial statistics. His work in economics proper began with a revision of Rau's *Lehrbuch der politischen Oekonomie*, appearing in 1875 and 1876. In later editions, the work, which came to bear no direct relation to the original work of Rau, was published under the title *Lehr- und Handbuch der politischen Oekonomie*, of which the *Grundlegung* was Wagner's own work (1892-94), as well as the *Finanzwissenschaft* (in four parts, 1877-1901, several revised editions of first three parts). The *Grundlegung* and the *Finanzwissenschaft* are the best known and most ambitious works of Wagner. In addition, he has published a long list of books and articles, chiefly on practical problems of economics and social science.

Wagner approaches economics from the point of view of jurisprudence and statistics. His method is mainly inductive, although in his *Grundlegung* he shows a marked tendency toward the deductive methods of the theoretical branch of economics. Although sometimes classed with the "Historical School" (see Political Economy), he was vigorously opposed to the view that historical and inductive studies make up the whole of fruitful economic science. In his work on finance he manifests a decided predilection for the extension of State functions, and has therefore not infrequently been regarded as a Socialist; he recognizes, however, the weaknesses of the pure socialistic theory, and seeks to establish the proper limits of individualism and socialism.

WAGNER, Alexander (1838—). An Hungarian painter, born at Budapest. After studying for two years at the Vienna Academy, he entered the school of Piloty in Munich, won his first success in 1859 with "Isabella Zapolya Taking Farewell of Transylvania," and executed for the National Museum in Munich the mural paintings "Entry of Gustavus Adolphus into Aschaffenburg" and "Marriage of Otto II. of Bavaria to Agnes von der Pfalz." The early development of his brilliant technique brought him such tasks as the frescoes in the Redoutengebäude at Budapest, "Banquet of Attila" and "Tournament Between King Matthias Corvinus and Knight Holubar," and the two paintings acquired for the National Museum, "Death of Titus Dagovich" and "Castle Vajda-Hunyad with Matthias Corvinus and Hunting Train." In 1866 he became professor at the Munich Academy. Of his genre scenes produced since the seventies, with a special view to the spirited action of the horse, there are to be noted "Csiko's Race" (1876), "Post Near Toledo" (1879), "Picador in Bull-Fight" (1880), "Horses Driven Over the Puszta" (1886), "Return from Hay Harvest in Hungary," in the Municipal Gallery, Nuremberg, and others.

WAGNER, vȧg′nâr′, Charles (1852—). A French moral essayist and Protestant clergyman. After studying at Paris, Strassburg, and Göttingen, he served in several Protestant missions in the provinces, went to Paris in 1882, and aroused general interest by his effective protest against the degenerating tendencies of Parisian literature and life in *La jeunesse* (1893, trans.), *Le courage* (1894, trans.), *La vie simple* (1895; trans. 1901), and other volumes.

WAGNER, văg′nĕr, Heinrich Leopold (1747-79). A German poet, born at Strassburg. He studied law in his native city, and in 1774 settled at Frankfort. At Strassburg he made the acquaintance of Goethe, while both were students. The friendship was continued at Frankfort. Wagner published two tragedies, *Die Reue nach der That* (1775) and *Die Kindesmörderin* (1776), both of which discuss social problems with revolting crudity. His talent is seen to better advantage in *Prometheus, Deukalion und seine Rezensenten,* and *Voltaire am Abend seiner Apotheose,* dramatic satires. Wagner was the oldest of Goethe's followers, and a typical poet of the so-called 'storm and stress' period. He had a lively fancy, but lacked taste and the sense of literary form. Consult Schmidt, *Heinrich Leopold Wagner, Goethes Jugendenosse* (2d ed., Jena, 1879).

WAGNER, Hermann (1840—). A German geographer and statistician, a brother of the economist Adolf Wagner, born at Erlangen. He studied at Erlangen and Göttingen, and in 1864 received an appointment in the gymnasium at Gotha. He became connected with the Justus Perthes Geographical Institute, edited from 1868 to 1876 the statistical section of the *Gothaer Almanach,* and in 1872 founded *Die Besölkerung der Erde,* a periodical devoted to the statistics of area and population. In 1880 he became professor of geography at Göttingen. Since 1879 he has been editor of the *Geographisches Jahrbuch.* He has published *Lehrbuch der geographie* (1894-95) and *Methodischer Schulatlas* (10th ed. 1902).

WAGNER, Johann Martin von (1777-1858). A German sculptor, born at Würzburg. He studied under his father, Johann Peter Alexander Wagner, and then in Vienna under Füger. At Rome in 1808 he painted "The Heroes Before Troy," and illustrated Goethe's *Götter Griechenlands.* Louis I. made him director of the gallery at Munich. The bas relief "An Eleusinian Festival" (1819) and the great frieze of Walhalla (1827-37) at Regensburg are among his best works. Consult Ulrichs, *Johann Martin von Wagner* (Würzburg, 1866).

WAGNER, Moritz (1813-87). A German traveler and naturalist, born at Bayreuth. He studied at Erlangen and Munich; after which he traveled in Algeria, and upon his return published *Reisen in der Regenschaft Algier* (3 vols., 1841). In 1842-45 he explored the Caucasus, Armenia, and Kurdistan. The results of these explorations appeared in *Der Kaukasus und das Land der Kosaken* (2 vols., 1847); *Reise nach dem Ararat und dem Hochlande Armeniens* (1848); *Reise nach Persien und dem Lande der Kurden* (2 vols., 1852). Later he spent three years in North America and Central America with Karl Scherzer, and they jointly published *Reisen in Nordamerika* (3 vols., 1854) and *Die Republik Costa-Rica* (1856). From 1857 till 1860 Wagner was engaged in exploring the region of Panama and of the northern Andes. On his return he became professor of geography and ethnology in the University of Munich. Among his publications, besides those mentioned, are *Die Darwinsche Theorie und das Migrationsgesetz der Organismer* (1868) and *Naturwissenschaftliche Reisen im tropischen Amerika* (1870).

WAGNER, Richard (1813-83). The originator of the music-drama, and one of the greatest of all musical geniuses. He was born at Leipzig, May 22, 1813, the ninth child of Karl Friedsohn Wagner and Johanna Rosina Bertz Wagner. The father, who was a clerk in the police court, and during the French occupation of Leipzig was chief of police, died five months after Richard's birth. His widow, left in straitened circumstances, married in 1815 Ludwig Geyer, an actor, playwright, and portrait painter in Dresden, whither the family removed.

Wagner's own father had been fond of poetry and the drama, and devoted to amateur acting. From him Richard inherited, and in the surroundings of his stepfather's home absorbed, that love of the theatre which later directed his musical gifts toward the stage. At the Kreuzschule he wrote, in competition with his classmates, verses on the death of a schoolmate, which received the distinction of being printed. He aimed at the colossal even as a boy; his admiration for Shakespeare led him at fourteen years of age to begin a tragedy, which he described as a jumble of *Hamlet* and *Lear.* So many poeple died in the course of the first four acts that their ghosts had to return to keep the fifth act going. He was deeply impressed by Weber's music, and so moved by Beethoven, several of whose symphonies and whose *Egmont* music he heard at the Gewandhaus, in Leipzig—the family having returned there after Geyer's death in 1820—that he decided to write music for his tragedy. First he tried to teach himself; then he took lessons of Gottlieb Müller, who was too pedantic, however, for Wagner's assertive individuality. An overture composed by him at this time was played between the acts at the theatre where his eldest sister had an engagement. He had written the score in three different inks—the strings in red, the reeds in green, and the brasses in black. Every four bars a loud beat was required of the drum-player. At first the listeners were puzzled, then they became impatient, finally they laughed. In 1830 he entered the University of Leipzig. At this time he began studying music with Theodor Weinlig, to whom as late as 1877 he paid a high tribute. A sonata and a polonaise (piano duet), without Wagnerian characteristics, date from this period, and a *C Major Symphony,* which was performed at Leipzig in January, 1833, has an interesting history. Wagner gave it to Mendelssohn, hoping for another performance. Nothing came of it. We know it was Mendelssohn who played the *Tannhäuser* overture at the Gewandhaus "as a warning example." After Mendelssohn's death all search for the manuscript proved fruitless. But in 1872, in an old trunk which Wagner had left in Dresden when he fled during the Revolution of 1849, an almost complete set of the parts was found. A score was compiled from these, and Christmas Eve, 1882, nearly half a century after its composition and within a few weeks of his death, Wagner conducted this early work at a private performance in Venice.

In 1833, at the age of twenty, he became a professional musician, accepting the post of chorus master at Würzburg, where his brother Albert was a tenor, actor, and chorus master. He became successively for brief periods conductor at Magdeburg, Königsberg, and Riga, composed the operas *Die Feen* and *Das Liebesverbot* (based on Shakespeare's *Measure for Measure*), and the overtures *Columbus* and *Rule Britannia;* wrote a libretto sketch *Die hohe Braut*, which he sent to Scribe, who took no notice of it; and added to his financial burdens, already critically heavy, by marrying, in 1836, Minna Planer, an actress in Königsberg.

As Kapellmeister at Riga (1837-39) Wagner completed the libretto and the first two acts of *Rienzi*. With his wife he took passage in a sailing vessel from Pillau to London, and during the tempestuous voyage gained his first inspiration for *Der fliegende Holländer*. After passing eight days in London and four weeks in Boulogne, he arrived in September, 1839, at Paris, where he remained until April, 1842, passing through some of the bitterest experiences of his career. At one time he was so impoverished that he offered himself as a chorus singer at a small Boulevard theatre, but was refused for his lack of voice. The first version of *A Faust Overture* was finished in 1840 (remodeled in 1855), and, through Meyerbeer's influence, he sold to Pillet, director of the Opéra, his *Flying Dutchman* sketches, for which, however, Foucher and Revoil were commissioned to write the libretto and Pierre Louis Philippe Dietsche the music. The result, the *Vaisseau fantôme*, soon disappeared from the stage, but, by an irony of fate, Dietsche conducted nearly twenty years later the *Tannhäuser* performances which made such a colossal and famous fiasco at the Opéra.

After selling his *Flying Dutchman* sketches Wagner at once set to work on his own version. He had sent the score of *Rienzi* to Dresden, where it had aroused the enthusiasm of the chorus master, Wilhelm Fischer, and of the tenor, Tichatschek. It was accepted and produced October 20, 1842. Schroeder-Devrient was the Adriano, and Tichatschek the Rienzi. *Rienzi's* success led to the production of *Der fliegende Holländer*, January 2, 1843, which was received with only moderate favor. Plainly this sombre but beautiful work was ahead of the times. Spohr, who produced it at Cassel the following June, was the only eminent musician who then approached Wagner with cordiality. Had Wagner not been as true as steel in all matters relating to art, he would have taken his cue from the ill success of the *Dutchman* and reverted to the brilliant style of *Rienzi*. But *Tannhäuser* was his answer to the public that had failed to appreciate *The Flying Dutchman*.

Meanwhile, in January, 1843, he had become one of the conductors of the Dresden opera. His revival and revision of Gluck's *Iphigenia in Aulis* attracted much attention, as did also his performance of the *Ninth Symphony*, with new and striking readings of the score.

Tannhäuser was produced at Dresden, October 19, 1845, and proved even a greater puzzle to the public than the *Flying Dutchman*. Liszt, however, brought it out at Weimar late in 1848, an achievement which led to the now historic Wagner-Liszt friendship, in which Liszt played one of the noblest and most self-sacrificing rôles ever taken by genius. "I once more have courage to suffer," wrote Wagner after hearing of the Weimar performance; while Liszt replied: "So much do I owe to your bold and high genius, to the fiery and magnificent pages of your *Tannhäuser*, that I feel quite awkward in accepting the gratitude you are good enough to express with regard to the two performances I had the honor and happiness to conduct."

Lohengrin was finished in 1848, but Dresden was afraid to produce it. Undaunted, however, Wagner took up other subjects. Sketches for an opera on the Saviour are interesting in view of his allegorical treatment of the subject more than thirty years later in *Parsifal*. The story of Barbarossa also was considered, but abandoned for the Nibelung myth. The drama *Siegfrieds Tod*, in alliterative verse, which formed the basis of the *Götterdämmerung*, was written in the autumn of 1848. More than a quarter of a century and much heart-breaking storm and stress were to intervene before Wagner's ambitions regarding the work into which this drama developed were realized.

A venture in publishing his scores resulted in great pecuniary embarrassment. Believing that political changes might lead to more advanced ideas in art, he joined in the revolutionary agitation of 1848-49. When the revolution failed he fled first to Paris and then to Zurich. He was so impoverished that Liszt was obliged to furnish Frau Wagner with the means of joining her husband, and in spite of the moral grit which came to Wagner through his passionate devotion and loyalty to his art, it is questionable if he could have stood the strain without the aid which his brother artist so generously extended to him. An even greater solace was Liszt's production of *Lohengrin* at Weimar in August, 1850. It acted as a tonic on Wagner. He became all activity. For, though at a distance, he directed the production as well as he could through numerous written instructions. This performance was one of the most important events in Wagner's career. It started the now historic 'Wagner question,' which was fought out in a fierce war of words, with vituperation almost unheard of in art matters, on the part of Wagner's enemies, covering many years; the Wagner cause, however, forging steadily ahead and becoming finally triumphant. A letter from Wagner to Liszt, November 20, 1851, shows that the *Nibelung* dramas were written backward. Finding that certain narrative episodes in *Götterdämmerung* needed to be set forth on the stage, he wrote *Siegfried*. Finding that even this did not wholly clear up matters, he wrote *Die Walküre*, and as a further explanatory prelude to these three, *Das Rheingold*. The same letter proves that he also appreciated the impossibility of producing the work except "at a great festival, to be arranged perhaps especially for the purpose of this performance."

Wagner finished the composition of *Rheingold* in May, 1854, but there is evidence that the music of the "Ring" had been in his mind some time before he penned the score. Dr. William Mason visited Wagner in Zurich in June, 1852, and the composer gave him in autograph the Dragon Motive essentially as it is found in the first act of *Siegfried*. Yet the music of this act was not sketched out until several years later. In 1855 he was somewhat relieved financially by an en-

RICHARD WAGNER
FROM A PAINTING BY FRANZ LENBACH

gagement to conduct the London Philharmonic concerts. For that conservative body he was, however, far too progressive. "The directors continually referred me to what they chose to call the Mendelssohn traditions." Meanwhile the composition of the *Ring* continued, but not without many moments of depression. "Brünnhilde sleeps, I am, alas, still awake," he wrote to Liszt; and again (January, 1857), "My nervous system resembles a pianoforte very much out of tune, and on that instrument I am expected to produce *Siegfried*. Well, I fancy the strings will break at last, and then there will be an end. We cannot alter it. This is a life fit for a dog."

In 1857 he was so disheartened that he abandoned the composition of the *Ring* at the *Waldweben* scene in *Siegfried* and turned to *Tristan*, probably instigated by a call from an agent of the Emperor of Brazil, who asked if Wagner would compose an opera for an Italian troupe at Rio de Janeiro and conduct the work himself. *Tristan* was intended to be a 'thoroughly practicable work'—short and comparatively easy to perform. As a fact it is the most advanced of Wagner's music-dramas. In Vienna, in 1861, it was pronounced impossible after fifty-seven rehearsals; and its production could not be secured until June, 1865, at Munich, after King Ludwig of Bavaria had become Wagner's patron.

The famous Paris fiasco of *Tannhäuser* occurred in March, 1861. The hostile demonstrations which resulted in its withdrawal after three performances were instigated by the Jockey Club, partly because Wagner refused to introduce a ballet, partly to show disrespect toward the Emperor, who, at the urging of Princess Metternich, had commanded the production. But the treatment accorded Wagner made a hero of him in Germany and the ban of exile was lifted from him, except in Saxony, where he was not amnestied until later. On May 15, 1861, in Vienna, he heard *Lohengrin* for the first time. He had been obliged to wait thirteen years after its composition for this privilege.

Wagner now took up *Die Meistersinger*. As early as 1845 he had sketched the story as a humorous sequel to *Tannhäuser*. He worked on the score at Biebrich and also at Penzing, near Vienna, where in 1863 he published his *Nibelung* dramas, expressing the hope that the bounty of some German ruler would make the production of his work possible. But in the spring of 1864, worn out by his struggle with poverty and broken in spirit, he determined to give up his public career and eagerly grasped the opportunity to visit a private country seat in Switzerland. On a détour to Stuttgart he was found there by a messenger from King Ludwig of Bavaria, and thus, at perhaps the most critical and darkest moment of his life, he received promise of the aid which was to enable him to realize his artistic hopes. *Tristan* was produced in Munich in June, 1865, after most exacting rehearsals under Von Bülow. Intrigues at Court and in musical circles forced Wagner to leave Munich, and he took up his residence near Lucerne. The King, however, continued his steadfast patron, and *Die Meistersinger von Nürnberg* was produced June 21, 1868, at the Bavarian capital, where in 1869 and 1870 *Rheingold* and *Die Walküre* also were given.

In 1870, Wagner, his first wife having died January 25, 1866, married Bülow's divorced wife, Cosima, a daughter of Liszt and the Countess d'Agoult. Bayreuth having been determined on as the site for the theatre to be built for the production of the *Ring*, Wagner took up his residence there in April, 1872. At last, twenty-eight years after its conception, August 13, 14, 16, and 17, 1876, *The Ring of the Nibelung* was performed at Bayreuth. In June, 1882, *Parsifal* was produced. In the autumn of that year, Wagner's health being poor, he left his Bayreuth villa, 'Wahnfried,' for Venice. On February 13, 1883, he died there of heart disease at the Palazzo Vendramin. He is buried in a vault in the garden of 'Wahnfried.'

WAGNER'S ART THEORIES. Wagner practically represents the entire evolution of music since Beethoven. He may be said to have changed the whole face of music. He found it progressing along well-defined, almost rigid classical forms, which, while they guided, also fettered inspiration. He broke through these and established for the composer complete freedom of choice in expression. This is a far more important achievement than his reform in matters operatic, which usually is regarded as entitling him to his greatest fame. No mistake is more common or less justified than to look upon him simply as a composer for the stage. Whether his music is heard in connection with stage action or independent thereof, it is effective and beautiful as pure music. His music-dramas have long furnished the most popular selections for the concert room. His whole theory of the music-drama, with 'continuous melody' taking the place of the separate aria, romanza, or scena of old style opera; his whole system of leading motives, would have remained merely theory and system, had he not possessed the marvelous gift of musical invention which enabled him to touch them with life. The advance in the art of instrumentation due to his almost magical insight into the production of tone-color effects seems measured by centuries instead of only by the decades between him and the masters of the classical school. And this he has accomplished with hardly any additions to the instruments they employed—simply by a genius for instrumental combinations which enabled him to produce the exact expression of thought or feeling desired. New and daring harmonies, original and bold contrapuntal combinations, a wealth of chromatic progression and enharmonic modulation unite with most vivid and graphic instrumentation, thematic fertility, and vocal declamation or song, to raise Wagner to an artistic height of which, even now, many still are unable to take the measure; and all these means are not employed at haphazard, but in every instance for the purpose of producing a legitimate effect. He wrote his own libretti, and whatever faults of length may be charged against them, a strong dramatic impulse runs through them and they abound in powerful climaxes. Wagner was intensely German, and his use of old German legendary material did much to revive popular interest in Germany in this branch of national literature.

Passing over *Das Liebesverbot* and *Die Feen*, as early works, *Rienzi* is found to be an opera of the brilliant Meyerbeer type. A steady advance toward music-drama is apparent in *Der fliegende Holländer*, *Tannhäuser*, and *Lohengrin*, until in *Der Ring des Nibelungen* we at last have the full fruition of his theories. The four scores of the cycle are woofs of leading motives, the orchestra, like the Greek chorus, eloquently commenting upon or emphasizing the stage action or participating in it like a dramatis persona. Nothing would seem more perfectly adapted to a plastic union of music and drama than the leitmotiv (q.v.) ('leading motive' or typical phrase). It is a musically expressive melody which at the same time typifies a character, thought, or impulse, in the drama; and which is ever changing throughout the action, according as the relations of the person, thought, or impulse it typifies vary in the drama. Up to, and including, *Lohengrin*, Wagner may still be said to have composed operas, though *Tannhäuser* and especially *Lohengrin* already have certain characteristics of his more advanced style, but the *Ring*, *Tristan*, *Meistersinger*, and *Parsifal* are music-dramas.

Before giving the *Ring* dramas their final form he became imbued with Schopenhauer, and Brünnhilde's immolation may be regarded as that philosopher's 'Negation of the will to live' expressed in action and music. It is the woman Brünnhilde whose sacrifice causes the 'dusk' of the gods of mythology and the dawn of the new human era. The self-sacrificing grace of woman and man's redemption through it is a favorite topic of Wagner (Senta, Elizabeth); in Isolde's death over Tristan's body we have typified the Oriental philosophy of the remingling of the soul with the universe; and *Parsifal* is the story of Christ symbolized for the stage. The finale of the first act is nothing less than a communion service with a choir in the dome, a chorus on the stage, an orchestra in the sunken space, and tolling bells without, a colossal aggregation of effects, yet all for a valid artistic purpose. Therein is the key to Wagner's greatness. For this reason, too, all of his scores, although unmistakably Wagnerian, differ from one another according to their subjects. The music of *Tristan*, for example, clothes that drama in a raiment of many yet ever blending tone colors. But it could not be fitted to any of his other dramas. *Die Meistersinger* is Wagner's only music-drama with a touch of absolute comedy. Yet it too is not without its philosophy. In the form of a charming mediæval romance, it symbolizes Wagner's own career. The Meistersinger, with their blind adherence to their arbitrary rules of poetic and musical compositions, and the crabbed, intriguing Beckmesser typify the Philistines and the vituperative critics who so embittered Wagner's career. The noble knight, Walther von Stolzing, who is free and untrammeled by tradition, is the composer himself. Hans Sachs, who recognizes his genius, is the enlightened public through whom Wagner finally triumphed.

Wagner's influence in operatic reform was largely directed toward suppressing the undue ascendency of the prima donna. Opera had sunk absolutely to the level of a series of detached pieces intended wholly for vocal display. The Wagner music-dramas require great singers, but these do not absolutely dominate everything. Moreover, an intellectual and dramatic grasp of their rôles is demanded of them, and it is through their interpretations, viewed from a higher standpoint than that of mere *solfeggio*, that their achievements now are judged. No longer, too, are inane librettos, like those of the old-style operas, tolerated. ("What is too stupid to be spoken is sung."—Voltaire.) The book of the modern musical stage work has become, thanks to Wagner, a thing of serious moment. As for the reform wrought through Wagner in the scenic setting, mechanical effects, and staging of opera, that is too obvious to need more than reference.

Besides Wagner's stage works there may be mentioned his *Kaisermarsch* (in celebration of the forming of the new German Empire), *Huldigungsmarsch* (dedicated to King Ludwig), *Centennial March* (see below), and *Siegfried Idyll*. He composed some beautiful songs. In addition to his libretti, he wrote much in defense of his theories, and among other essays his famous *Das Judentum in der Musik* (1852), which caused intense feeling and subjected him to many attacks. It drew out more than a hundred published replies.

WAGNER'S MUSIC IN AMERICA. Although Wagner never was in this country, the possibility of his coming over here often is referred to in his letters. References occur as early as 1848. In a letter to his friend Wilhelm Fischer, chorus master of the Royal Theatre, Dresden, he speaks of America as a 'possible money source.' In 1855 Ferdinand Praeger contributed to the *Musical Gazette*, published in New York by Mason Brothers (sons of Lowell Mason), two letters from London describing Wagner's work with the London Philharmonic Society. His personal characteristics also were interestingly set forth and these letters, contributed at this comparatively early date to an American periodical, are noteworthy items in the Wagneriana of those days. In April, 1855, the New York Philharmonic Society, during the first year of Carl Bergmann's conductorship, and in its thirteenth season, gave its first performance of a Wagner work—the *Tannhäuser* overture, which made a profound impression. Possibly it was this, coupled with the Praeger letters, which led Mason Brothers to make Wagner an offer to come to the United States. The amount offered seems to have been from $10,000 to $12,000, and he was to conduct concerts in the country for six months. The offer was the subject of some interesting correspondence between Wagner and Liszt. Though generous for the times and a godsend to Wagner in his unfortunate circumstances, his artistic conscience dictated that he should remain closely in touch with German sentiments and ideals in the working out of his colossal theory of a new type of musico-dramatic production. In all matters at issue between his material needs and his artistic conscience Wagner always decided promptly in the latter's favor; and he declined the offer. In 1873 an offer came to him from Chicago, with promise of ample capital, to produce his *Ring of the Nibelung* there. But again he realized that his mission lay in Germany. In 1880 he put an end to all further offers by stating that he would not come to America for less than $1,000,000.

Probably Wagner's music was first played in the United States by the traveling Germania Orchestra, which came over in 1848, and whose repertoire included the *Rienzi* and *Tannhäuser* overtures. The first production of a Wagner opera in America occurred at the Stadt Theatre, New York, where, in April, 1859, Bergmann conducted *Tannhäuser* with relics of a defunct

German opera company as principals and a chorus from the Arion Society. Sporadic performances of *Tannhäuser* were given at the Stadt Theatre in July, 1861, and of that opera and *Lohengrin* in 1870; but Wagner gained his first foothold on the American operatic stage when Strakosch brought out *Lohengrin* (in Italian) in March, 1874, in the Academy of Music, with Campanini as Lohengrin, Christine Nilsson as Elsa, Annie Louise Cary as Ortrud, Del Puente as Telramund, Nanetti as King Henry, and Blum as the Herald. In 1884 Dr. Damrosch established German opera at the Metropolitan Opera House, New York, and produced *Die Walküre* early in 1885. This was the first performance of a Wagnerian music-drama in America, as the performances during a so-called 'Wagner Festival' under Adolf Neuendorff at the Academy of Music in the spring of 1877 were so inadequate as to be absolutely harmful to the Wagner cause. Since 1884-85 all the Wagner operas and music-dramas, except *Parsifal*, have been given repeatedly. Materna, Lehmann, Nordica, Ternina, Niemann, Alvary, and Jean de Reszke are the singers, and besides Dr. Damrosch, Seidl is the conductor, most closely identified with the establishment of Wagner opera and music-drama in America.

On Christmas Eve, 1903, *Parsifal* was produced at the Metropolitan Opera House, New York, for the first time outside of Bayreuth.

In 1875 Wagner accepted from Theodore Thomas, who, through his concerts, prepared more than any one else in this country the way for Wagner music-drama, an offer of $5000 for a "Centennial March" for the opening of the Centennial Exhibition in Philadelphia. Wagner is said to have remarked that the best thing about the march was the money he got for it—a discriminating judgment.

BIBLIOGRAPHY. Among the numerous biographies of Wagner may be mentioned Glasenapp (Leipzig, 1894-99); Tappert (Elberfeld, 1883); Gautier (Paris, 1882); Nohl, trans. (Chicago, 1884); Jullien (Paris, 1886); Kobbé (New York, 1890); Muncker (Bamberg, 1891); Finck, (New York, 1893); Chamberlain, trans. (London, 1897); Henderson (New York, 1901); Vogel (Leipzig, 1883). For his importance theoretically and technically in the field of music, consult: Wolzogen, *Erinnerungen an Wagner* (Vienna, 1883); Krehbiel, *Studies in the Wagnerian Drama* (New York, 1891); Chamberlain, *Das Drama Wagners* (Leipzig, 1892); Ernst, *L'art de Wagner* (Paris, 1893); Schuré, *Le drame musical* (3d ed., ib., 1895); Lavignac, *The Music Dramas of Wagner* (London, 1898); Newman, *A Study of Wagner* (New York, 1899); Lichtenberger, *Wagner, der Dichter und Denker* (Dresden, 1899); Saint-Säens, *Harmonie et mélodie* (Paris, 1885); and the writings of Liszt.

WAGNER, RUDOLF (1805-64). A German physiologist, born at Bayreuth. He studied medicine at Erlangen and Würzburg, and comparative anatomy under Cuvier at Paris. After traveling in France, he practiced medicine at Augsburg for a short time. He became a professor in the University of Erlangen in 1832. In 1840 he was called to the University of Göttingen, where he died. Among his writings are *Lehrbuch der vergleichenden Anatomie* (Leipzig, 1834-35), republished under the title of *Lehrbuch der Zootomie* (1843-47); *Icones Physiologicæ* (ib., 1839-40); *Lehrbuch der Physiologie* (ib., 1839); *Handwörterbuch der Physiologie* (Brunswick, 1842-55); *Neurologische Untersuchungen* (Göttingen, 1854); and *Vorstudien zu einer wissenschaftlichen Morphologie und Physiologie des menschlichen Gehirns als Seelenorgans* (ib., 1860-62).

WAGNER, SIEGFRIED (1869—). A German musical conductor, son of Richard Wagner, born near Lucerne. Although intended for the career of an architect, he early determined to follow his father's profession, and accordingly left the Polytechnic School, in which he was studying, to commence his musical training under Kniese and Humperdinck (q.v.). Outside of Germany he is better known as a conductor than as a composer. In 1893 he entered upon his career as a musical conductor, and toured through Germany, Austria, Italy, and England, meeting with marked success. In 1896 and 1899 he won general favor by his work as conductor of *Der Ring des Nibelungen* at Bayreuth. His published works include a three-act comic-romantic opera, *Der Bärenhäuter*, text written by himself, and arranged from one of Grimm's fairy tales. It was produced at the Court Theatre in Munich in 1899, and met with success. The next opera was *Herzog Wildfang* (Munich, 1901), which met with more popular approval than *Der Bärenhäuter*. Other compositions are a symphonic poem based on Schiller's poem *Sehnsucht*, and several minor orchestral works.

WAGON. See CARRIAGE.

WAGONETTE. A four-wheeled carriage having a capacity for six or more passengers. It has a transverse seat for the driver and two longitudinal seats behind, which are usually entered by a step at the rear. Wagonettes are ordinarily supplied with a canopy, and are favorite vehicles for use in the country on account of their large capacity.

WAGRAM, vä′gràm, or DEUTSCH-WAGRAM. A village of Lower Austria, on the left bank of the Russbach, about 20 miles northeast of Vienna, notable as the scene of one of Napoleon's most celebrated victories, gained over the Austrians under the Archduke Charles, July 6, 1809. After the French defeat at Aspern (q.v.) in May of that year, Napoleon had retired to the island of Lobau in the Danube, whence, with his forces increased by the arrival of Eugène Beauharnais, he prepared to set out for a decisive struggle with the Austrians. On the night of July 4th the French began to cross the Danube, and early in the morning of the following day their forces, 160,000 in number with nearly 600 guns, were drawn up on the left bank of the river. The Austrians numbered about 110,000 men. The battle began early with an assault by Masséna on the Austrian right, which was driven from the villages of Aspern and Essling. Davout's attempt, however, to encircle the Austrian left failed, and the night closed with the advantage on the side of the Austrians, who had sustained by desperate fighting repeated charges against their right and centre by Oudinot, Bernadotte, and Beauharnais. The Archduke Charles had dispatched orders to the forces under the Archduke John to advance from Pressburg and take the enemy in the rear, while the main army. confident of success, prepared to assume the offensive. John, however, could not arrive in time, and when the Austrians advanced to the attack on the morning of the 6th they met determined resistance from the French. Toward noon Davout with excellent support succeeded in turning the Austrian left, and, though the Austrian right and centre had held fast, the Archduke Charles was compelled to retreat. The Austrian loss is estimated at nearly 35,000 men killed and wounded, and the French loss was nearly 30,000. The battle of Wagram was followed by the treaty of Schönbrunn (October 14th), in which Austria was forced to cede to the conqueror. See NAPOLEON I.

WAGTAIL. A small bird of the European family Motacillidæ, characterized by slenderness of form and a long narrow tail, which the bird incessantly wags up and down, with a jerking motion. The wagtails run with great speed, and frequent the margins of rivers and lakes, inundated fields, and other moist grounds, feeding almost entirely upon insects and worms. They make their nests on the ground, among moist herbage, or in stony places. One species, the yellow wagtail (*Budytes flava*), occurs abundantly in Alaska in summer, migrating to and from Asia; and the American titlark (q.v.) is a member of the family. The name 'wagtail' is often given in the United States, however, to the similarly appearing American warblers (q.v.) of the genus Seiurus, especially to the two 'water-thrushes' *Seiurus Noveboracensis* and *Seiurus motacilla.* Like their congener the oven-bird (*Seiurus auricapillus*), they are among the largest of warblers, and are olive above and buffy white below, streaked with black.

WAH. A mammal. See PAÑDA.

WAHABIS, wä-hä'bēz, **WAHHABIS,** or **WAHABITES.** A reforming sect in Islam, named after its founder, Mohammed ibn Abd al-Wahhab (1691-1787). He was born in Aarad, a district west of Nejd, the central province of Arabia. He traveled as a student of law as far as Basra, and perhaps Damascus, and brought back home with him from his observations the conviction of the necessity of reformation in his faith. He was past forty years of age when he began preaching his new doctrine, which consisted chiefly in the following points: (1) Establishment of the Koran as sole and literal authority, to the rejection of Sunnite or orthodox tradition; (2) rejection of all ecclesiastical and legal authority subsequent to the first four Caliphs, whose successors he disowned; (3) enforcement of the strict discipline of Islam in the matter of prayer, fasting, and pilgrimage; (4) Puritan simplicity of life, which extended to prohibition of liquor, tobacco, gambling, luxury of dress and life, and the use of tombstones; (5) rejection of the superstitious accretions, some of which, such as devotion at the tombs of saints, imperiled the central dogma of Islam. Upon this doctrine Abd al-Wahhab laid his greatest theological stress, giving his sect the name of *Muwaḥḥuidûn*, i.e. Unitarians. But the rigor of these doctrines was not at first welcome to the free Arabians, and the reformer had to suffer persecution and exile. His political opportunity came with the conversion of Mohammed ibn Saud, Emir of Derayeh, the capital of Aarad (1742). With Abd al-Wahhab as his spiritual counselor, Ibn Saud became the head of the sect, and claimed to be the head of Islam. The Province of Aarad and the greater part of Nejd were conquered before Ibn Saud's death. He was succeeded by his son Abd al-Aziz, who called himself Iman and Sultan, thus defying the ruler of the Ottoman Empire. He carried his kingdom north toward Mesopotamia as far as Basra, and worsted the Turkish troops. He was assassinated by a Shiite, and the murder was revenged by the destruction of the Shiite town of Kerbela, near Bagdad, by the third of the line, Saud (1800). Advance was now made into the independent kingdom of Oman (1803), and a quarrel with the Sherif of Mecca brought that holy city and Medina under Wahabite control, and all central Arabia submitted. By 1810 the State reached to the neighborhood of Bagdad, and Damascus was held for ransom in 1811, while the territory east of the Jordan paid tribute for many years. In 1810 the new power went to the extreme of its iconoclastic principles by despoiling Mohammed's tomb at Medina, and by interfering with the pilgrimages to the holy cities. This endangered the Turkish Sultan's claim as protector of those sanctuaries. He placed the suppression of the rebellion in the hands of the ambitious Mehemet Ali, Viceroy of Egypt (q.v.), who pursued tiresome and bloody campaigns from 1811 to 1818 before the generalship of Ibrahim Pasha enabled him to attain his end. In 1823 another member of the Saud dynasty, one Turki, reëstablished the Wahabite power over Central Arabia and the whole eastern coast under the suzerainty of Egypt. In 1838 the Turks again intervened, but the Emir Feysul (1842-65) finally established the independence of the Wahabite State, regaining a great part of its original domain. Since that time there have ensued civil wars and interference of the Turkish Empire, and the political Wahabite State is now a minor factor in Central Arabia. Its centre is Riad, in Aarad. The Wahabite influence is still strong, however, throughout Arabia, although it is said to be less militant and more liberal than of old. From Arabia the reform spread into Africa, where it produced important fruits in the Brotherhood of al-Senussi (see SENUSSI), and into India. Here a converted bandit, Said Ahmad, a reputed descendant of Mohammed, declared a religious war against the Sikhs, but was finally defeated and slain (1826-31). While the movement has no political status in India, its religious influence is widespread there through its books, the *Sirāt al-Mustakin* and the *Takwiyat al-Imān.* In general, the movement has had its part in the new life of Islam, and promises to contribute still more in the future. Consult: Burckhardt, *Bedouins and Waháby*s (London, 1831); Palgrave, *Central and Eastern Arabia* (ib., 1865); Rehatsek, "The History of the Wahhabys in Arabia and India," in the *Journal of the Asiatic Society of Bengal,* vol. xxxviii.; W. S. Blunt, *Future of Islam* (London, 1880), and in Appendix to Lady Anne Blunt's *Pilgrimage to Nejd* (ib., 1881).

WAHLBERG, väl'bĕrk, ALFRED LEONARD (1834—). A Swedish landscape painter, born in Stockholm. He studied at the Düsseldorf Academy under Jude, and in 1866 removed to Paris, where he settled, becoming the pupil of Corot and Daubigny. His work has poetic sentiment, sobriety, simplicity, and realism. His landscapes, usually chosen from Sweden or the banks of the Oise, include "Forests and Waterfall" (1863); "View at Fjellbacka" (1868); "An October Day" (1873, now in New York City); "Morning in the Forests of Eure" (1894); "Storm on the Plains of Anoers" (1894); "Gullmarsfjord," and views of the Oise, of Finistère, and of Sweden, at the Exposition of 1900.

WAHLSTATT, väl′stät. A battlefield near Liegnitz (q.v.), Silesia.

WAHLVERWANDTSCHAFTEN, väl′fĕr-vänt′shäft-*e*n (Ger., Elective Affinities). A fatalistic romance by Goethe (1809), dealing with the irresistible passions which a married pair, Edward and Charlotte, conceive for Ottilie and the captain, two unmarried friends, and the tragic result that arises in consequence. The work has been severely criticised as immoral, and as highly praised.

WAHNFRIED, vän′frēt. The residence of Richard Wagner at Bayreuth, built in 1873 by Wölfle. The front bears the inscription, "Hier wo mein Wähnen Frieden fand, *Wahnfried* sei dieses Haus von mir Tenannt." The grave of the great composer is in the garden.

WAHOO. See Elm.

WAHRMUND, vär′mụnt, Adolf (1827—). An Austrian Oriental scholar. He was born at Wiesbaden, studied at Göttingen and Vienna, and was connected with the Imperial library in the latter city from 1853 to 1861. In 1871 he became teacher of Arabic in the Oriental Academy, and was at the head of this institution from 1885 till 1897. He published grammars of modern Arabic, Persian, and Turkish, and a modern Arabic-German dictionary; *Die christliche Schule und das Judenthum* (1885); *Das Gesetz des Nomadenthums* (1887); *Der Kulturkampf zwischen Asien und Europa* (1887); *Das Reich der Zwecke* (1895).

WAIFS (OF. *waif, gueyf, gaif*, from Icel. *veif*, flapping or moving thing, from *veifa*, to vibrate, waver; connected with Goth. *bi-waibjān*, OHG. *weibōn*, to waver). In English law, stolen goods which are thrown away or abandoned by a thief on being pursued. Such goods belong to the Crown, but this prerogative is usually waived if the true owner diligently endeavors to prosecute the thief. The owner may reclaim stolen goods under such circumstances in the United States. See Bishop on *Criminal Law*.

WAIKATO, wī′kȧ-tō. A river of New Zealand. It rises in the centre of North Island, south of Lake Taupo, which it traverses, and after a northwesterly course of 140 miles flows into the Pacific Ocean on the west coast, by a wide estuary, passing Mercer and Havelock, which with Hamilton are the chief settlements on its banks (Map: New Zealand, E 3).

WAIN′WRIGHT, Jonathan Mayhew (1792-1854). A Protestant Episcopal bishop. He was born in Liverpool, England, of American parentage. He graduated at Harvard College (1812); became rector of Christ Church, Hartford, Conn. (1816); assistant minister of Trinity Church, New York (1819); rector of Grace Church (1821), and of Trinity Church, Boston (1834); took charge of Saint John's Chapel, Trinity Parish, New York (1838); and was elected provisional bishop of the diocese of New York, and consecrated in 1852. Among his published writings are: *There Cannot be a Church Without a Bishop* (1844); *The Pathways and Abiding-Places of Our Lord* (1851); and *The Land of Bondage* (1852). Consult his memoirs by J. N. Norton (New York, 1858).

WAINWRIGHT, Richard (1849—). An American naval officer, born in Washington, D. C. He graduated at the United States Naval Academy in 1868, became a lieutenant in 1873, commanded the coast-survey vessel *Arago* for a time, was successively flag-lieutenant to Admiral Patterson, commanding on the Asiatic Station, and secretary to Admiral Jouett, commanding the North Atlantic Squadron, and was promoted to the rank of lieutenant-commander in 1894. In February, 1898, he was executive officer of the battleship *Maine*, when that vessel was destroyed in Havana Harbor, and during the Spanish-American War he commanded the converted yacht *Gloucester*, taking a distinguished part in the naval battle of Santiago and being largely responsible for the destruction of Cervera's torpedo-boat destroyers, the *Pluton* and the *Furor*. In March, 1899, he was promoted to the rank of commander, and in March, 1900, became superintendent of the United States Naval Academy.

WAITE, Morrison Remick (1816-88). An American jurist, Chief Justice of the Supreme Court of the United States from 1874 to 1888. He was born at Lyme, Conn., and graduated at Yale in 1837. He was admitted to the bar at Maumee City, Ohio, in 1839. In 1849 he was elected to the Ohio Legislature as a Whig, of which party he was a member until the organization of the Republican Party. He first attracted national attention when in 1871 he was appointed with Caleb Cushing and William M. Evarts to represent the United States before the tribunal for the arbitration of the *Alabama* and other claims at Geneva, Switzerland. In 1873 he was president of the Ohio Constitutional Convention. In January, 1874, President Grant nominated Waite to succeed Salmon P. Chase as Chief Justice of the United States, and he was at once unanimously confirmed. This position he held until his death. As Chief Justice he was dignified and impartial, and absolutely unbiased by political considerations. In the numerous constitutional questions growing out of the interpretation of the amendments following the Civil War, he maintained a balance between the rights of the States and the extended powers of the Federal Government, and many of the most important opinions of this period were written by him. Among these decisions were those on the head-money tax cases (1876), the polygamy cases (1879), the election laws (1880), the power of removal by the President (1881), the Virginia land cases (1881), the Civil Rights Act (1883), the *Alabama* claims (1885), the Legal Tender Act (1885), the express companies' cases (1886), the extradition cases (1886), the Virginia debt cases (1887), and the cases of the Chicago anarchists (1887).

WAITS (OF. *waite, gaite, guet*, Fr. *guet*, watch, guard, from OHG. *wahta*, Ger. *Wacht*, watchman, from OHG. *wahhēn*, Ger. *wachen*, Goth. *wakan*, AS. *wacian*, *wæccan*, Eng. *watch;* connected with Lat. *vigil*, wakeful, watchful). A name which has, at successive periods of English history, been given to different classes of musical watchmen. In the time of Edward IV. the waits appeared to have formed a class distinct from both the watch and the minstrels. The waits were not confined to the Court; there were musical watchmen at an early period in many provincial towns. In Exeter a regular company existed in 1400. The word in the provinces was afterwards sometimes applied to the town musicians, who may have represented the old waits, but who had no duties to perform as watchmen. The name was also given to the town band, or to private musicians when employed as serenaders. At present, in London, the waits are musicians who play during the night or early in the morning for two or three weeks before Christmas.

WAITZ, vīts, GEORG (1813-86). A German historian, born at Flensburg, in Schleswig. He was educated in the schools of his native town and at the universities of Kiel and Berlin. In 1842 he was called to the chair of history at Kiel, where he remained for five years. In 1849 he became professor of history at Göttingen. He remained there till 1875, when he was called to Berlin as chief editor of the *Monumenta Germaniæ Historica.* He was actively engaged on this work till his death. Waitz was turned from the study of law at the university by the influence of Ranke, and he is usually regarded as one of that historian's principal disciples. In his own field of mediæval history he was the foremost German scholar of his day. His important publications include: *Jahrbücher des deutschen Reichs unter Heinrich I.* (1837); *Ueber das Leben und die Lehre des Ulfila* (1840); *Lübeck unter Jürgen Wullenweber und die europäische Politik* (1855-56); *Grundzüge der Politik* (1862); and *Deutsche Kaiser von Karl dem Grossen bis Maximilian* (1872), besides a great number of contributions to the *Monumenta.* Consult: Steindorff, *Bibliographische Uebersicht über Georg Waitz's Werke* (Göttingen, 1886).

WAITZ, THEODOR (1821-64). A German psychologist and anthropologist, born at Gotha. He studied at Leipzig and Jena, and in 1848 was appointed professor of philosophy in the University of Marburg. He attempted to point out the weakness of the philosophy of Fichte, Schelling, and Hegel, and made psychology the basis of all philosophy. He also studied anthropology and ethnology extensively. His works include an edition of Aristotle's *Organon* (1844-46); *Jahrbuch der Psychologie als Naturwissenschaft* (1849); *Allgemeine Pädagogik* (1852; 3d ed. 1883); and *Die Anthropologie der Naturvölker* (1859-72; vols. v. and vi. edited by Gerland).

WAITZEN, vī′tsen (Hung. *Vácz*). A town of Hungary, at the base of the Waizenberg, on the left bank of the Danube, 22 miles north of Budapest (Map: Hungary, F 3). It is the seat of a bishop and has a fine cathedral. Population, in 1900, 16,808, mostly Magyars.

WAIVER (from OF. *weyver*, *guever*, to waive, refuse, surrender, resign, probably from Icel. *veifa*, to vibrate, waver). A voluntary abandonment or renunciation of a known legal right. A contractual right can usually only be waived for a consideration, but where a person possessing a certain right acts inequitably to the detriment of the person against whom the right exists, he may be deemed to have waived it upon the principle of estoppel. The doctrine of waiver is, perhaps, most frequently applied to the renunciation of statutory rights and privileges, such as: statutory and common law liens; the right to notice of protest and dishonor of commercial paper; also, conditions of forfeiture in contracts, as in insurance policies; and many technical irregularities in pleading and practice which are not necessarily fatal to the cause of action. Consult the authorities referred to under CONTRACT; ESTOPPEL.

WAKAMATSU, wä′kȧ-mät′sōō. A town in the Prefecture of Fukushima, Japan, situated in the northern part of the island of Hondo, 79 miles east-southeast of Niigata (Map: Japan, F 5). It was the castle town of the Prince of Aizu, whose clan is noted for its gallant fighting on the side of the Shogunate during the Revolution of 1868. The castle, the last of the Shogun's strongholds to yield, has been completely demolished. The chief manufacture is lacquer ware. Population, in 1898, 29,200.

WAKASHAN (wä′kȧ-shăn) **STOCK** (Nootka *wakash*, good). A well-marked Indian linguistic group occupying the west coast of British Columbia from about 50½° N. to Gardner Channel, the west and northwest coast of Vancouver Island, and a narrow strip of territory about Cape Flattery, Wash. The stock consists of a large number of small tribes, each speaking a separate dialect, all of which may be grouped into three languages, Hailtzuk (q.v.), Kwakiutl (q.v.), and Nootka (q.v.), the last including the Makah of Cape Flattery. All the tribes of this stock are maritime in habit, daring sailors, fierce fighters, and strongly conservative. They build large communal houses of cedar planks, are organized upon the clan system, and have slavery and the potlatch (q.v.) as recognized institutions. The population of the various tribes in 1903 was about 5200: West Coast Agency, British Columbia (Nootka division), 2600; Kwawkewlth Agency, British Columbia (Kwakiutl division), 1300; Northwest Coast Agency, British Columbia, 'Oweekayo Nation' (Hailtzuk division), 900; Makaw, at Neah Bay Agency, Washington, 410.

WAKAYAMA, wä′kȧ-yä′mȧ. The capital of the Prefecture of Wakayama, in Japan, situated on the southern coast of the island of Hondo, 39 miles by rail southwest of Osaka (Map: Japan, D 6). It is the former castle town of the princes of Kishu, one of the 'three august families.' The castle rises on a wooded hill and is one of the most perfect examples of the old architecture of Japan. It dates from 1850. A short distance from Wakayama stands the temple of Kiimiidera, celebrated for its beautiful situation. Tradition gives the date of its founding as A.D. 770. The principal manufacture is cotton flannel. Population, in 1898, 63,667.

WAKE (AS. *wacu*, watch, from *wacian*, *wæccan*, to watch). The English equivalent of the ecclesiastical vigil (q.v.). The saint's-day festivals are still kept in many English parishes under the name of 'country wakes.' A *lyke-wake* or liche-wake is a watching of a dead body all night by the friends and neighbors of the deceased. The custom no doubt originated in superstitious fear either of passing the night alone with a dead body, or of its being interfered with by evil spirits. Consult Brand, *Popular Antiquities*, in Bohn's Antiquarian Library (London, 1849). See MORTUARY CUSTOMS.

WAKE, WILLIAM (1657-1737). Archbishop of Canterbury. He was born at Blandford, Dorsetshire, England, graduated at Oxford, 1676, and accompanied Viscount Preston as chaplain to the English Embassy to France in 1682; returning in 1685, he was elected preacher to Gray's Inn, 1688. He became canon of Christ Church, 1689; rector of Saint James's, Westminster, 1693; Dean of Exeter, 1702; Bishop of Lincoln, 1705; and Archbishop of Canterbury, 1715. In 1717-20 a union was proposed between certain members of the Gallican Church and the Church of England, to which he showed himself favorably inclined. He published many works, including *The State of the Church and Clergy of England in Their Councils, Synods, Conventions, and Their Other Assemblies, Historically Deduced* (1703), and a translation of *The Apostolic Fathers* (1693).

WAKE'FIELD. An episcopal city, market town, and municipal and Parliamentary borough, the capital of the West Riding of Yorkshire, England, on the Calder, nine miles south of Leeds (Map: England, E 3). Among the chief buildings are the cathedral, formerly the parish church, founded in 1329; the grammar school (1591), a wealthy institution; a library, corn exchange, etc. The town has long been famous for its manufactures of woolen yarn and cloths. The surrounding district is agricultural, and Wakefield is noted for its corn and cattle markets. Coal mines are worked in the vicinity. It was incorporated in 1848, and its boundaries were extended in 1895. It dates from the Wackefield of Domesday, and was the scene of a Yorkist defeat in 1460. Population, in 1891, 38,832; in 1901, 41,544.

WAKEFIELD. A town, including several villages, in Middlesex County, Mass., ten miles north of Boston, on the Boston and Maine railroad (Map: Massachusetts, E 2). It has the Beebe Town Library with over 13,000 volumes and the Wakefield Home for Aged Women. The Town Hall was the gift of Cyrus Wakefield, a public-spirited citizen. Wakefield is mainly engaged in manufacturing, its various industries in the census year 1900 having an invested capital of $3,209,070, and an output valued at $2,958,656. The most important products are rattan, knit goods, stoves, and shoes. The government is administered through town meetings. The town owns and operates the electric light plant and the gas plant. Originally a part of Reading, Wakefield was settled about 1639, and was incorporated as South Reading in 1812. It received its present name in 1868. Population, in 1890, 6982; in 1900, 9290. Consult Hurd, *History of Middlesex County* (Philadelphia, 1890).

WAKEFIELD, EDWARD GIBBONS (1796-1862). An Anglo-Australian colonist and statesman. He was born in London, and was educated in Westminster and in Edinburgh, but was an unruly student and did not graduate. In 1814 he received a minor appointment in the diplomatic service at Turin and later at Paris. At twenty years of age he made a runaway marriage; in 1826, his first wife having died in 1820, he again eloped with an heiress, going through a 'Gretna Green' marriage which was declared void by act of Parliament, and he was imprisoned in Newgate. His three years' imprisonment furnished him material for a valuable work on prison management, entitled *Facts Relating to the Punishment of Death in the Metropolis* (1831). He subsequently resided in Australia, in Canada, where he was elected member of Parliament (1843), and in New Zealand; introduced the "Wakefield colonization system," somewhat resembling the preëmption plan of the United States; took part in abolishing penal transportation; and edited and wrote various treatises on social and political questions, of which the most important is *A View of the Art of Colonization* (1849). He died in New Zealand.

WAKEFIELD, GILBERT (1756-1801). An English classical scholar, born at Nottingham. At the age of twenty he graduated from Jesus College, Cambridge. In 1778 he was ordained a deacon in the Church of England, but after holding for a brief time two curacies, he gave up his profession owing to his inability to subscribe to the doctrine of the Trinity. He turned to teaching for support, becoming classical tutor in Warrington Academy (1779-83), and in the dissenting college at Hackney (1790-91). Resigning this position on account of his objection to public worship (elaborated in *An Enquiry into the Expediency and Propriety of Public or Social Worship*, 1791), he devoted the rest of his life to study and controversy. He wrote a reply to Paine's *Age of Reason* (1794), crossed swords with Porson (q.v.), and was imprisoned for two years (1799-1801) in Dorchester jail for seditious libel contained in a violent *Reply* to Bishop Watson's *Address to the People of Great Britain.* As an ardent sympathizer with the French Revolution, he looked forward with enthusiasm to the expected invasion from France. Wakefield's scholarship is well represented by a critical edition of *Lucretius* (3 vols., 1796-99), and *Silva Critica* (1789-95), an attempt to illustrate the Scriptures "by light borrowed from the philology of Greece and Rome." Among other works are a translation of the New Testament (1792), a group of Greek tragedies edited under the title of *Tragœdiarum Delectus* (1794), editions of Vergil's *Georgics* (1788), of Horace (1794), Moschus (1795), a treatise on Greek metres called *Noctes Carcerariæ* (1801), controversial tracts pertaining to politics and religion, and an autobiography under the title of *Memoirs.*

WAKEFIELD, ROBERT (1480?-1537). An English Oriental scholar. He was born probably at Pontefract, Yorkshire. After graduating from Cambridge in 1513-14 he went abroad for study and remained to teach at Louvain and at Tübingen. Being summoned home in 1523, he was appointed chaplain to Henry VIII., and became attached to Cambridge University as lecturer on Hebrew. He was among the advisers of the King on the subject of his divorce. In 1530 he went to Oxford as teacher of Hebrew, and in 1532 was appointed canon of King's College or Christ Church, newly refounded by Wolsey. He is remembered for his efforts to prevent the destruction of books during the dissolution of the lesser monasteries. Among his works printed by Wynkyn de Worde was one reputed to be the first book printed in England with Hebrew and Arabic characters, *Oratio de Laudibus et Utilitate Trium Linguarum Arabicæ, Chaldaicæ et Hebraicæ* (1524).

WAKEFIELD, The Vicar of. See Vicar of Wakefield.

WAKE FOREST COLLEGE. An educational institution under Baptist control at Wake Forest, N. C., founded in 1833 as Wake Forest Institute and reorganized as a college in 1838. It is organized in schools of Latin, Greek, English, modern languages, pure mathematics, applied mathematics and astronomy, chemistry, biology, physics, moral philosophy, history and political science, law, the Bible, pedagogy, and medicine, and confers the degrees of B. A., B. S., LL.B., and M. A. There is no preparatory department, but subcollegiate classes are maintained in Latin, Greek, mathematics, and English for students not fully prepared for collegiate work. In 1903 the students numbered 309, the faculty 17, and the library contained 16,000 volumes. The endowment was $200,000, with an income of about $32,000. The value of the college property was estimated at $350,000, with buildings and grounds valued at $93,000.

WAKE ISLAND. A small island in the Pacific Ocean belonging to the United States. It lies in latitude 19° 10′ north and longitude 166° 30′ east, on the cable route between the United States and the Philippines, 1505 miles east-northeast of Guam and 2325 miles west of Honolulu (Map: Guam, B 9). It is only about one square mile in area, and is uninhabited. It was acquired for the United States by the second Philippines expedition in 1898.

WAKE′LEY, Joseph Beaumont (1809-75). A Methodist Episcopal minister. He was born at Danbury, Conn., and entered the New York Conference in 1833. He filled various appointments in the neighborhood of New York and won renown as an ecclesiastical antiquary. As the result of his researches he published *Heroes of Methodism* (1857); *Lost Chapters Recovered from the Early History of Methodism* (1858); *Anecdotes of the Wesleys* (1869); *Portraiture of Rev. William Cravens* (1869); *A Prince of Pulpit Orators—Whitefield* (1871); *Temperance Cyclopædia* (1875); and *The Wesleyan Demosthenes: Comprising Select Sermons of Joseph Beaumont* (1875). He edited the *Reminiscences Historical and Biographical of Rev. Henry Boehm* (1865).

WAKEM, Philip. A piteously misshapen lad, in love with Maggie Tulliver, in George Eliot's *Mill on the Floss.*

WAKE′MAN, Henry Offley (1852-99). An English historical writer, educated at Eton and at Christ Church, Oxford, graduating B. A. in 1873, with first honors in modern history. His life was passed at Oxford. He became a tutor in Keble College, and afterwards fellow and bursar of All Souls. As a member of the board of the faculty of modern history and of the Hebdomadal Council, he performed important services to the university. His *History of the Church of England* (1896; 5th ed. 1898) is regarded as the standard work from the Anglican point of view. Next to this comes *The Church and the Puritans, 1570-1660* (1887; 3d ed. 1892). Among his other works are *History of Religion in England* (1885); *Europe, 1598-1715* (1894); and *Life of Charles James Fox* (1890).

WAKE ROBIN. See Arum.

WAKIDI, wȧ-kē′dē (Ar. *Abū ʻAbd Allāh Muḥammad ibn ʻUmar al-Wāḳidā*) (747-823). One of the first biographers of Mohammed. He was born in Medina, the centre of the traditions concerning the Prophet. Unsuccessful as a merchant, he finally gained patronage in Bagdad, and found opportunity for his literary labors. His chief work is the *Kitāb al-maghāzi*, or Book of the Campaigns of Mohammed. He was a close student of the traditions concerning the Prophet, and excelled in chronology. The book has been translated by Kremer, *History of Muhammed's Campaigns* (Calcutta, 1856), and it has been condensed into German by Wellhausen in *Muhammed in Medina* (Berlin, 1882). A number of later works have been erroneously ascribed to this historian. Consult Brockelmann, *Geschichte der arabischen Litteratur.*

WAKLEY, wāk′lĭ, Thomas (1795-1862). An English surgeon and reformer, born at Membury, Devonshire. He studied medicine in the Borough Hospitals in London and at a private school of anatomy founded by Edward Grainger. For several years he practiced in London, and then in 1823 founded a weekly medical journal called the *Lancet*, through which he made many bitter enemies, but accomplished much good. From 1835 till 1852 he was a member of the House of Commons, and carried through many reforms. In 1851 he began in the *Lancet* a crusade against adulterated foods which resulted in legislation to correct the evil.

WALAFRID (vä′lȧ-frēt) **STRA′BO** (c.808-849). A mediæval German monk and scholar. At an early age he went to the famous cloister of Reichenau for his education, and entered the Benedictine Order at the age of fifteen. He spent about three years at Fulda under Rabanus Maurus, and then returned to the Imperial Court as instructor of the young son of Louis the Pious. As a reward, the Emperor bestowed on him the Abbey of Reichenau. In the contest that followed the death of Louis, Walafrid, like Rabanus, took the side of German unity as represented by Lothair; he was obliged to leave his abbey, but recovered it in 842. Little is known of his life after this. He was of a poetical nature, and left some notable verse, distinguished by elevation of thought. Conspicuous in the *Visio Wettini*, a description of the experiences of his teacher Wettin in the other world, and the first of that class of mediæval poems which reached its highest point in the *Divina Commedia*. His name is even better known for his *Glossa Ordinaria*, only a compilation, but the most popular commentary on Scripture throughout the Middle Ages. His works are in Migne, *Patrologia Latina*, cxiii. and cxiv.

WALAPI, wä′lȧ-pī, or **HUALAPAI** (Pine People). A tribe of Yuman stock (q.v.) originally residing about the Great Bend of the Colorado and extending eastward into Arizona. They are now gathered upon a reservation in the same country. They were agricultural and generally peaceable and friendly toward the whites, but deficient in moral stamina. Under better supervision the former dissipation has been checked, and the survivors bid fair to become successful stockmen, an occupation for which they seem to have a natural aptitude. They number now 570, but are steadily though slowly decreasing, in great part on account of diseases introduced by the whites.

WALCH, välk, Christian Wilhelm Franz (1721-84). A German theologian. He studied theology at Jena, traveled in Holland, France, Switzerland, and Italy; became professor of philosophy at Jena in 1750, and three years afterwards at Göttingen; and in 1754 was made professor of theology at that institution. He wrote a great number of works upon classical literature, theology, and ecclesiastical history. Among these are: *Entwurf einer vollständigen Historie der römischen Päpste* (1756; 2d ed. 1758); *Entwurf einer vollständigen Historie der Kirchenversammlungen* (1759); and *Entwurf einer vollständigen Historie der Ketzereien, Spaltungen und Religionsstreitigkeiten, bis auf die Reformation* (1762-85).

WALCHEREN, väl′ĸĕr-*e*n. An island belonging to the Province of Zealand, Netherlands, at the mouth of the Scheldt (Map: Netherlands, B 3). The Sloe, now bridged, passes between it and the island of South Beveland on the east. Length, 12 miles; area, 80 square miles. The island is protected from the sea by dunes and dikes, and is very fertile. It contains Middelburg and Flushing. Walcheren was the scene of a British military disaster during the Napoleonic wars. In July, 1809, a British fleet comprising nearly 250 vessels of war and 400 transports carrying some 40,000 men set sail for Holland with the intention of seizing Antwerp and obtaining command of the Scheldt. Criminal negligence was displayed in the preparations for the expedition, and both Sir Richard Strachan, the naval commander, and the Earl of Chatham, who was placed at the head of the land forces, were markedly incapable. Valuable time was wasted in the reduction of Flushing, and not until late in August was Chatham 'prepared' to march on Antwerp. By that time, however, the French forces in Holland had been greatly strengthened, and the British commander deemed it inexpedient to pursue the campaign. The French assumed the aggressive and in the first days of September the British abandoned Flushing. Chatham with part of the forces returned to England, leaving 15,000 men on the island of Walcheren. There the swamp fever played havoc with the men, and the medical authorities were utterly incompetent to combat the ravages of the disease. The island was finally abandoned in the latter part of December, the results of the expedition being a loss of 7000 dead and the permanent disablement of half of the remainder.

WALCKENAER, vȧl′ke-nâr′, Charles Athanase, Baron (1771-1852). A French scientist, born in Paris. After service in the army he devoted himself to the study of entomology, ethnography, and the history of geography. In reward for the work entitled *Mémoires sur les anciennes peuples de Gaule* (1813) he was made a member of the Institute (1815) and in 1840 he was chosen life secretary of the Academy of Inscriptions. He published *Essai sur l'histoire de l'espèce humaine* (1798); *Histoire naturelle des aranéides* (1805); *Le monde maritime* (4 vols., 1818; 12 vols., 1819); *Histoire naturelles des insectes* (3 vols., 1836-44); and numerous other works. A collection of his best work was published in 1862 under title of *Œuvres choisies.*

WALCOTT, wŏl′kŏt, Charles Doolittle (1850—). An American geologist and paleontologist, born at New York Mills. He early showed a decided bent toward the study of natural history. In 1876, he became one of the assistants of the Geological Survey of the State of New York, and three years afterwards entered the service of the United States Geological Survey, of which he became the director in 1894, succeeding Major John W. Powell, the former chief. His promotion to the leadership was due to the excellent work he had done as paleontologist and geologist in the past, also to his quality as an administrator. His talents led to many claims upon his time for counsel and service. After the death of Professor G. Brown Goode, he gave much attention to the United States National Museum. He was one of the founders of the Washington Academy of Sciences and its president. He became secretary of the Carnegie Institution in 1902. He was often called upon to advise the Government in respect to scientific projects—for example, irrigation, the survey of the Philippines, and the coördination of scientific bureaus in Washington. He was the author of many important geological memoirs and reports, the most of which are printed in the publications of the Survey.

WALD, vält. A town of the Rhine Province of Prussia, 10 miles southeast of Düsseldorf. There are important manufactures of steelware, cutlery, wire, and pottery. Population, in 1895, 15,054.

WALDECK, väl′dĕk. A principality of the German Empire, composed of two separate parts: the one, the former County of Waldeck, bounded on the east and south by Hesse-Nassau, on the west and north by Westphalia and containing 408 square miles; the other, the former Principality of Pyrmont, situated to the north, and surrounded by Prussia, Brunswick, and Lippe, and containing 25 square miles (Map: Germany, C 3). The main division is a country of low mountains, with no great fertility. Its western portion, containing slate formations, is highest, reaching an elevation of 2750 feet. The streams belong to the Weser basin. The climate is somewhat raw. Siderite is mined. The town of Pyrmont is a well-known spa. Agriculture and stock-raising are the main occupations. Forests occupy over one-third of the total area. The manufactures and commerce are small. After the Austro-Prussian war of 1866, the reigning Prince assigned his main rights as sovereign to the King of Prussia, which arrangement can be terminated on notice. The Prussian King names all public officials and Prussia controls the finances. There is a Landtag of 15 members. The principality is represented by one member in the Bundesrat and by one in the Reichstag. Arolsen is the capital. Population, in 1900, 57,918.

The Waldeck house sprang from the mediæval counts of Schwalenberg. The affiliated Pyrmont lines became extinct in 1494. Waldeck joined the Confederation of the Rhine in 1807 against its will. It was an ally of Prussia in the war of 1866 and became a member of the North German Confederation in 1867 and of the German Empire in 1871.

WALDECK, Georg Friedrich, Count (later Prince) (1620-92). A German soldier and statesman. He was born at Arolsen, and was the second son of Wolrad IV. of the Wildungen line. It was his ambition to form a league of Protestant countries about Brandenburg, and in 1656 he was active in bringing about the League of Marienburg with Sweden against Poland. In 1664, as a field-marshal, he distinguished himself at Saint Gotthard against the Turks; in 1682 for services against the French he received the title of Prince; and in 1683 he helped to drive the Turkish army from before Vienna. In 1689 he was put in command of the allied forces in the Netherlands. In the same year he gained a success at Walcourt over the French under Marshall d'Humières, but in 1690 he was badly defeated by Marshal Luxembourg at Fleurus. For his life, consult Rauchbar (Arolsen, 1867-72) and Erdmannsdörfer (Berlin, 1869).

WALDECK-ROUSSEAU, vål'dek' rōō'sō', Pierre Marie Ernest (1846—). A French statesman, born at Nantes. He studied law; in 1879 was elected Deputy for Rennes; and was Minister of the Interior in Gambetta's *grand ministère* of 1881, and in the Cabinet of Jules Ferry of 1883-85. In 1894 he was elected to the Senate for the Department of the Loire, and in the following January he was supported by the Right for the Presidency of France against MM. Faure and Brisson. In the confused politics of the years that followed he was regarded as a leader of the Moderate Republicans. After the fall of the Dupuy Cabinet in June, 1899, he formed a new Ministry. His Cabinet contained men of wide divergence of opinion, as is evinced by the fact that at one extreme was M. Millerand, the socialist leader, and at the other was General de Gallifet, notable for his severity in suppressing the Commune of 1871. All, however, were united upon the platform of sustaining the Republic against the royalists and clericals. The Premier himself took the portfolio of the Interior, and set himself vigorously to the work of establishing order throughout the Republic. He permitted the Dreyfus case to be reopened, and in December, 1900, carried through a general amnesty law for all connected with the case. The most important law passed during his Premiership was, however, the Association Bill of 1901. (See France, Section on *Religion.*) Throughout his incumbency the Premier showed great ability in gaining support for his measures. When the general election of 1902 came, he entered the contest with great vigor; and, thanks to his admirable personality, and despite the bitterest opposition, he gained a great victory for Republican principles. Feeling his task completed, he resigned in June, 1902, with the prestige of having held office longer than other Premier since the establishment of the Third Republic. His publications include: *Discours parlementaires* (1889); *Discours prononcés dans la Loire* (1896); *Questions sociales* (1900); *Associations et congregations* (1901); and *La defense républicaine* (1902). Consult J. Ernest-Charles, *Waldeck-Rousseau* (Paris, 1902).

WALDEN, wąl'den, or **WALDENSIS,** wŏl-dĕn'sĭs (c.1377-1430). An English ecclesiastic, born at Saffron Walden, Essex. His family name was Netter, but from the place of his birth he was often called Walden, or Waldensis. He entered the Carmelite Order at London; studied at Oxford; and was ordained an acolyte in 1394, and a sub-deacon in 1395. In 1409 he attended the Council of Pisa, and on his return entered with energy into the persecution of the Wyclifites. Afterwards he became confessor to Henry V. and after his death to young Henry VI. He is thought to have instituted the Order of Carmelite nuns in England, and for this and numerous other services to his Order he is regarded as one of its saints, though never formally canonized. He was a man of great learning; and among his written works are: *Doctrinale Fidei Ecclesiæ Catholicæ contra Wiclevitas et Hussitas* and *Fasciculi Zizaniorum Johannis Wyclif,* a collection of documents and other materials, which form an important contemporary source upon the history of the Lollards. Some doubt has, however, been thrown upon his having made this collection. The first two of the seven parts of the collection were edited by Dr. Shirley for the "Rolls Series" (1858).

WALDEN, wŏl'den, John Morgan (1831—). A Methodist Episcopal bishop. He was born at Lebanon, Ohio, and graduated at Farmers' College near Cincinnati, in 1852. He began his career as a journalist, first in Illinois and then in Kansas; was a member of the Kansas Legislature (1857), and of the Leavenworth Constitutional Convention (1858). He entered the Cincinnati Conference in 1858; was corresponding secretary of the Freedman's Aid Commission (1862-66); corresponding secretary of the Freedman's Aid Society of his Church (1866-68); and one of the publishing agents of the Methodist Book Concern, at Cincinnati, Ohio (1868-84). He was elected bishop in 1884. He was a member of the Ecumenical Methodist Conference held in London (1881); and again of the one held in Washington (1891).

WALDEN; OR LIFE IN THE WOODS. A descriptive work by Henry David Thoreau (1854) an account of the author's life and thoughts during a solitary residence (March, 1845-May, 1847) in a cottage on the shores of Walden Pond, Concord, Mass.

WALDENBURG, väl'den-bōōrk. A town of Silesia, Prussia, 42 miles southwest of Breslau (Map: Germany, G 3). It has porcelain, pottery, and glass works, and coal mines. Population, in 1895, 13,989.

WALDENSES, wŏl-dĕn'sēz. The name given to the followers of Peter Waldo and their successors in modern times. Waldo, or more properly Valdez or Valdesius, was a wealthy merchant of Lyons, France, in the latter half of the twelfth century. Moved by the death of a friend in 1170, he determined to lead a life of poverty and to devote himself to the cause of religion. As he wished to read the Scriptures, he employed two ecclesiastics to translate portions of the Bible and some special passages from the Fathers into the vernacular. He divided his property with his wife, placed his two daughters in the monastery of Fontévrault, and gave all his money to the poor. Followers soon flocked to him, and were known sometimes by his name, sometimes as the 'Poor Men of Lyons.' Later some of them asserted that their Church had always been independent of the Roman Catholic Church, and that their origin dated from the persecutions of the third century. This idea is now entirely abandoned. Waldo and his followers had no intention of separating from the Church, but their fundamental principles, that, first, all Christians, lay or clerical, ought freely to interpret the Scriptures, and second, that laymen had a right to teach, brought them under the condemnation of the Church. The Archbishop of Lyons forbade them to teach, and they appealed to the Pope. They were convicted of error at the Lateran Council in 1179. Then they appealed for permission to found an order, but this was denied, as the Pope objected to their dress and to the close association of the two sexes in their journeys. As they continued their preaching, they were anathematized by the Council of Verona in 1184, and again at Narbonne in 1190. Many fled from Lyons into Dauphiné and Piedmont. Their missionaries traveled far and wide making converts. They still considered themselves members of the Church, but preached against the vices of the clergy and held the belief that only a holy priest could administer the sacraments. Gradually the community took form. It consisted really of two parts: the 'fraternity' proper, made up of men and women who had taken the three monastic vows of poverty, chastity, and obedience, and for whom it was not lawful to lie, to take an oath, or to shed blood; and, second, 'the faithful,' who followed the teachings of Waldo but were not obliged to take the vows. It is impossible now to determine exactly their organization, as it differed from place to place; but they had bishops, priests, and deacons. In the beginning their beliefs were nearly the same as those held by the orthodox Christians of the time. The councils and inquisitors frequently distinguished between heretics and the followers of Waldo. Nevertheless they suffered with the Albigenses, from whom they differed widely in doctrine, in the Albigensian crusade. (See ALBIGENSES.) As a result few were left in France. Their headquarters in the thirteenth century were in the upper valleys of Piedmont. There they were known as the 'Poor of Piedmont,' 'the Leonisti,' from their origin at Lyons, or as the 'Insabates,' from the shoes fashioned like sandals which they wore. Many other names were given to them at different times and in different places, of which the most familiar is the French name Vaudois.

In Piedmont they suffered persecution in 1220. In 1231 Pope Gregory IX. excommunicated them, but they increased steadily in numbers. They suffered much from the Inquisition in many parts of Europe, but in Piedmont the steep valleys and their obscurity gave them a relative security. In the fourteenth and fifteenth centuries many went to Calabria under the protection of the Neapolitan ruler, and established several colonies. In the fourteenth century there were persecutions in Piedmont, but it is not absolutely certain that the victims were mainly Waldenses. At this time the obscurity of the Waldenses in Piedmont makes it difficult to trace their history. Later the followers of John Huss complained bitterly of their lukewarmness, but the school of 'Barbes,' as their priests were called, continued to exist.

The extent of their learning has probably been exaggerated, yet there are references to Waldensian doctors of medicine who seem to have been much sought for. In going about the country the Barbes adopted disguises, usually as merchants, which made them inconspicuous. In the first stage of the movement learned inquisitors bore almost uniform testimony to their excellent moral lives; but in 1487 attention was again directed especially to them by Innocent VIII., who preached a crusade against them as heretics. The Waldenses in Piedmont made a heroic resistance, but in vain. The excessive cruelty of the Inquisitors led by Louis XII. of France, the ruler of part of Piedmont, to interpose, and he obtained from Pope Alexander VI. a bull absolving the Waldenses. In 1532 and 1533 they joined the reform party. This brought on them a fresh persecution by the Inquisition. In 1545 the Parliament of Aix ordered lords of lands on which the Waldenses lived to oblige their vassals to conform to the Established Church or to leave their lands. As they refused to conform, frightful massacres took place at Cabrières and Mérindol. These horrors brought about a reaction, and one of the chief persecutors was condemned to death in 1557. For some time pacific means were employed to convert them, but without success. Later they were forbidden to open schools, condemned to exile and violence, and massacres followed. In 1655 the Waldenses in Piedmont were ordered to conform to the Catholic faith within twenty days under penalty of death and confiscation of their property. As they remained firm, persistent attacks were made upon them, and these attacks were met by a valiant but useless defense. This persecution fortunately lasted for only a short time, as within a few months the Duke of Savoy by the Treaty of Pignerol allowed them to follow their religious beliefs in the upper valleys of his dominions. Some Waldenses had returned to France, or else some persons there had been converted to this faith. These enjoyed relative religious immunity until the revocation of the Edict of Nantes in 1685. After that the decree went forth that their churches should be destroyed and that their ministers should be banished. At about the same period persecutions began again in Piedmont. The Waldenses made a stubborn resistance, but 12,000 men, women, and children were taken prisoners. These were released within a few months, largely through the intervention of the Swiss cantons, and were exiled. Many of them went to Switzerland as a land of refuge. In 1689 they resolved to make an attempt to reconquer their own valley homes in Piedmont. At first they were successful, but a great force was sent against them and their position seemed desperate. The political issues of Europe led to a coalition against Louis XIV. in 1690, and their aid was sought to defend the frontiers of Piedmont against his troops. They received in compensation official permission to return to their villages in 1694. The peace of 1697 was disastrous to them, as in 1698 they were ordered to go into exile. Because of the character of their country, where in the upper valleys they were relatively secure, this decree was never fully enforced. In 1740 they secured some indulgence, but there was little change in their position, although there was also little persecution, up to the time of the French Revolution. In 1799 liberty of conscience was proclaimed. After the fall of Napoleon in 1814 there was a reaction under Victor Emmanuel I. Finally, in 1848, under Charles Albert, the Waldenses acquired civil and religious liberty. In 1872 they organized a General Conference of the Waldenses, which was to meet once in three years. At that time there were reported to be 15 churches in Piedmont, 11 in Lombardy, 6 in Tuscany, 9 in Romagna, and 8 in Sicily. These were served by 45 pastors and 7 missionaries. In 1901 they were reported to have 47 churches, 66 stations, 49 pastors, 8 evangelists, and 6180 communicants. Besides the churches in Italy, they had established congregations at Marseilles, France; Rosario, Argentine Republic; Monett, Mo.; and in North Carolina.

Much has been written about their literature. There are extant versions of the Scriptures, the *Sentences*, as the extracts from the Fathers were called, various forms of services, and especially a considerable number of poems. The latter were written in the fifteenth and sixteenth centuries, but were formerly supposed to be much older. They have been studied with great diligence, and there has been much discussion as to the language spoken by the Waldenses. Naturally this language has been much contaminated by their wanderings, but it is Provençal. The best editions of their poems are by Apfelstedt, in the *Zeitschrift für romanische Philologie*, vol. iv., and in the *Archiv für das Studium der neueren Sprachen*, vol. lxii. For their history, consult: Léger, *Histoire générale des églises évangéliques des vallées de Piémont, ou Vaudoises* (Leyden, 1669); Comba, *History of the Waldenses* (Eng. trans., London, 1888; later ed. in French, Paris, 1898-1900); Lea, *History of the Inquisition* (Philadelphia, 1888); Dieckhoff, *Die Waldenser im Mittelalter* (Göttingen, 1851); Herzog, *Die romanischen Waldenser* (Halle, 1853); Montet, *Histoire littéraire des Vaudois du Piémont* (Paris, 1885); Muston, *Israel of the Alps; History of the Waldenses of Piedmont* (Eng. trans., London, 1863); Melia, *Origin, Persecution, and Doctrines of the Waldenses* (ib., 1870); Preger, *Die Verfassung der französischen Waldenser in der älteren Zeit* (Munich, 1890); Bompiani, *Short History of the Italian Waldenses* (New York, 1897). For their doctrinal belief, consult Schaff, *Creeds of Christendom* (New York, 1877-78).

WALDERSEE, väl'dĕr-zā, ALFRED, Count (1832—). A German soldier, born at Potsdam. He entered the army in 1850, served in the war of 1866, and at the beginning of the Franco-Prussian War was an aide-de-camp to the King of Prussia. He was present at the battle of Gravelotte, and became chief of staff to the Grand Duke of Mecklenburg. For his services in the war he was made a colonel and received the Iron Cross. When peace came, he was appointed chargé d'affaires at Paris; in 1882 became quartermaster-general of the Prussian staff: and in 1888 succeeded Moltke as chief of staff. In 1898 he was appointed inspector-general, and in 1900 field-marshal. In August of that year he was given command of the German forces in China, and was also made commander-in-chief of the allied forces.

WALDEYER, väl'dī-ĕr, WILHELM (1836—). A German anatomist, born at Hehlen, in Brunswick. He studied at Göttingen, Greifswald, and Berlin, taught in the University of Breslau 1865-72, then became professor and director of anatomy in the University of Strassburg, and in 1883 went to the University of Berlin as professor and director of the anatomical institute. His specialties are histology, embryology, and comparative anatomy. His published works include: *Eierstock und Ei, ein Beitrag zur Anatomie und Entwicklungsgeschichte der Sexualorgane* (1870); *Medianschnitt einer Hochschwangern bei Steisslagen des Fötus* (1886); *Das Gorilla-Rückenmark* (1889); *Lage der weiblichen Beckenorgane* (1892).

WALDIS, väl'dĭs, BURKARD (c.1490-c.1557). A German fabulist, born at Allendorf, in Hesse. He became a monk, but afterwards turned Protestant, and suffered much persecution. After many vicissitudes he in 1544 became pastor of his native village. His first important literary production, the drama *Die Parabel vom verlornen Sohn*, was successfully performed at Riga in 1527. He is chiefly remembered for his *Esopus ganz neu gemacht und in Reimen gefasst* (1548, and many later editions; one by Von Tittmann, 1882). Among his other works was a paraphrase of the Psalter in verse, composed while he was imprisoned, and later published in 1553.

WALDMÜLLER, vält'mṳl-lĕr, FERDINAND (1793-1865). An Austrian painter, born in Vienna, where, after a short course of study at the academy under Maurer and Lampi, he devoted himself to the painting of miniature portraits, but afterwards found his true sphere in the delineation of peasant life in Nether Austria, which he depicted with great truth to nature, subtle humor, and a fine sense of color. Episodes from the life of children were among his most successful canvases. Among his principal works may be mentioned: "Child Learning to Walk" (1822); "Two Tyrolese Huntsmen Resting" (1829); "Beggar Boy on the Bridge" (1830); "Soup Day at the Convent" (1858, all in the Vienna Museum); "After School" (1841, National Gallery, Berlin); "Sunday Afternoon" (1846, Königsberg Museum); "The Adoption" (1849, Breslau Museum); "Palm Sunday" (1855), and "Evening Prayer" (1864).

WALDMÜLLER, ROBERT. The pseudonym of the German author EDOUARD DUBOC (q.v.).

WAL'DO, PETER. See WALDENSES.

WALD'RON, GEORGE. The correct name of the Irish author commonly known as George Barrington (q.v.).

WALDSEEMÜLLER, or **WALTZEMÜLLER**, vält'zā-mṳl'lĕr, MARTIN (c.1470-c.1514). A German geographer, born at Freiburg. For several years after 1505 he was professor of geography in the College of Saint-Dié in Lorraine. In 1506 he and some compatriots matured a plan for a new edition of the work of Ptolemy, revised and amended so as to include the results of recent discovery. In the following year Waldseemüller finished a small treatise which he intended as an introduction to the more elaborate work; and this treatise, together with a Latin translation of the famous second letter from Americus Vespucius (q.v.) to Soderini, and some verses in praise of Vespucius, was published under the title of *Cosmographiæ Introductio* on the college press in the same year. The work is famous because in it Waldseemüller said: "But now the parts have been more extensively explored and another fourth part has been discovered by Americus Vespucius (as will appear from what follows); wherefore I do not see what is rightly to hinder us from calling it Amerige or America, i.e. the land of Americus, after its discoverer Americus." By this Waldseemüller did not mean that Americus had discovered the new regions first, or that the whole of what had been discovered should be named in his honor; on the contrary, it seems that by the 'Fourth Part' he meant merely the northeastern part of what is now known as South America. The new edition of Ptolemy was finally published in 1513. It contained a map called *Tabula Terræ Novæ*, which had been made under the supervision of Waldseemüller prior to 1508. On this map the 'Fourth Part' is not called America, but Terra Incognita; while to the left, referring to the Pearl Coast and perhaps to Honduras, is the inscription: "This land with the adjacent islands was discovered by Columbus of Genoa by order of the King of Castile." Of the first edition of the *Cosmographiæ* but one copy is known to be in existence, and it is in the Lenox Library in New York City. Of the three other editions published the same year, about 20 copies are preserved. Consult Fiske, *The Discovery of America* (Boston, 1902).

WALDSTEIN, wạld'stīn, CHARLES (1856—). An American archæologist, born in New York City. He studied at Columbia in 1871-73, and in 1875 received the degree of Ph.D. from Heidelberg University in Germany. In the following year he studied both in Leipzig and in the British Museum, and he also delivered a course of lectures in the museum in 1878. He then traveled in Italy and Greece, and in 1880 became lecturer on classical archæology in Cambridge University. Two years afterwards he was made 'reader' in Greek art; from 1883 until 1889 he was director of Fitzwilliam Museum, to which he added a museum of art; from 1888 until 1897 was director of the American School of Archæology at Athens; and while doing this work discovered that the so-called 'Apollos' are simply statues of athletes. After 1895 he held the professorship of fine arts in Cambridge in addition to his archæological chair. In 1883 he delivered a course of lectures before the Royal Institution, and in 1886 one at Columbia University. Among his published works are: *The Balance of Emotion and Intellect* (1878); *Essays on the Art of Phidias* (1885); *Excavations at the Heraion of Argos* (1892); and *The Work of John Ruskin* (1893).

WALES (AS. *Walas*, *Wealas*, foreigners; connected with OHG. *walh*, foreign, Celtic *Volcæ*, a tribe of Gaul). An historical division of the United Kingdom of Great Britain and Ireland, administratively a part of England. It is a large peninsula projecting westward on the island of Great Britain, and bounded on the north by the Irish Sea, on the east by the English counties of Chester, Shropshire, Hereford, and Monmouth, on the south by Bristol Channel, and on the west by Saint George's Channel. Wales extends 136 miles from north to south and has a breadth varying from 36 to 96 miles. Area, 7442 square miles. The northwestern corner is cut off by Menai Strait to form the island of Anglesey (q.v.). Compared with England, Wales is distinctly a mountainous country, containing the highest point (Snowdon, 3590 feet) of the British Island south of Scotland. In general the mountains do not form well-defined ranges, but comprise a mass of short ranges and small groups, separated by narrow valleys. Wales is geologically more ancient than the greater part of England, consisting almost exclusively of the older Paleozoic rocks with igneous intrusions. The mineral deposits are extensive and valuable, including coal, iron, copper, zinc, tin, lead, and gold. Of these by far the most important is coal, amounting in value to about 85 per cent. of the mineral output of Wales and in quantity to about 20 per cent. of the coal supply of the United Kingdom. There are two coal fields, the north, in Denbigh and Flint, and the south, more than half in Glamorgan and the rest in Carmarthen, Pembroke, Brecknock, and the English county Monmouth. The north fields were worked as early as the sixteenth century and the development of the south fields began about the middle of the eighteenth. The latter fields extend 89 miles east and west, with a maximum breadth of 21 miles and an area of about 1000 square miles. The thickness of the coal measures is estimated at about 7000 feet. Cardiff (q.v.) has become the largest coal-exporting port in the world, its export in 1901 being 14,316,929 tons. In 1901 Wales yielded mineral products to the value of $105,000,000, or about one-fifth of the total amount produced by Great Britain and Ireland.

For agriculture, manufactures (the most important of which is iron), and other topics concerning Wales not treated here, see GREAT BRITAIN.

COUNTY	Area Square Miles	Pop. in 1891	Pop. in 1901
Anglesey	276.0	50,098	50,590
Brecknock	733.3	51,393	59,906
Cardigan	692.3	63,467	60,237
Carmarthen	918.4	130,566	135,325
Carnarvon	571.8	117,586	126,835
Denbigh	665.7	118,979	129,935
Flint	254.7	77,041	81,725
Glamorgan	792.6	467,954	860,022
Merioneth	656.0	48,859	49,130
Montgomery	797.0	58,003	54,892
Pembroke	613.6	88,296	88,749
Radnor	470.6	21,791	23,263
Totals	7,442.0	1,294,033	1,720,609

The population increased from 718,353 in 1821 to 1,519,035 in 1891, and 1,720,609 in 1901. The increase between 1890 and 1900 was 13.3 per cent., as against 9.9 per cent. for the United Kingdom. From the table below it will be seen that Glamorgan has as large a population as all the rest of Wales, and that there was but one county in England that made a larger percentage of gain.

This is one of the most densely populated counties in Great Britain, its growth being due to its great mining industry. It contains all the cities of Wales that exceeded a population of 50,000 in 1901: Cardiff, with 164,420, having increased 27.54 per cent. in the decade ending with that year; **Swansea**, with 94,514; and Merthyr Tydfil, with 69,227. Wales is divided into 12 administrative counties, as shown in the preceding table.

The greater portion of the population belong to the Calvinistic, Methodist, or other dissenting bodies. Various attempts have been made to secure the disestablishment of the Church of England, which is still the State Church.

Wales has the same educational system as England (q.v.). (See also GREAT BRITAIN.) Elected school boards have charge of elementary education in districts not adequately provided for by voluntary schools, the necessitous voluntary schools receiving public aid. Attendance is compulsory. Non-sectarian religious instruction is offered but is not compulsory in board schools. Sectarian instruction may be given in the voluntary schools. There is no organized system of secondary education. The University of Wales, consisting of the three colleges of Aberystwith, Bangor, and Cardiff, was established in 1893.

The Welsh are a Celtic people. Their average height is 1.695 metres; the cephalic index, 78.0. The Welsh are brunettes, with black hair and hazel eyes. The earliest inhabitants of Wales, as of the rest of Britain, are supposed to have been of non-Caucasic origin. These were succeeded by Celts, possibly first of the Gaelic division, although in the earliest historic times Wales, like Britain, was occupied by Cymric or Brythonic Celts. After the Saxon invasion Wales was, as it still remains, the ethnic centre of this race, although later admixtures of both Irish and English have probably modified the type.

HISTORY. At the time of the coming of the Romans, the tribes of Wales, representing a mixture of the primitive Iberians with the later invading Celts, were the Decongi in the north, the Opdovices in the centre, the Silures in the southeast, and the Demetæ in the southwest, all bearing the general name of Cymry. After a long struggle the subjugation of these tribes was accomplished under Vespasian. The Celtic inhabitants of Britain, fleeing before the wave of Anglo-Saxon invasion, took refuge in the Welsh mountains, where, in time, they were merged with their native kinsmen and maintained their independence against the Teuton conquerors. The country was divided into several States, of which Gwynedd, Gwent, Dyved, and Powys were the most important. Of these the first two, because of their situation on the eastern frontier of Wales, were engaged in constant hostilities with the Anglo-Saxon kingdoms, especially Northumbria and Mercia. Constant warfare, too, prevailed among the Welsh principalities themselves. In 1062-64 Harold, the son of Godwin, overran Wales with an English army after a struggle with Griffith ap Llywelyn, King of Gwynedd. William the Conqueror succeeded in forcing the recognition of his sovereignty from the Welsh princes, but this did not prevent them from raiding the English border, for protection of which the early Norman kings erected a number of feudal lordships with very extensive powers, the so-called lords of the marches. The marchers were a turbulent class and a source of trouble to the kings, but they served their purpose in holding the Welsh back. Llywelyn, Prince of North Wales, had sided with Simon de Montfort against Henry III., but later had submitted to the King. In 1273, however, he refused to pay homage to the new King, Edward I., who in 1277 invaded Wales and at Rhuddian compelled Llywelyn to submit to humiliating terms, including the surrender of the eastern portion of his lands and the annual acknowledgment of fealty. Llywelyn rose in rebellion in 1282, but perished, and his brother David, who carried on the struggle, was captured in the following year and beheaded. By 1284 the English conquest of the country was complete, and the process of introducing English law and administration was begun. In 1301 Edward I. conferred on his second son, Edward, born at Carnarvon, in Wales, the title of Prince of Wales (see WALES, PRINCE OF), and this sufficiently satisfied the pride of the Welsh to keep them loyal for a hundred years. The national spirit did not die out, however, and was nourished by the songs of the bards, whom the English Government regarded with great disfavor. Upon the seizure of the English throne by Henry IV. a revolt broke out in Wales, which, under the leadership of Owen Glendower (q.v.). assumed, in 1402, formidable proportions. Henry IV. repeatedly invaded the country, but the revolt was not suppressed till the death of Glendower, about 1415. The Welsh submitted to Henry IV., whom, from his birthplace, Monmouth, they regarded as their countryman. Glendower's was the last national uprising. In 1536 Wales was incorporated with England, its inhabitants receiving all the rights and privileges of English subjects. Worthy of notice is the national revival of recent years, which has taken the form of a patriotic cultivation of the ancient Cymric tongue and literature. See WELSH LANGUAGE AND LITERATURE.

Consult: Cooke, *Topographical and Statistical Description of Wales* (London, n. d.); Woodward, *History of Wales* (ib., 1850); Odgers, *Local Government in England and Wales* (ib., 1899); Rhys and Jones, *The Welsh People* (ib., 1900); Edwards, *Wales* (New York, 1902).

WALES, PRINCE OF. The title borne by the eldest son of the sovereign of Great Britain and Ireland. It was first conferred on Prince Edward, afterwards Edward II., in 1301. The idea of making Wales an appanage for the heir apparent seems due to Edward III., who in 1343 invested his son, the Black Prince, with the principality, and from that time the title has been borne by the eldest son of the reigning King. The Principality of Wales has usually been bestowed by patent and investiture, though in a few instances the heir to the throne has become Prince of Wales simply by being so declared. The Earldom of Chester was made a principality for the King's eldest son in 1393, and has since the accession of Henry IV. been annexed to the Principality of Wales. On the death of a Prince of Wales in his father's lifetime, the title has been conferred on the heir apparent. As heir of the crown of Scotland, the eldest son of the sovereign is Prince and High Steward of Scotland, Duke of Rothsay, Earl of Carrick, Baron of Renfrew, and Lord of the Isles. As

heir to the crown of Ireland the Prince of Wales bears the title of Earl of Dublin, created in 1849.

WALES, University of. An institution of higher education, established in 1893 by the union of the three colleges of Aberystwick, Bangor, and Cardiff. These colleges had been founded, originally, in 1872, 1883, and 1885, and previous to their unification gave no degrees, though their work was accepted as partially equivalent for the degrees in English, Scotch, and Irish universities. Aberystwick was founded and is largely patronized by the dissenting churches. The two others are free and give no theological work. Instruction for women is provided. The administration of the university is in the hands of a council composed of representatives from various county political and educational boards of Wales, and of a senate consisting of members of the instructing staff. The senate recommends to the council, with whom the chief control lies. There was a combined faculty in 1903 of 130 and an attendance of 1400.

WALES, Philip Skinner (1837—). An American naval surgeon. He was born at Annapolis, and educated for his profession in the universities of Maryland and Pennsylvania. He was commissioned full surgeon in the navy in 1861 and served through the Civil War at the Naval Hospital and on board the United States ship *Fort Jackson* of the North Atlantic and Western Gulf Squadrons. He became chief of the Bureau of Medicine and Surgery in 1880, and Surgeon-General and Medical Director in 1881. In the last capacity he was on duty until 1884 and was then detailed to special service in Washington (1884-87). He was one of the first in attendance on President Garfield when he was shot by Guiteau. His career was interrupted by the discovery of frauds in his department, and although acquitted of actual responsibility, he was suspended from office for five years, and afterwards resided abroad.

WALEWSKI, vȧ′lĕf′skē′, Alexandre Florian Joseph Colonna, Count and Duke (1810-68). A French statesman. He was the son of Napoleon I. and the Polish Countess Walewska, and was born at Walewice, in Poland, May 4, 1810. When the revolt of 1830 broke out in Poland he joined the Polish army, and after the capitulation of Warsaw (September, 1831) he went to France. He served for a short time in the French army, where he held a captaincy, but he soon gave up the army for literature and politics. He was sent to Egypt on a diplomatic mission; held appointments under the Guizot Ministry; was chargé d'affaires in Aregntina in 1848; then held the posts of envoy at Florence and Naples, and in 1854 at London. He became Minister of Foreign Affairs in 1855, and as French plenipotentiary presided over the sessions of the Congress of Paris in the following year. He was appointed Minister of State in 1860, and retired in 1863. He was made a duke in 1866 and was president of the Legislative Assembly in 1866-67. He died at Strassburg, September 27, 1868. His published writings include *Un mot sur la question d'Alger* (1837), *L'alliance anglaise* (1838), and a drama, *L'école du monde* (1840).

WALFISH (wŏl′fĭsh) **BAY.** A possession of Great Britain on the west coast of Africa, forming a part of Cape Colony, but situated as an enclave in German Southwest Africa, 400 miles north of the mouth of the Orange River. It is named from the bay on which it borders (Map: Cape Colony, A 1). It consists of a small peninsula, and a sandy stretch of territory on the mainland. Area, 430 square miles. It has a harbor, which is a free port, and is the best on the coast of Damaraland and Namaqualand. Population, in 1891, 768, chiefly Hottentots. The chief settlements are Sandfontein and Scheppmansdorf. The territory was acquired by Great Britain in 1878.

WALFORD, wạl′fẽrd, Mrs. Lucy Bethia (1845—). An English novelist, the youngest daughter of John Colquhoun, born at Portobello, near Edinburgh, Scotland. In 1869 she married Alfred Saunders Walford of Cranbrooke Hall, in Essex. She began her long series of excellent novels with *Mr. Smith* (1874). Among others are *Pauline* (1877); *Cousins* (1879); *Troublesome Daughters* (1880); *A Stiffnecked Generation* (1888); *The Mischief of Monica* (1891); *The Matchmaker* (1893); *Iva Kildare* (1897); *The Archdeacon* (1899); *One of Ourselves* (1900); and *Charlotte* (1902).

WALHALLA, vȧl-hăl′lȧ (Icel. *valhöll*, hall of the slain). In Scandinavian mythology, the hall of the fallen in battle. It stood in Gladsheim, and in front of it was the grove Glasur, the trees of which bore golden leaves. Before the house, which was so high that its summit could scarcely be seen, a wolf was hung, as a symbol of war, over which sat an eagle. The hall itself, ornamented with shields, and wainscoted with spears, had 540 doors, through each of which 800 heroes could walk abreast. Every morning they marched out at the crowing of the cock, and fought furiously with one another; but at midday all wounds healed, and the heroes assembled to the feast under Odin's presidency. The guests ate of the bacon of the boar Sahrimmer, and refreshed themselves with beer and mead, which flowed in abundance from the udder of the goat Heidrun, while the attendant Walkyries handed them the drinking-horns, under Freyja's direction. See Odin; Walkyries.

The name Walhalla is also given to a German temple of fame, situated about seven miles east of Regensburg, Bavaria, on the heights above the Danube Valley. This singularly beautiful and imposing structure was erected under Louis I. It was designed by Klenze, and was completed in 1842. It is built of gray marble, in close imitation of the Parthenon, and is 246 feet long. Fifty-two Doric columns surround it. The interior is Ionic. Schwanthaler, Wagner, and Rauch had charge of the decorative features. The number of busts of eminent Germans is 101.

WALKE, wạk, Henry (1808-96). An American naval officer, born in Princess Anne County, Va. He entered the navy as a midshipman in 1827, was commissioned lieutenant in 1839, and served in the bomb-brig *Vesuvius* in the Mexican War. At the outbreak of the Civil War he escaped from the Pensacola Navy Yard; transported the garrison of Barancas to Fort Pickens, which he supplied with provisions; and assisted in dismantling Forts Barrancas and MacRea. In

November, 1861, he commanded the gunboats *Taylor* and *Lexington* at the battle of Belmont, Missouri; and later commanded the *Carondelet* at the bombardment of Fort Henry and Fort Donelson. With the same vessel he took part in the bombardment above Island No. 10 on March 17, 1862; on April 4th ran past the batteries (see Island Number Ten); captured a battery opposite Point Pleasant two days later; in command of the *Carondelet* and *Pittsburg* captured three batteries below New Madrid; and on April 7th covered the crossing of Pope's army. In the following May he participated in the battle of Fort Pillow; and in June in the battle of Memphis, where he was the chief antagonist of the ram *Arkansas*. In the following month he was commissioned captain. He participated in command of the *Lafayette* in the operations against Vicksburg and Grand Gulf, and accompanied Porter's first expedition up the Red River. In 1864 he was sent with the *Sacramento* to Europe, relieved the *Kearsarge*, and blockaded the *Rappahannock* in the port of Calais. He was commissioned commodore in 1866 and rear-admiral in 1870, and retired in 1871. He published *Naval Scenes in the Civil War* (1877).

WALKER, wa̧'kẽr. A town in Northumberland, England, on the north shore of the Tyne estuary, 2½ miles east of Newcastle. Shipbuilding works, blast furnaces, and iron, machine, and chemical works are among its chief industrial establishments. Population, in 1901, 13,335.

WALKER, Amasa (1799-1875). An American economist, born at Woodstock, Conn. From 1820 to 1840 he was engaged in business, retiring in the latter year from commercial life. In 1842-48 he lectured on political economy at Oberlin College; in 1853-60 was examiner on political economy at Harvard; and in 1859-69 lecturer on political economy at Amherst. In 1843 he was delegate to the first international peace congress at London, and in 1849 delegate to the peace congress at Paris. He was elected to several political offices, among them that of Secretary of State of Massachusetts (1851-53), and Representative in Congress (1862-63). He was a frequent contributor to periodical literature, especially on financial subjects, on which his authority was regarded of the highest. His principal work was *Science of Wealth* (1866), a manual of political economy which attained a high degree of popularity.

WALKER, Francis Amasa (1840-97). A distinguished American economist, born in Boston. He was the son of Amasa Walker (q.v.). He graduated at Amherst in 1860 and entered upon the study of law. Soon after the outbreak of the Civil War he enlisted, and he served until near the close of the war. During the greater part of the war he held the rank of lieutenant-colonel, and at the end of the war was brevetted a brigadier-general. From 1865 to 1868 he taught Latin and Greek at Williston Seminary; in 1868 he was on the staff of the *Springfield Republican*. In 1869 he was placed in charge of the Bureau of Statistics of the Treasury Department; in 1870 he became superintendent of the Ninth Census, and in 1872 Commissioner of Indian Affairs. In 1873-81 he occupied the chair of political economy and history at the Sheffield Scientific School of Yale, and in 1877-79 he was lecturer at Johns Hopkins University. In 1878 he represented the United States at the Monetary Conference in Paris. He was appointed superintendent of the Tenth United States Census in 1880, and in 1881 became president of the Massachusetts Institute of Technology. From 1882 to 1897 he was president of the American Statistical Association, and in 1885-92 was president of the American Economic Association. He was a member of many other learned societies, both of America and Europe. He was a prolific writer, especially on economic topics, and was one of the foremost advocates of international bimetallism. In economic theory he is regarded as an original and powerful thinker, and his treatment of wages and profits has had a profound influence upon economic theory. The development of interest in economics in America is in a large measure the result of Walker's work. His principal writings are *The Indian Question* (1874); *The Wages Question* (1876); *Money* (1878); *Money in Its Relation to Trade and Industry* (1879); *Political Economy* (1883); *Land and Its Rent* (1883); *History of the Second Army Corps* (1886); *Life of General Hancock* (1894); *The Making of the Nation* (1895); and *International Bimetallism* (1896). For biographical notices and an extended bibliography of Walker's works, consult *Publications of the American Statistical Association*, vol. v. (Boston, 1896-97).

WALKER, Frederick (1840-75). An English figure and landscape painter and illustrator, born in Marylebone, London. His earliest studies consisted in drawing the Elgin marbles in the British Museum, the influence of which may be seen in all of his works. In 1858 he apprenticed himself to Whimper, a line engraver, with whom he remained two years, devoting his spare time to painting. He soon became well known as an illustrator, and especially for his illustrations of the articles of Thackeray, whose friendship he formed at this time. He finally relinquished engraving in 1865. Before this he had become distinguished as a water-colorist, having taken the gold medal at the Paris Exposition in 1863 with his "Philip in Church." The most successful of his oil paintings is "The Wayfarers" (1866); the National Gallery has his "Vagrants" (1868) and "Harbor of Refuge" (1872). Walker exercised a great influence upon English art of the present day. Although he is an excellent painter in oils, it is in his water-colors that the full charm of his painting appears—the delicacy of drawing, bloom of color, and grace of form and movement. Though his figures are drawn after nature, the influence of the Parthenon reliefs and statues is evident throughout. Walker was the friend of Thackeray and other influential men of the day, and is supposed to be the prototype of Little Billee in Du Maurier's *Trilby*.

WALKER, George (1618-90). An Irish clergyman, distinguished for the part he took in the heroic defense of Londonderry against the army of James II. in 1689. He was born in the County of Tyrone, of English parents, was educated at the University of Glasgow, and, entering the Church, became rector of Donaghmore. When the army of James II. entered Ulster, and took possession of Kilmore and Coleraine, Walker sought refuge in Londonderry. The town was not fortified sufficiently to oppose regular troops, and Lundy, the governor, prepared to surrender to the enemy. Some of his officers protested against this course, and the citizens determined not to yield, Walker encouraging them to fight to the last. Walker saved Lundy from the rage of the populace, and enabled him to leave the city in safety. Major Baker and Walker became joint governors, aided by Captain Adams Campbell. Baker soon after died. The siege began in April, and lasted till the end of July. The inhabitants were reduced to the greatest extremities by hunger, but they were sustained to the last by the inspiring sermons preached to them by Walker in the cathedral, and the example he and Captain Campbell set in heading sallying parties. After the raising of the siege Walker was made Bishop of Derry by the King. Walker was present at the crossing of the river at the battle of the Boyne, and was killed. He published *A True Account of the Siege of Londonderry* (1689).

WALKER, Horatio (1858—). An American animal, figure, and landscape painter, born in Listowel, Ontario, Canada. He studied with Fraser in Toronto, but was practically self-taught. He took his subjects from the lives of the descendants of the Canadian-French colonists, who kept in an uncommon degree the characteristics and habits of their fathers. His later work gained in largeness of outlook, while still keeping the masculine solidity of treatment and the strength and heroic force that caused him justly to be compared with Constant Troyon. His color scheme varies, but it is always direct and harmonious. His works include "Spring Evening—Shepherd and Sheep" (1895); "A Pastoral" (1899); "Pigs and Ducks" (1900); "Oxen Drinking" (1899, exhibited at the Royal Academy); "Turkeys" (1902); and "Plowing in the First Gleam."

WALKER, Sir Hovenden (c.1656-1728). An English naval officer, born in Queens County, Ireland. He seems to have entered the Royal Navy at an early age. In 1702, as acting commodore, he commanded a squadron that sailed to the West Indies and took part in the attack on Guadeloupe. In 1706 in the *Cumberland* he assisted Sir John Leake in the relief of Barcelona. In 1707-08 he was captain-resident at Plymouth. In 1710 he was promoted to be rear-admiral of the white and was knighted, and in April was appointed to command the "secret" expedition against Quebec, which proved a failure. In 1711 Walker was appointed commander-in-chief in Jamaica. After the accession of George I. Walker's name was removed from the list of admirals, ostensibly because of the failure of the Quebec expedition, but probably because of suspected Jacobitism. He subsequently spent several years in South Carolina as a planter, but shortly before his death returned to his family estates in Ireland. He published *A Journal, or Full Account of the Late Expedition to Canada* (1720).

WALKER, James (1794-1874). President of Harvard College. He was born at Burlington, Mass., graduated at Harvard College in 1814, studied divinity, and was settled over the Unitarian church in Charlestown, 1818-39; he was professor of moral and intellectual philosophy in Harvard College, 1839-53; and president, 1853-60. He was editor of the *Christian Examiner*, 1831-39. He published for undergraduate use editions of Reid *On the Intellectual Powers*, and Stewart's *Philosophy of the Active and Moral Powers* (1849); *Sermons* (1861); *Memoir of Daniel Appleton White* (1863); and *Memoir of Josiah Quincy* (1867). A *Memorial* appeared at Cambridge in 1875.

WALKER, James Barr (1805-87). An American religious writer. He was born in Philadelphia; studied law at Ravenna, Ohio, and graduated at Western Reserve College, Hudson, Ohio, in 1831; after being editor of several religious papers he studied theology and was licensed as a Congregational preacher, 1841. He established a private orphan asylum at Mansfield, Ohio, and was lecturer at Oberlin College and Chicago Theological Seminary on harmony between science and revealed religion. He published *Philosophy of the Plan of Salvation* (1855); *God Revealed in Creation and in Christ* (1855); *Philosophy of Skepticism and Ultraism* (1857); *Philosophy of the Divine Operations in Human Redemption* (1862); *Poems* (1862); *The Living Questions of the Age* (1869); *Doctrine of the Holy Spirit* (1870).

WALKER, John (1732-1807). An English lexicographer and actor, born at Colney Hatch, Middlesex. He played at first in provincial companies, and afterwards under the management of Garrick at Drury Lane. In 1758 he joined the company of Barry and Woodward to open the Crow Street Theatre, Dublin. His chief rôles were tragic, especially noteworthy being his Cato and Brutus. In 1768 he left the stage, and the following year he opened a school at Kensington Gravel-pits in partnership with James Usher, through whose influence he left the Presbyterian for the Roman Catholic Church. The school failed after two years, however, and Walker then began to lecture on elocution, and made several tours. His most permanent work was his *Critical Pronouncing Dictionary and Expositor of the English Language* (1791, and repeatedly reprinted). This long remained the standard and is still of interest as giving the pronunciations in vogue at the beginning of the nineteenth century. His other books, now of minor importance, include *Elements of Elocution* (1781; 8th ed. 1838); *Hints for Improvement in the Art of Reading* (1783); *Rhetorical Grammar* (1785; 7th ed. 1823); *Melody of Speaking Delineated; or Elocution Taught Like Music* (1789); *Key to the Classical Pronunciation of Greek and Latin Proper Names* (1798; 9th ed. 1833); *Teacher's Assistant in English Composition* (1801-02), reprinted as *English Themes and Essays* (11th ed. 1853); and *Outlines of English Grammar* (1805; 2d ed. 1810).

WALKER, John Grimes (1835—). A United States naval officer, born in Hillsboro, N. H. He graduated at the head of his class at Annapolis in 1856; was promoted lieutenant in the navy in 1858; and was instructor in mathematics in the Naval Academy in 1859 and 1860. He served on the *Winona* in Farragut's expedition against New Orleans; was promoted lieutenant-commander in July, 1862; and in command of the iron-clad river steamer *Baron de Kalb* participated in the operations against Vicksburg. After the fall of that city he led the expedition up the Yazoo River, and while engaging Confederate batteries his vessel was sunk by a torpedo. He was then transferred to the Atlantic coast, and as commander of the *Shawmut* assisted in the capture of Wilmington in 1865. He was promoted commander in 1866; became a captain in 1877; from 1873 till 1878 was secretary of the Lighthouse Board; was appointed chief of the Bureau of Navigation in 1881; and in 1889 became a commodore. From 1889 till 1893 he commanded the White Squadron; in 1894 was put in command of the Pacific Squadron and was sent to protect American interests in the Sandwich Islands; in the same year was commissioned rear-admiral; and in 1897 was retired. In the last mentioned year he was appointed president of the Nicaragua Canal Commission, and in 1899 became president of the Isthmian Canal Commission.

WALKER, Leroy Pope (1817-84). A Confederate Secretary of War, born at Madison, Ala. He was admitted to the bar; was several times a member of the State Legislature; in 1847 and again in 1849 was chosen Speaker of the House; and from 1850 till 1853 was judge of the Fourth Circuit Court. In February, 1861, he was made Secretary of War in the Confederate Cabinet, but toward the close of the year resigned. His most notable action as Secretary consisted in delivering after the fall of Fort Sumter a speech in which he declared that before the war closed the Confederate flag would be flying in triumph over Independence Hall, Philadelphia, and over Faneuil Hall, Boston. This utterance, which was regarded as in a certain sense official, had much influence in rousing the North. After he resigned he was made a brigadier-general, and was for a time in command of Mobile, but in 1862 he retired from the army, and during the remainder of the war served as judge of a military court.

WALKER, Robert James (1801-69). An American political leader and financier, born at Northumberland, Pa. He graduated at the University of Pennsylvania in 1819, and began the practice of law at Pittsburg in 1822. In 1826 he removed to Mississippi and became prominent as a lawyer and land-speculator. He was active in his opposition to nullification and secession in 1832-33, and through his influence the Legislature passed an act declaring nullification treasonable. In 1835 he was elected United States Senator as a Democrat, and at once became known as one of the foremost anti-slavery advocates in his party. He secured great influence over President Tyler, and is generally credited with having been largely instrumental in causing his return to the Democratic Party. While in the Senate he opposed the Bank of the United States and the distribution of the surplus, advocated gradual emancipation, and introduced the resolution for Texan independence. From 1845 to 1849 he was Secretary of the Treasury. The tariff bill of 1846 was adopted almost as it came from his hands. In 1853 he declined the post of commissioner to China, and in 1857, against his will, was appointed Governor of Kansas Territory. He resigned in 1858, declaring that he would not help to force slavery upon the Territory. At the beginning of the Civil War he took strong ground in favor of the Union, negotiated a loan in Europe for the United States in 1863-64, and was instrumental in preventing the success of the second Confederate loan. On his return he published a number of articles opposing the impeachment of President Johnson, advocating the Alaska treaty, and favoring the construction of the Pacific Railroad.

WALKER, Sears Cook (1805-53). An American astronomer, born in Wilmington, Mass. He graduated at Harvard College (1825), and for some time taught school near Boston. Afterwards he removed to Philadelphia, taught, and engaged in scientific labors, and prepared (1837) a plan for an observatory in connection with the high school. In 1845 he was appointed to the Naval Observatory, took charge of the longitude work of the United States Coast Survey (1847), and continued in this department of the United States Government service until his death. Walker's most important contributions to astronomical science were his improvement and introduction into general use of the electric chronograph (q.v.) and his investigation of the orbit of Neptune.

WALKER, Timothy (1806-56). An American lawyer, born at Wilmington, Mass. He graduated from Harvard in 1826; taught mathematics for three years; studied in the Harvard Law School (1829-30); and three years later, in association with Judge John C. Wright, he established the Cincinnati Law School, in which he was a professor of law until 1844. He was presiding judge of the Hamilton County Court of Common Pleas (1842-43). He edited the *Western Law Journal* for several years. The degree of LL.D. was conferred on him by Harvard in 1854. His lectures on law and his chief work, *An Introduction to American Law,* have always been popular with law students. He died at Cincinnati in 1856.

WALKER, William (1824-60). An American adventurer and filibuster, born in Nashville, Tenn. He graduated at the University of Nashville and was admitted to the bar, after which he studied medicine at Edinburgh and Heidelberg. He then engaged in newspaper work in New Orleans and San Francisco. In the summer of 1853 he organized an expedition for the conquest of the Mexican State of Sonora. He eluded the United States authorities, landed with an armed force at La Paz, in Lower California, in November, captured several small towns, proclaimed himself President, and started on a march inland. His provisions and ammunition ran short, however, and to escape falling into the hands of a Mexican force which was sent against him he crossed the boundary into the United States, and surrendered to the United States officials at San Diego. He was tried at San Franciso for violating the neutrality laws, but was acquitted. He next planned an expedition to Nicaragua, then in a state of civil war. He landed at Realejo June 11, 1855, and succeeded in capturing Grenada and making an arrangement with General Corral, the President, by which Walker was appointed Secretary of War and commander-in-chief. The two leaders soon quarreled and Walker had Corral tried for conspiracy and shot. Walker was then in complete control of Nicaragua, of which, after a short and successful war with Costa Rica, he had himself proclaimed President. Walker's rule very soon became arbitrary, however, and provoked an insurrection, which resulted in his expulsion from Grenada. To save himself he surrendered May 1, 1857, to Commander C. H. Davis of the United States sloop *Saint Mary's*, by whom he was conveyed to New Orleans, where he was put under bonds to keep the peace. In November of the same year he was again in Nicaragua with a strong force of Americans and natives behind him, but was soon again driven from the country. Late in 1858 he started with a force of adventurers for Honduras, but a shipwreck caused him to abandon the expedition for the time being. In June, 1860, he made a second attempt, landed at Ruatan on August 15th, and captured Truxillo (Trujillo), but was compelled to flee, and subsequently surrendered himself to the captain of the British sloop-of-war *Icarus*, by whom he was handed over to the Honduran Government. He was condemned by court-martial at Truxillo and shot there on September 22, 1860. He wrote *The War in Nicaragua* (1860). Consult also: Wells, *Walker's Expedition to Nicaragua* (1856); and Doubleday, *Reminiscences of the Filibuster War in Nicaragua* (1886).

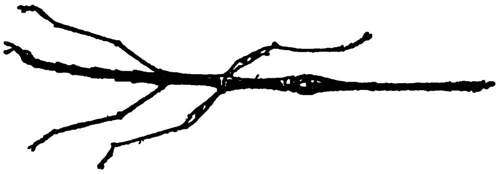
WALKER, WILLIAM SIDNEY (1795-1846). A Shakespearean critic, born at Pembroke, South Wales. He graduated at Trinity College, Cambridge, in 1819, and became a fellow in Trinity in 1820, but he resigned his fellowship in 1829. During his later years he was at times insane, and was dependent upon his friend for support. He published numerous poems and other literary productions, but his great work consisted in his critical study of Shakespeare's plays. Part of the results of this study were published posthumously under title of *Shakespeare's Versification, and Its Apparent Irregularities Explained by Examples from Early and Late English Writers* (1854; 3d ed. 1859). There followed *A Critical Examination of the Text of Shakespeare, with Remarks on His Language and That of His Contemporaries, Together with Notes on His Plays and Poems* (3 vols., 1860). The works are poorly arranged, but they have nevertheless been invaluable to later commentators on Shakespeare.

WALKER, WILLISTON (1860—). An American teacher and writer on Church history, born in Portland, Maine. He graduated at Amherst in 1883, and at the Hartford Theological Seminary in 1886; then studied in Germany and in 1888 took the degree of Ph.D. at Leipzig; and was professor of Church history at the Hartford Theological Seminary from 1889 to 1901, when he accepted a similar chair at Yale University. His publications include: *On the Increase of Royal Power Under Philip Augustus* (1888); *The Creeds and Platforms of Congregationalism* (1893); *A History of the Congregational Churches in the United States* (1894); *The Reformation* (1900); and *Ten New England Leaders* (1901).

WALKING FERN. A small evergreen fern (Camptosorus rhizophyllus) which grows in tufts and whose heart shaped and very tapering fronds often take root at the apex and thus form new plants, hence the popular name. It is a native of eastern North America but is rather rare. See PLATE OF FERNS.

WALKING FISH. One of the curious eel-like fishes of the 'snake-head' family (Ophiocephalidæ), numerously represented in the fresh waters of the East Indies and China; in the latter country they are called by a name equivalent to 'living fishes,' because, according to Sir John Richardson, they are, or were, "carried about in tubs and sold in pieces cut from the fish when alive." They are elongated, reaching in some cases a length of four feet, and have a snake-like head covered with shield-like scales. Their respiratory apparatus is double, as it is necessary for them to be able to breathe air direct, and their habit of occasionally going out upon land has given them the name 'walking fish' in India. They are common in tanks and ponds, where they lie at the margin with the head out of water. They breed twice a year, preparing a nest for the eggs, which the male guards, and survive droughts by burying themselves in the mud. Consult Day, *Fauna of India: Fishes* (London, 1889).

WALKING-STICK. An insect of the orthopterous family Phasmidæ, especially one of those forms destitute of wings, in which the body is long, slender, and cylindrical like a small stick, the legs being slender and delicate, and resembling little twigs. Some of the walking-sticks proper, which are more abundant in the tropics than elsewhere, reach a length of nine inches or more. From their resemblance to the twigs and leaves of various plants, the terms walking leaf and leaf-insect (q.v.) are often applied to them. Some of the slenderer species look like stems of grass; others resemble pieces of bark covered with lichens, while others appear mossy. Protective resemblance, in fact, is carried to an extreme in this group, the legs and antennæ, and even the attitudes assumed by the insects, enhancing the resemblance to vegetable structures. The eggs are frequently strangely sculptured and resemble the seeds of various plants, each being surrounded by a capsule. They are dropped loosely on the ground, where they remain during winter. The adults are very voracious, and are plant-feeders throughout their entire growth. A North American species (*Diapheromera femorata*) feeds on the leaves of several trees, but more especially upon walnuts, and when occurring numerously may cause excessive defoliation. If a leg be cut off beyond the femur and trochanter joint, the parts remaining outside the joint are dropped before the next molt and are afterwards renewed either as a straight, short stump or as a miniature leg resembling the normal one except in size and in the absence of one tarsal joint. A leg cut off nearer the body is not replaced. Phasmidæ have been found in the fos-



A WALKING-STICK INSECT.

silized amber, in the Tertiary strata in North America, and in the Carboniferous rocks there occur remains of gigantic insects which may possibly be connected with this group.

WALKÜRE, väl-kụ′re, DIE. An opera by Wagner. See RING OF THE NIBELUNGEN; WAGNER, RICHARD.

WALKYRIES. See VALKYRIES.

WALLABY (Australian name). A local name for the small kangaroos of Australia, especially of the genera Petrogale (rock-kangaroos, and Halmaturus. The species of Halmaturus have no hair on the muffle and live in scrubby country. Some are of large size, but the true wallabies are small. One of the most striking is the black-gloved wallaby (*Halmaturus manicatus*), of which Gould said that if its fore feet and the tips of its ears had been carefully dipped in ink they could not be any blacker, nor could the coloring terminate any more abruptly. The name is not restricted to these genera, however; thus Parry's wallaby, of the mountains of Queensland, is a large species of the kangaroo genus proper—Macropus. See Plate of KANGAROOS.

WAL′LACE, ALFRED RUSSEL (1822—). An English naturalist and philosopher. He was born January 8, 1822, at Usk, in Monmouthshire, and fitted himself for work as a surveyor and engineer. He then became English master in the Collegiate School at Leicester. Wallace, already interested in botany and insects, was greatly aroused by Darwin's *Journal*, and other books of the period. Early in 1848 he sailed with H. W. Bates (q.v.) for Pará. In 1850 Bates and Wallace parted company, finding it more convenient to explore separate districts, and collect independently, Wallace taking the northern parts and tributaries of the Amazon. He returned to England in 1852, but his collection and notes were lost by shipwreck. *Travels on the Amazon and Rio Negro* (1853) is a popular account of these experiences. In 1854 Wallace went to the Malayan Archipelago, where he traveled and collected for eight years from Malacca to New Guinea. He studied the ethnological relations of this island world, collected the vocabularies of 75 native dialects, and made numerous measurements of the aboriginal crania, besides studying the habits of the orang-outang and the birds of paradise.

Wallace during his residence at Sarawak wrote in February, 1855, an essay "On the law which has regulated the introduction of new species," which was published in September, 1855, though he remarks that ten years previous the idea of such a law suggested itself to him. But beyond vaguely stating that in the method of peopling of the earth, the process was gradual, and that no new creation was formed widely differing from anything before existing, the essay only shows that its author was keenly alive to a search for the causes of evolution. But light was shed upon the subject by Malthus's *Essay on Population;* and it was by reading this suggestion that Wallace, like Darwin, hit upon the doctrine of natural selection (q.v.). In February, 1858, while at Ternate, he wrote his famous essay *On the Tendency of Varieties to Depart Indefinitely from the Original Type.* It led to the publication of Darwin's preliminary essay, and the two papers were published in the *Proceedings* of the Linnean Society of London for August, 1858. In this essay Wallace discusses the nature of varieties, the struggle for existence, the law of perpetuation of species, useful and useless variations, and the partial reversion of domesticated varieties, although he does not use the term 'natural selection,' which we owe to Darwin. Wallace did no work in the anatomy, embryology, and morphology of animals, and but little systematic work, but his contributions to bionomics, or the relations of animal life to the world around it, were numerous and important.

To Wallace we are indebted for a comprehensive and epoch-making work in zoögeography. Strongly inclined to speculation, he gave in his *Tropical Nature* (1878) and *Island Life* (1880) many valuable suggestions regarding the effect of geological and climatic changes on animal life. His simple and uncritical nature is shown by the interest he took in spiritualism, and he was apparently, for a while, at least, a believer in miracles and spirit-manifestations. This tendency led him to deny that man's moral and spiritual nature has, like his physical being, been evolved by a natural process. He also became a student of sociology and was president of the Land Nationalization Society, holding that the State should own the soil. These views did not enhance his reputation, which will mainly rest on his discovery of natural selection. His native amiability and high-mindedness of character were conspicuously shown by his rare self-abnegation of any claim for the discovery of natural selection, and by his uninterrupted friendship with Darwin. During the latter part of his life Wallace lived in a rural part of England enjoying a very moderate pension from the Government, bestowed in recognition of his work in natural history.

Wallace's most important works, and those containing his theoretical views, are, besides the 1858 essay, his epoch-making paper "On the Phenomenon of Variation and Geographical Distribution as Illustrated by the Papilionidæ of the Malayan Region," published in the *Transactions of the Linnean Society* of London (1865); *Contributions to the Theory of Natural Selection* (1870); *The Malay Archipelago* (1869); *The Geographical Distribution of Animals* (1876); *Tropical Nature* (1878); *Island Life* (1880); *Darwinism* (1889). Other works are: *Miracles and Modern Spiritualism* (1875); *Land Nationalization: Its Necessity and Its Aims* (1882); *Australia and New Zealand* (1893); *Studies, Scientific and Social* (1900); *Man's Place in the Universe* (1903).

WALLACE, HORACE BINNEY (1817-51). An American jurist. He was born in Pennsylvania in 1817, educated at the University of Pennsylvania and Princeton, graduating in 1835; studied both medicine and law, but never engaged in active practice. With Judge Hare he edited *American Leading Cases; Smith's Leading Cases; White and Tudor's Leading Cases in Equity; British Crown Cases Reserved;* published a novel, *Stanley, or Recollections of a Man of the World*, and several works of travel. In 1851 he was afflicted with a brain disease and committed suicide.

WALLACE, John William (1815-84). An American lawyer, law-reporter, and author, the son of John Bradford Wallace, a prominent lawyer of Philadelphia. He was born in Philadelphia, Pa., graduated at the University of Pennsylvania in 1833, and studied law in his father's office and at the Inner Temple in London. In 1844 he became standing master in chancery in the Pennsylvania Supreme Court, was reporter of the Third Circuit of the United States Circuit Court from 1842 to 1853, and from 1863 to 1876 was reporter of the United States Supreme Court. From 1860 to 1884 he was president of the Pennsylvania Historical Society. He published: *Reporters, Chronologically Arranged, with Occasional Remarks upon Their Respective Merits* (1843); *Cases, Argued and Abridged, in the United States Supreme Court* (23 vols., 1864-76); and *An Old Philadelphian, Colonel William Bradford of 1776* (1884); and edited *British Crown Cases Reserved* (1839-53).

WALLACE, Lewis (1827—). An American soldier and novelist, known as Lew Wallace. He was born in Brookville, Ind. He studied law in Indiana, served in the Mexican War, and then practiced law until the Civil War. He served as colonel of a regiment of Indiana volunteers in West Virginia in 1861, and on September 3, 1861, was promoted to the rank of brigadier-general of volunteers. He took a prominent part in the second day's fighting at Shiloh (q.v.), having failed to reach the battlefield on the first day, and in the subsequent operations about Corinth, and in 1863 superintended the construction of defenses at Cincinnati, and protected that city when it was threatened by a Confederate force under General E. K. Smith. Subsequently he commanded the Middle Department and the Eighth Army Corps, with headquarters at Baltimore, and on July 9, 1864, with a greatly inferior force, delayed the advance of General Jubal A. Early (q.v.) at Monocacy, where, however, he suffered a defeat.

He was president of the court of inquiry which investigated the conduct of General D. C. Buell (q.v.) in November, 1862, and of the court which tried Henry Wirz, commandant of the prison at Andersonville, Ga. (q.v.), and was a member of the court which tried those charged with complicity in the assassination of President Lincoln. On retiring from the army in 1865 he resumed the practice of law in Indiana, was Governor of New Mexico (1878-81) and United States Minister to Turkey (1881-85). His popularity as a lecturer was great throughout the country. Among his novels *The Fair God* (1873) and *The Prince of India* (1893) were highly estimated. *Ben Hur* (1880), a story of Palestine and Rome in the time of Christ, achieved an almost unprecedented success and was dramatized (1900). Wallace was also the author of *The Boyhood of Christ* (1889) and of a poem, *The Wooing of Malkatoon* (1898).

WALLACE, Sir William (c.1272-1305). A Scotch patriot. He was the second son of Malcolm Wallace, a small landed proprietor. His biographer, Blind Harry, who lived 200 years later, had access to sources now lost and gives a very full account of the hero; but unfortunately his statements are in some cases self-contradictory, and in many cases improbable. According to this writer Wallace in his youth performed prodigious feats of valor in killing Englishmen. His first authentic appearance was in May, 1297. John de Warenne was then ruling Scotland, as the representative of Edward I. of England, and English sheriffs were placed over many of the shires. At the head of a band of about 30 men Wallace burned Lanark and killed the English sheriff. Many of the Scotch joined his band, which he quickly formed into a well-disciplined army. He plundered Scone, drove out English priests and friars who held Scotch benefices, and after ravaging much of the country, laid siege to Dundee. An English army of over 50,000 was sent against him. At Stirling Bridge, September 11, 1297, Wallace, who had a considerably smaller army, won a great victory. Edinburgh and Stirling soon fell into his power; Roxburgh, Haddington, and other towns were burned. His success was so complete that before October 18th he was invading England. He harried Northumberland, Westmoreland, and Cumberland and returned to Scotland about the end of the year. For a few months he was generally recognized as guardian of the realm. In the meantime Edward I. was preparing to reconquer Scotland. On July 22, 1298, he inflicted a crushing defeat upon Wallace at the battle of Falkirk (q.v.). At least 10,000 Scots were killed and Wallace was forced to retreat. From this time we have little knowledge of his actions. He resigned the office of guardian, went to France to seek aid, and may have gone to Rome, but the last is uncertain, as his movements from 1299 to 1303 cannot be traced. In the summer of 1304 it is certain that he was again fighting against Edward; he was especially excluded from the general amnesty offered to the other leaders, and was outlawed. After many attempts to capture him had failed, he was taken by Sir John de Menteith in 1305. On August 23d he was placed on trial in Westminster Hall. He was convicted the same day and condemned to be hanged, drawn, beheaded, and quartered. The sentence was executed on the following day. Blind Harry's *Life of Wallace* has been edited frequently. The best editions are by Jameson (Edinburgh, 1820) and Moir (Scottish Text Society, Edinburgh, 1885-89). Consult also: Moir, *Sir William Wallace* (Aberdeen, 1886); Murison, *Sir William Wallace* (Edinburgh, 1898). Pauli, in his *Geschichte Englands* (Hamburg, 1853), gives a good account of Wallace's services to Scotland.

WALLACE, William Vincent (1814-65). An Irish musician and operatic composer, born at Waterford. After being for some years leader of the orchestra of a Dublin theatre, he emigrated to Australia, and subsequently gave successful concerts there, as also in New Zealand, India, and America. In 1845 he went to England, and wrote his first opera, *Maritana*, which was an immediate success both in London and Vienna, and still holds the stage. *Matilda of Hungary* followed in 1847. During a sojourn of some years in Germany, Wallace continued his musical studies; and after again visiting North and South America, composed *Lurline*, which was brought out in London in 1860, with even greater success than *Maritana*. In 1861 he produced *The Amber Witch;* in 1862, *Love's Triumph;* and in 1863, the *Desert Flower*. Wallace died at the Château de Bages, in the south of France, leaving another opera, *Estrella*, nearly completed.

WALLACHIA, wŏl-lā'kĭ-ȧ. A former principality of Europe, now forming the southwestern part of Rumania (q.v.). It is bounded by the Transylvanian Alps, Moldavia (on the northeast), and the Danube, and is divided by the Aluta, a tributary of the Danube, into Great Wallachia on the east and Little Wallachia on the west (Map: Balkan Peninsula, E 2). Total area, 29,800 square miles. Population, estimated at 4,000,000. The principal city is Bucharest. See RUMANIA.

WALLACHS, wŏl'lăks. See RUMANIA; RUMANIAN LANGUAGE AND LITERATURE.

WALLACK, JAMES WILLIAM (1795?-1864). A well-known actor and manager; born in London. He was of a theatrical family and when quite young became a member of the company at Drury Lane, supporting Elliston, Edmund Kean, and others. In 1818 he made his first appearance in the United States as Macbeth at the Park Theatre, New York, and for a number of years he divided his time between England and America. During several years he was stage manager at Drury Lane. In 1852, having finally settled in the United States, he took control of the first theatre known as Wallack's, at Broadway and Broome Street, New York. In 1861 he built the second Wallack's Theatre, at Broadway and Thirteenth Street, of which his son John Lester Wallack (q.v.) became the manager. As an actor Wallack was at his best in comedy and in romantic parts, such as Rolla in *Pizarro* and Don Cæsar de Bazan. Consult: *A Sketch of the Life of James William Wallack, Late Actor and Manager* (New York, 1865); Lester Wallack, *Memories of Fifty Years* (New York, 1889); Russell, *Representative Actors* (London, n. d.).

WALLACK, JOHN LESTER (1820-88). An American actor, the son of James William Wallack. His real name was John Johnstone Wallack. He was educated in England for the British Army. After having left the army for the theatre, he came to America in 1847, making his first appearance as Sir Charles Coldstream in *Used Up*. In 1852 he became stage manager at his father's theatre. In 1882 he opened the third and last Wallack's Theatre, at Broadway and Thirtieth Street, New York, which he conducted with great liberality and much artistic success, though the financial results were less satisfactory. He himself was a very popular actor, especially in comedy. His Charles Surface and his Benedick were admirable, and in several melodramatic rôles he was extremely successful. He was the author of several plays, of which *Rosedale* is best known. He died at Stamford, Conn. Consult his *Memories of Fifty Years* (New York, 1889); McKay and Wingate, *Famous American Actors of To-Day* (New York, 1896).

WAL'LAROO' (Australian name). A well-known kangaroo (*Macropus robustus*) of Queensland and southward, which is of large size and robust form, and has long, thick, smoky gray fur. See Plate of KANGAROOS.

WALLASEY, wŏl'lȧ-sȧ. A manufacturing town in Cheshire, England, on the west bank of the Mersey estuary, four miles west of Liverpool (Map: England, C 3). It is distinguished for its municipal activity and its public works. It owns the water-works, the gas and electric-lighting plants, and the street railways. A notable feature is the Wallasey embankment, which prevents the inroads of the sea on the peninsula. Population, in 1891, 33,229; in 1901, 53,580.

WALLAWALLA, wŏl'lȧ-wŏl'lȧ (rushing water, or many waters). A tribe of Shahaptian stock (q.v.) formerly occupying the territory about the river of the same name and the adjacent banks of the Columbia, in Washington and Oregon, and since 1855 associated with the Cayuse and Umatilla upon the Umatilla Reservation, Oregon. They were visited by Lewis and Clark in 1804 and were Christianized by Jesuit missionaries about forty years later. They lived originally by fish, roots, and game, but are now fairly prosperous farmers and stock-raisers, with a population of 525.

WAL'LA WAL'LA. The county-seat of Walla Walla County, Wash., about 200 miles south by west of Spokane; on Mill Creek, and on the Northern Pacific Railroad and the line of the Oregon Railroad and Navigation Company (Map: Washington, G 3). It is the seat of Whitman College, opened in 1866; Saint Paul's Episcopal School; Saint Vincent's Academy; Saint Patrick's Catholic School; and De La Salle Institute. Walla Walla College, a Seventh-Day Adventist institution, is at College Place, 2½ miles to the west. Other prominent features are the State Penitentiary, city hall, county court-house, Saint Mary's and the New Walla Walla hospitals, and the public library. There are also the military post of the Sixth United States Cavalry, Fort Walla Walla (q.v.), and a United States Weather Bureau office. The city is in a region noted for its large production of wheat, barley, and fruit. There are manufactures of flour, threshing machines, leather, cigars, beer, sashes, doors, blinds, etc. Under the charter of 1884 the government is vested in a mayor, chosen annually, and a unicameral council. The water-works are owned and operated by the municipality. A military post was established here in 1856 and the settlement which grew up about it was at first called Steptoe City. In 1868 it was chartered under the present name. Population, in 1890, 4709; in 1900, 10,049.

WALL-CREEPER. The Alpine wall-creeper (*Tichodroma muraria*) is a beautiful little bird of the creeper family (*Certhiidæ*), which is found from the European Alps along the mountain ranges to the Himalayas. During the summer months it makes its home among precipitous rocks, fluttering about the faces of cliffs with queer butterfly movements, and darting hither and thither like a humming-bird. Its resemblance to the latter is enhanced by the very long, straight, slender bill, with which it probes the crevices and cracks of the rocks in search of the spiders and flies upon which it lives. Its colors are gay, but its song is insignificant. See illustration on Plate of CREEPER.

WALLENSTEIN, väl'*en*-stīn (more correctly, WALDSTEIN), ALBERT EUSEBIUS WENZEL VON, Duke of Friedland, Sagan, and Mecklenburg (1583-1634). An Imperialist general in the Thirty Years' War. He was the third son of a noble though not wealthy Bohemian family, and was born at Hermanic, in Bohemia, September 24, 1583. His parents, who were Protestants, intrusted the care of his education to the Moravian Brotherhood of Koschumberg, who, however, made little of their stubborn and passionate pupil. On his parents' death, his uncle, Albert Slavata, a zealous Catholic, took charge of his bringing up, and having won him over to his own creed, sent him to the Jesuit *convictorium* at Olmütz, and to the universities of Altdorf, Bologna, and Padua, where his education, such as it was, was completed. He traveled in Germany, France, and Holland, took service in the Imperial army, fought against the Turks in Hungary, and, returning home in 1606, married a widow of noble rank, who at her death in 1614 left him all of her great wealth. This, with the estates bequeathed him by his uncle, made him one of the richest and most influential noblemen of Bohemia. In 1617 he raised a volunteer corps with which he fought for the Hapsburg cause against Venice, and for his services was made a count of the Empire and colonel in the Imperial army. Upon the outbreak of the Bohemian Revolution in 1618 he sent a regiment to the aid of the Emperor, and after the battle of the White Hill near Prague (1620) acquired possession at much less than their value of 60 confiscated lordships in Bohemia. In 1623 he married a daughter of Count Harrach, who exercised great influence at the Imperial Court, and was created Duke of Friedland. Two years after, when the King of Denmark, Christian IV., took up arms for the Protestants against the Emperor, Wallenstein offered to raise, equip, and maintain 20,000 men, provided he were intrusted with the absolute command, and allowed to appoint his own officers, a proposal accepted by the Emperor in his need. Wallenstein brought together in Bohemia adventurers from all quarters, men who had learned that his service meant ample booty, and in a short time his army far exceeded the stipulated number. With this array Wallenstein marched into North Germany, and, acting in concert with Tilly (q.v.), routed Mansfeld at Dessau (April 25, 1626), pursued him through Silesia and Moravia, and on his junction with the army of Bethlen Gâbor in Hungary, compelled, by skillful strategy, the combined forces to remain on the defensive. Released by a truce with the Transylvanian Prince and the death of Mansfeld, he returned by way of Silesia, recovered the fortresses which Thurn had captured, forced the Elector of Brandenburg to submit to the Emperor, and joined Tilly in annihilating the military power of Denmark.

The value of Wallenstein's services caused the Emperor to overlook the complaints of the princes whose possessions suffered greatly from the rapacity, oppression, and license which his soldiers were allowed to exercise. Wallenstein was rewarded with the Mecklenburg duchies, the rank of generalissimo on land, and admiral of the Baltic. He speedily made himself master of his new territory; fitted out a fleet, by the aid of which he captured Usedom and Rügen, with various Baltic ports, and laid siege to Stralsund, but failed before the heroic resistance of its inhabitants. Wallenstein's arrogance grew with his success and aroused the enmity of a powerful party at Court. The Catholic League, headed by the Duke of Bavaria, became his bitter adversary, and backed by the intrigues of France, induced the Emperor to dismiss Wallenstein in 1630. Wallenstein obeyed and went into retirement, waiting for the day, which he was confident would come, when he would be again needed. He lived in magnificent state at Prague, but much of his time was spent in scheming for revenge. All the while he kept a watch over affairs in Vienna. The death of Tilly (April, 1631) and the advance of Gustavus Adolphus toward the hereditary Austrian dominions made it necessary for him to be recalled, and after some pretense of indifference he consented to take the field on condition that he be given absolute command over the Imperial forces with the powers of negotiating and, at need, of concluding peace. With the Swedes on the Danube, the Saxons in Bohemia, and the army of the League almost annihilated, the Emperor had no choice; and Wallenstein within three months was at the head of 40,000 men, well armed and disciplined. Commands and entreaties were in vain employed to induce him to save Bavaria from the Swedes; but in July, 1632, he moved against Gustavus Adolphus, who was intrenched in Nuremberg. There Wallenstein fortified himself, and for more than two months the two armies confronted each other, an attack by the Swedes on Wallenstein's lines (September 3d) being repulsed with heavy loss. At last Gustavus retreated to the Danube, whence his skillful opponent soon drew him by marching on Saxony. The two again confronted each other at Lützen (q.v.), where a great battle was fought in which the Swedes gained the advantage, though at the price of the death of their King (November 16, 1632).

Wallenstein now set out upon a course of action entirely independent of the Emperor, and in the early part of 1633 entered into negotiations with Sweden, Saxony, and France, whether with treasonable designs against the Emperor (his enemies charged him with aspiring after the Bohemian crown) or for the purpose of deceiving the enemy, it has not yet been definitely determined. Suddenly breaking off negotiations, he renewed the struggle against Saxony and Brandenburg; but this did not prevent his opponents from spurring on the Emperor to remove him from his command. In his winter quarters in Bohemia Wallenstein was aware of the progress of the intrigues, and he sought to attach the officers of his army to himself by causing them to pledge absolute obedience to him. His enemies finally carried the day, and in February an Imperial edict removed him from his command on the ground of conspiracy. A number of his officers had been gained over to the Imperial side, chief among whom were Piccolomini and Gallas (qq.v.), to the latter of whom the command of the army was transferred. Wallenstein now removed from his headquarters at Pilsen to Eger for the purpose of establishing communication with the Swedish army under Bernhard of Weimar. On the way to Eger he was joined by Colonel Butler, commander of a regiment of dragoons, to whom had been intrusted the task of seizing the person of Wallenstein. No opportunity offered for the execution of the plan until the arrival at Eger, where, with two other Scotch officers, Gordon and Leslie, Butler determined upon the assassination of the great general. On the night of February 25th an

Irish officer named Devereux with a number of soldiers broke into the house where Wallenstein had taken up his quarters and slew him with a pike thrust in the breast. His estates were confiscated by the Emperor. Wallenstein had much of the ability of the statesman as well as the soldier. He was more liberal than his age and tolerant in religious matters, having no convictions of his own. He was unscrupulous, and his ability was curiously affected by a superstitious faith in astrology, which he had studied deeply in Italy. There is a large amount of literature, both history and fiction, relating to Wallenstein. Much of it is controversial. Schmid, "Die Wallensteinlitteratur," in *Mitteilungen des Vereins für Geschichte der Deutschen in Böhmen* (Prague, 1878, 1882, 1884), mentions 806 titles. Consult: Ranke, *Geschichte Wallensteins* (Leipzig, 1880), the classic biography; Förster, *Briefe Wallensteins* (Berlin, 1828-29); id., *Albrecht von Wallenstein* (Potsdam, 1834); id., *Wallensteins Prozess* (ib., 1844); Hallwich, *Wallensteins Ende, ungedruckte Briefe und Akten* (ib., 1879); Gindely, *Waldstein während seines ersten Generalats, 1625-1630* (Prague, 1886); and a reply to Hallwich, *Zur Beurtheilung des k. Generals A. von Waldstein* (ib., 1887); Bilek, *Beiträge zur Geschichte Wallensteins* (ib., 1886); Wittich, "Zur Geschichte Wallensteins," in Sybel's *Historische Zeitschrift* (1892-93). See Thirty Years' War.

WALLENSTEIN TRILOGY. A name applied to three famous plays by Schiller based on the career of the Austrian General Wallenstein. The newly built theatre at Weimar was opened with *Wallenstein's Lager* (Wallenstein's Camp) on October 12, 1798; *Die Piccolomini* (q.v.) was presented on January 30, 1799, and *Wallenstein's Tod* (Wallenstein's Death) on April 20, 1799. The first of the plays gives a vivid picture of the wild life of the soldiery in the Thirty Years' War. In the *Piccolomini*, Wallenstein appears in the midst of his ambitious schemes, relying on the devoted army, but surrounded by treacherous friends in the pay of the Emperor. *Wallenstein's Tod* depicts his alliance with the Swedes and the final catastrophe of his murder.

WALLER, wŏl'lĕr, Edmund (1606-87). An English poet, born at Coleshill, in Buckinghamshire, March 3, 1606. He was sent to Eton, and thence to King's College, Cambridge (1620). He seems to have left the university without a degree. It appears that at the age of eighteen (perhaps earlier) he obtained a seat in Parliament for Amersham. After the death of his wife (1634), Waller courted Dorothy Sidney, eldest daughter of the second Earl of Leicester, whom he commemorated in verse under the name of Sacharissa. In the Long Parliament Waller joined the party of his cousin Hampden, but when the attack was made on Strafford and the episcopacy (1641) he began to move toward the Royalist side and was soon won over. In 1643 he was appointed by Parliament one of the commissioners to negotiate with King Charles, then at Oxford. On this occasion he was drawn into a plot to secure the city of London for the King. Some of his colleagues were hanged. He himself was fined £10,000 and banished the kingdom (November, 1644). After an exile of seven years, spent mostly in France, Waller was pardoned, November, 1651. Returning to England, he now gave his support to the Commonwealth, and was subsequently appointed a commissioner of trade (1655). After the Restoration he was elected to Parliament for Hastings (1661), and continued a member down to his death. He died at Beaconsfield, the family estate in Buckinghamshire, October 21, 1687. Three editions of his collected poems appeared in 1645, and new editions with added poems were frequent after the Restoration. The heroic couplet he reduced to an art. Waller has long since ceased to interest a wide public, but he lives for a few perfect little poems, such as the song beginning "Go, lovely rose," and the lines "On a Girdle." Consult his *Poems*, edited by J. T. Drury (Muses' Library, London, 1893); and E. A. Gosse, *Seventeenth Century Studies* (new ed. 1897).

WALLER, Frank (1842—). An American architect and artist, born in New York City and educated at the Free Academy there. In 1870 he went to Rome and studied under John Chapman for one year. The year following he traveled in Egypt, making many studies and sketches. He was one of the incorporators of the Art Students' League and was its first president (1875). Among his paintings are "Tombs of the Caliphs" (1874), "Caravan on the Desert" (1878), "Temple of Korn," "Eventide, Venice" (1883), and "Hop Picking" (1885). He wrote *Report on Art Schools* (1879) for the Art Students'-League, and the first report of the League (1886).

WALLER, Sir William (c.1597-1668). A Parliamentary general, son of Sir Thomas Waller, lieutenant of Dover. He studied at Magdalen Hall, Oxford, and became a soldier of fortune. When the English Civil War began, he entered the Parliamentary army as colonel of a regiment of horse; commanded a force that captured Portsmouth and gained numerous other successes; took Malmesbury on March 21, 1643; captured 1600 of the Welsh army two days later; but was defeated at Roundway Down. He was given another army and gained several successes, but in June, 1644, was defeated by King Charles at Cropredy Bridge. In the early part of 1645 he led the expedition for the relief of Taunton. The Self-Denying Ordinance put an end to his military career, and he then became one of the Presbyterian leaders in Parliament; gained the enmity of the army; and in 1647 fled to France. Returning to England, he supported the proposed treaty with the King, and in December, 1648, was imprisoned on a charge of having instigated the Scots to invade England. He was later active in negotiating for the return of Charles II.; in February, 1660, sat in the Long Parliament; was a member of the last council of state; promoted the calling of a free Parliament; and sat in the Convention. A *Vindication of the Character and Conduct of Sir William Waller*, written by himself, was published posthumously in 1797.

WALL-EYED PIKE. See Pike-Perch; and Plate of Perches of North America.

WALL-EYED POLLACK. See Pollack.

WALLFLOWER (*Cheiranthus*). A genus of herbs or shrubby biennials and perennials of the natural order Cruciferæ, characterized by racemes of rather large yellow or purple flowers. The common wallflower (*Cheiranthus Cheiri*), a native of Europe, which occurs in rocky places and on old walls, is frequently grown for ornamenting such places. In the wild state its flowers are always yellow, but the numerous cultivated varieties are diversely colored. In the north, where it is not hardy, it is grown as a house plant. The double varieties are especially ornamental. *Cheiranthus semperflorens* is a North African perennial producing yellow and white flowers at different periods of the year. It is not very hardy and requires a dry sheltered place in winter. Wallflowers thrive best in a rather dry gravelly soil; on good garden soils they grow too coarse. They are propagated by seeds and cuttings. The plants flower the second season at the north.

WALLFLOWER (*Cheiranthus Cheiri*).

WALLICH, väl′lĭk, NATHANIEL (1786-1854). A Danish-British naturalist, born at Copenhagen. He studied medicine in his native city, and in 1807 became surgeon to the Danish settlement of Serampore, in India. When that place fell into the hands of the English in 1813, he entered the service of the East India Company, and in 1815 became superintendent of the Calcutta botanical garden. He explored Nepal, the forests of Western Hindustan, and those of Ava and Lower Burma; in 1828 took to England more than 8000 specimens of plants; and after returning to India explored Assam and other places. His published works include: *A Numerical List of Dried Specimens of Plants in the East India Company's Museum* (1828); *Plantæ Asiaticæ Rariores* (3 vols., 1830-32); and *Testamen Floræ Nepalensis Illustratæ* (1824-26).

WALLIN, väl-lēn′, JOHAN OLOF (1779-1839). A Swedish poet, born in the District of Dalarna. He entered the ministry, and in 1837 he was made archbishop of Upsala. Early in life he began to write poetry, and first obtained general recognition in 1815 through the didactic poem *Uppfostraren* (the educator), which was awarded the highest prize by the Academy. On account of his great success in writing hymns he was called by Tegnér "David's Harp of the North." Among his other poems are: "George Washington," "Gustavus III.," "Homesickness," and "The Angel of Death." A collection of his poetical works was published at Stockholm in 1848 (3 vols.).

WALLINGFORD, wŏl′lĭng-fẽrd. A borough in a town of the same name, in New Haven County, Conn., 12 miles north by east of New Haven; on the Quinnipiac River, and on the New York, New Haven and Hartford Railroad (Map: Connecticut, D 4). It has a public library with more than 4800 volumes, and a Masonic Home. Manufacturing is the most important industry of the borough, the chief products being sterling silver goods, plated ware, insulated wire, brassware, and iron and brass bedsteads. Under the revised charter of 1899 and 1901, the government is vested in a board of warden and burgesses, chosen annually. The water-works and the electric light plant are owned and operated by the municipality. In 1670 Wallingford was incorporated by Connecticut and settled by 100 planters from New Haven. The 'Wallingford Community' was organized in 1851, near the town, on the model of the Oneida Community (q.v.). Population, in 1890, 4230; in 1900, 6737. Consult Davis, *History of Wallingford* (Meriden, 1870).

WALLIS, wŏl′lĭs, JOHN (1616-1703). An English theologian and mathematician, born at Ashford. He was educated for the ministry at Cambridge. He took the degree of B.A. at Emmanuel College in 1637, received the M.A., and was ordained in 1640, and soon after became a fellow of Queen's College (1644). He sided with the Parliament in the Civil War and was of great service to his party in deciphering intercepted messages of the Royalists. He became an adept in cryptology and received a generous remuneration for his work. In 1649 he was chosen Savilian professor of geometry at Oxford, which chair he held until his death. Wallis was a student of polemics, language, mechanics, and theology, but his genius for mathematics eclipsed his ability in other lines. He greatly systematized and extended the new geometry, extended the application of Kepler's law of continuity (see CONTINUITY), first made popular the present meaning of fractional and negative exponents, and introduced the symbol ∞ for infinity. His work on quadratures was original and included a discussion of such curves as represent $y = x^n$, $x^0 + x^1 + x^2 + \cdots$. His attempt at interpolation was the beginning of a more general method employed by mathematicians of the seventeenth century, which later enabled Newton to generalize the binomial formula.

Wallis increased the power of algebra by the systematic use of formulas, gave the law for forming the successive convergents of a continued fraction, and suggested (1685) a modern graphic interpretation of imaginaries. His chief works are: *Arithmetica Infinitorum* (1655); *Tractatus de Sectionibus Conicis Nova Methodo Expositis* (1655); *De Angulo Contactus et Semicirculi Tractatus* (1656); *De Cycloide* (1659); *Commercium Epistolicum* (1658); *Mathesis Uni-*

versalis (1657); *Mechanica, Sive de Motu Tractatus Geometricus* (1669-70-71); *De Gravitate et Gravitatione Disquisitio Geometrica* (1662 and 1674); *Treatise on Algebra* (1685; Latin trans., 1693); *Institutio Logicæ* (1687); *Grammatica Linguæ Anglicanæ* (1652). His complete works, containing also his editions of Ptolemy, Archimedes, Pappus, and Aristarchus, were published in Oxford (1693-99).

WALL OF ANTONINUS. See Roman Wall.

WALL OF AURELIAN. See Aurelian, Wall of.

WALLON, vȧ'lōɴ', Henri Alexandre (1812—). A French political leader and historian. He was educated at the Paris Normal School, and in 1840 was appointed Guizot's substitute in history and modern geography at the Sorbonne. Elected to the Legislative Assembly as a Conservative in 1849, he resigned in the following year because of the restriction of universal suffrage, and participated no further in politics during the Empire. In 1871 he was elected to the National Assembly as a Moderate Conservative; in 1875 proposed the clause by which the Republic was constitutionally established; and in the same year became Minister of Public Instruction. In 1876 he resigned and in the same year was elected life Senator. Among his works are *La vie de Jésus et son nouvel historien* (1864), answering Renan; *La terreur* (1873); *Histoire du tribunal révolutionnaire de Paris* (1880-82); and *Les répresentants du peuple en l'an II. 1793-1794* (1888-90).

WALLOON CHURCH. A Protestant Church in the Netherlands, the members of which are descendants of refugees of the Reformed faith, who entered Holland from France and Flanders in 1581 and subsequent years. Their services are still conducted in the French language and they use the Geneva Catechism instead of that of the Synod of Dort. They were once numerous, but now have only some 10,000 adherents.

WALLOONS, wăl-lo͞onz'. The Celtic population of Southern Belgium living on the Ardennes plateau. They are descendants of the Gallic Belgæ (q.v.), mingled with Latin and to a less extent with Teutonic elements. Their height is 1.650 metres; the cephalic index, 82.2. They are mainly dark, about 30-40 per cent. being blondes. Consult: Grandgagnage, *De l'origine des Wallons* (Liège, 1852); id., *Dictionnaire étymologique de la langue wallone* (ib., 1847-50); Forir, *Dictionnaire liégois-français* (ib., 1866-74); Micheels, *Grammaire élémentaire liégoise* (ib., 1863); Wilmotte, *Le Wallon; Histoire et littérature des origines à la fin du dix-huitième siècle* (Brussels, 1894).

WALL PAPERS. See Paper Hangings.

WALLS'END. A town in Northumberland, England, four miles east-northeast of Newcastle (Map: England, E 1). It is celebrated for its collieries and the quality of its coal. has shipbuilding yards, engineering works, lead and copper smelting works, and manufactures of aluminum, cement, bricks, and tiles. As *Segedunum* it was a provision depot of the Romans, and the remains of its ancient quay have been discovered. It derives its modern name from its position at the east end of Hadrian's Wall. Population, in 1891, 11,257; in 1901, 20,932.

WALL STREET. A street in New York City from Broadway to the East River, following the line of the early city wall across Manhattan Island. It contains the United States Sub-Treasury and numerous banking institutions, and is the centre of financial operations in the United States.

WALL-TREES. Fruit-trees trained on walls for the better exposure of the fruit to sunshine, and for the heat radiated from the wall. Brick walls are generally preferred to stone walls, over which they have the great advantage that the nailing can be accomplished more regularly. House walls are sometimes used. Trees are trained on walls in hot-houses as well as in the open air. In America, where land is plentiful and fruit is grown in abundance, the methods are rarely practiced, even in private gardens.

WALMISLEY, wŏmz'lĭ, Thomas Attwood (1814-56). An English church musician, born near London. He was the son of Thomas Forbes Walmisley, organist of Saint Martin's in the Fields, London, and the godson of Thomas Attwood, after whom he was named. He was a pupil of his father and his godfather, and went to Cambridge (matriculating in 1832) as organist of Trinity and Saint John's colleges. In 1836 he was appointed professor of music in the university. He was especially famous as an organist, but the remarkable originality and novelty of many of his compositions, notably his songs, trios, and glees, have given him a reputation as a standard English composer which far exceeds his temporary and local fame as an organist. His anthem "Not Unto Us" still remains a great favorite. He is probably one of the most important of the English cathedral composers and has been well described as a composer of "jubilant religious music, which shows the singer prayerful, yet joyous." His father, who survived him, published in 1857 a collection of his compositions for the church, most of which are in constant use in the cathedrals and churches of the Anglican communion.

WALNUT (AS. *walhhnutu*, walnut, foreign nut, so called because first brought from Italy and France, from *wealh*, OHG. *walh*, foreign; connected with Celtic *Volcæ*, a tribe in Gaul + *hnutu*, Icel. *hnot*, OHG. *nuz*, Ger. *Nuss*, nut; connected with OIr. *cnú*, Welsh *cneuen*, Bret. *knoenn*, nut), *Juglans*. A genus of beautiful trees of the natural order Juglandaceæ. The species, of which about 10 are known, are mostly North American and Asiatic. All but one or two species are trees with alternate pinnated leaves, monœcious flowers, and a drupe with a deciduous fleshy husk and a deeply wrinkled two-valve shell, within which is the curiously lobed and wrinkled seed. The species of hickory (q.v.) were formerly included in this genus. The common walnut, Persian or English walnut (*Juglans regia*), is a native of Persia and the Himalayas, but has long been cultivated. The date of its introduction is unknown, but it was certainly cultivated by the Romans in the reign of Tiberius. It is a lofty tree of 60 to 90 feet, with large spreading branches. The leaves have a balsamic odor when bruised. The tree yields a sugary sap and is sometimes tapped like the sugar maple. Pickles and ketchup are made of the unripe fruit. The ripe fruit is one of the best of nuts (q.v.) and an important article of export from Southern Europe and California, where the trees are extensively cultivated. The nearly mature nuts are much used in France with vinegar, salt, pepper, and shallots. Walnuts yield by expression a bland, fixed oil, which, under the names of walnut oil and nut oil, is used by painters and in the countries in which it is produced as an article of food. The cake left after the expression of the oil is sometimes used as human food, and for feeding cattle and poultry. The timber of the walnut is valuable, and is much used for cabinets, gun stocks, etc. It is light, although hard and fine-grained. The wood of young trees is white and little esteemed; that of old trees is brown, veined and shaded with darker brown and black. The wood of the roots is beautifully veined. Both the root and the husks of the walnut yield a dye, which is used for staining light-colored woods brown. The walnut when meant to become a timber-tree is best sown where it is to remain, as the roots are much injured by transplanting. The best kinds of walnut for fruit are generally grafted. The black walnut (*Juglans nigra*), a very similar tree, found in most of the United States, except the most northern, is one of the finest and largest and most beautiful trees in American forests, attaining heights of 150 feet and diameters of 6 or 7 feet. The fruit, which has a thick woody shell, is inferior to that of the common walnut. *Juglans Californica*, a Western species, greatly resembles the Eastern black walnut, and in California is much used as a stock on which *Juglans regia* is grafted. *Juglans rupestris* is a small tree or shrub from Colorado to Mexico. *Juglans Steboldiana* and *Juglans mandshurica* are the most important East Asiatic species. *Juglans cinerea,* the butternut (q.v.), is a close relative.

BLACK WALNUT (*Juglans nigra*).

WALNUT FAMILY. See JUGLANDACEÆ.

WALNUT INSECTS. The chief insect enemy of the black walnut in the United States is the hickory and locust tree-borer (*Cyllene pictus*). The beetles which are reared from walnut, however, are larger in size, and their yellowish markings are more or less white. (See LOCUST TREE INSECTS.) The common June beetle (q.v.) of the South is especially fond of the foliage of the walnut. The larvæ of the luna moth and of the regal moth are also found commonly feeding upon walnut leaves, and several species of underwing moths (q.v.) are especially fond of this tree; also one of the hawkmoths (*Cressonia juglandis*), which has a large pale blue-green caterpillar. Several leaf-miners and leaf-rollers (qq.v.) also attack the foliage, and a weevil (*Conotrachelus juglandis*) allied to the plum curculio feeds in the nuts. A scale-insect (*Aspidiotus juglans-regiæ*) occurs on the bark of the English walnut. Forty-five species of insects have been recorded as attacking this tree in the United States, while only fifteen are recorded from the so-called English walnut (*Juglans regia*) in Europe. Consult Packard, *Insects Injurious to Forest Trees* (Washington, 1890).

WALPOLE, wạl'pōl, HORACE or HORATIO, fourth Earl of Orford (1717-97). An English litterateur. He was probably the fourth son of Sir Robert Walpole, although some of his contemporaries believed the scandal according to which Carr, Lord Hervey, was his father, owing to the remarkable differences in temperament and taste between Horace and his brothers. He was educated at Eton and Cambridge, afterwards traveling abroad for some years, principally in Italy. In 1741 he returned to England and took his seat in Parliament. In 1747 he purchased a piece of ground near Twickenham, and built there his famous mansion and literary establishment—Strawberry Hill. In 1758 he published his *Catalogue of Royal and Noble Authors.* This was followed by *The Castle of Otranto* (1764), a weird tale of mystery which was one of the earliest signs of the Romantic movement; *The Mysterious Mother*, a tragedy (1768); and the *Historic Doubts on the Life and Reign of Richard III.* (1768). Among a multitude of works, however, those to which he owes the preservation of his name are his *Letters.* These will always be interesting as pictures and records of the society and fashionable gossip of his day, although their historical value is considerably marred by their evident want of truthfulness. Though Walpole thought of himself rather as a fine gentleman who condescended to write than as a professional author, the literary value of his *Letters* is very high, and sets him beyond question at the head of English letter-writers. On the death of his nephew in 1791 he became fourth Earl of Orford, but seems never to have cared to exercise his privileges as a member of the House of Lords. The best edition of the *Letters* is by Mrs. Paget Toynbee (16 vols., London, 1904); others are edited by Cunningham (London, 1886), and by Yonge (London, 1891). Among his other writings in modern editions are *Memoirs of the Last Ten Years of George II.* (London, 1846); *Memoirs of the Early Reign of George III.* (ib., 1845); *Journal of the Reign of George III. from 1771 to 1783* (ib., 1859). Austin Dobson, *Horace Walpole* (New York, 1890) is the latest and best biography. Consult also: Warburton, *Memoirs of Horace Walpole* (ib., 1851); Seeley, *Horace Walpole and His World* (ib., 1884); Macaulay's well-known essay on Walpole in the *Edinburgh Review* for October, 1833.

WALPOLE, Sir ROBERT, first Earl of Orford (1676-1745). An English statesman, born at Houghton, Norfolk, and educated at Eton and

King's College, Cambridge. He was elected to Parliament from the family borough of Castle Rising in 1701, and from the more important constituency of King's Lynn in 1702. Through membership in the council to Prince George of Denmark in 1705, and services as Secretary of War from 1708 to 1710, he won a high position in the Whig councils, only to fall with his party through the failure of the impeachment proceedings against Sacheverell. A brilliant share in the opposition incurred for him the bitter enmity of the Tories. Reëlected to Parliament from King's Lynn in 1713, the accession of George I. in the following year secured his return to ministerial favor. Serving at first as Privy Councilor and Paymaster-General of the forces, on the impeachment, largely through his endeavors, of the Bolingbroke Ministry, he was in 1715 made Chancellor of the Exchequer and First Lord of the Treasury. Disunion in the Cabinet during the year 1717 led to his resignation and the transfer of his energy to the opposition, in which he was a most determined enemy of the South Sea scheme. Restored to the paymastership of the forces in 1720, the disastrous failure of the South Sea bubble was followed in 1721 by his elevation for the second time to the office of First Lord of the Treasury and Chancellor of the Exchequer. From this time until his retirement in 1742, the life of Walpole may be said to be the history of England. "But his long administration is almost without a history," says Green; "all legislative and political activity abruptly ceased with his entry into office." His policy throughout was peace abroad and sound finance at home. Frauds in the excise during 1733, and the unpopular Gin Act of 1736, weakened his hold on popular affection; and quarrels between the King and the Prince of Wales in 1737, together with the Spanish war, into which the Ministry was forced in 1739, led to the overthrow of Walpole in 1742. He resigned February 2d of that year and was created Earl of Orford. He died March 18, 1745. His name is chiefly remembered in connection with his frank avowal of the necessity of Parliamentary corruption. "Personally he was free from corruption; and he is perhaps the first great English statesman who left office poorer than when he entered it. But he was certainly the first who made Parliamentary corruption a regular part of his system of government."

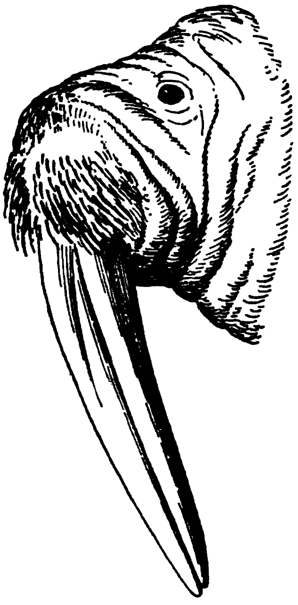
In addition to the various Parliamentary records, source material of value may be found in the writings of Horace Walpole (q.v.). Consult: *Memoirs of the Life and Administration of Sir Robert Walpole, Earl of Orford* (London, 1798), the standard biography; Morley, *Walpole* (Twelve English Statesmen Series, ib., 1890).

WALPOLE, Sir SPENCER (1839—). An English historian. He was born February 6, 1839, the eldest son of Spencer Horatio Walpole (1806-1898), and grandson of the Prime Minister Spencer Perceval. He was educated at Eton, and held several minor governmental positions, but is known chiefly for his historical works, which deal with modern English history. His *History of England from 1815*, which appeared in five volumes from 1878 to 1886, is in some respects the best work that appeared on England in the nineteenth century. In 1898 Walpole was knighted. Other works by him are *Life of the Right Honorable Spencer Perceval* (1874); *The Electorate and the Legislature* (1881); *Foreign Relations* (1882); *British Fish Trade* (1883); *Life of Lord John Russell* (1891).

WALPURGA, vȧl-po͞or′gȧ, or **WALPURGIS,** SAINT. A West Saxon maiden of royal birth, who followed her brothers Saint Wilibald and Saint Wunnibald, in the time of Saint Boniface, from her native country to Germany, to help them in extending Christianity. Wilibald established the Bishopric of Eichstätt about 741, and Wunnibald the neighboring Convent of Heidenheim about 745, the direction of which Walpurga undertook after his death (about 750), as the first abbess, holding this position until her death, about 780. Her bones were transferred to Eichstadt, where a convent was erected in her honor. The veneration of Walpurga became wide-spread. Throughout all Germany, and even in France, the Netherlands, and England, churches and chapels were dedicated to her, relics of her were shown, and festivals celebrated in her honor. The feast of Walpurga falls properly on February 25th; but as in some German calendars it is assigned to May 1st, the name of Walpurga has become associated with some of the most noted popular superstitions. May 1st had been one of the most sacred days of all paganism. (See BELTANE.) When the belief in witchcraft (q.v.) had come into vogue, the Walpurgisnight obtained a notorious significance, inasmuch as during the night, between April 30 and May 1, the witches were held to ride on broomsticks and goats to the old places of judgment and sacrifice, in order to enjoy themselves there with their master the devil. Such witch-hills were tolerably numerous in Germany and the neighboring countries. The best known, however, was the highest point of the Harz, the Brocken or Blocksberg, which has obtained a wide celebrity as the scene of the witches' Sabbath in Goethe's *Faust*. The existing legends are not ancient, belonging to the period of the witch persecutions in the sixteenth and seventeenth centuries, but they doubtless contain some measure of old belief.

WALPURGISNACHT, vȧl-po͞or′gės-näɢt. A choral symphony, the score of which is by Mendelssohn and the libretto by Goethe. It was first produced at Berlin during the winter of 1832-33, the composer himself directing the production.

WALRUS (Swed. *hvalross*, Dan. *hvalros*, walrus, whale-horse, from Swed., Dan. *hval*, whale + Swed. *hross*, Dan. *hros*, horse). One of the largest animals of the seal tribe (Pinnipedia), the two species of which constitute the family Trichechidæ (formerly Rosmaridæ) and classified on anatomical grounds between the eared seals (otaries) and earless or 'common' seals, though having little external resemblance to either. The form is thick and clumsy (see Colored Plate of SEALS), and a full-grown male will measure 12 feet in length and may exceed 2200 pounds in weight: but females are somewhat smaller. Young ones are rather thickly clothed with a faded brown fur, but as age advances this falls out, and old individuals are almost naked. The blunt muzzle is set with a thick mustache of bristles, which with the lips is very mobile. The ear is marked only by a fold of skin. The primary characteristic of the family is the possession of a pair of enormous tusks (the canine teeth), which project downward from the upper jaw, and are solid ivory, hard and more yellowish than those of elephants. Those of the female are longer (reaching sometimes 30 inches) than the male's, but his are stronger and thicker. For the support of these huge teeth—which are used as pickaxes in digging up mollusks, for aid in climbing upon ice or rocks, and as weapons—the anterior part of the skull is greatly enlarged and strengthened. Most of the other teeth fall out, so that an old walrus has in the upper jaw, besides the tusks, only two incisors and three pairs of molars, and in the lower jaw no incisors, two canines, and four pairs of molars. These animals are confined to northern shores, and two species are known—the Atlantic (*Odobœnus* or *Trichecus* *rosmarus*), and the Pacific walrus (*Odobœnus obsesus*). The latter is rather larger and more obese than its congener, and the tusks are usually longer and thinner. The Atlantic walrus, the 'rosmarus' or 'morse' of old writers, is found from the archipelago north of America eastward to about the mouth of the Yenessei and in Hudson Bay, Labrador, and Greenland, but it no longer, as formerly, comes south to Nova Scotia or Southern Norway, and is scarce around Spitzbergen and Nova Zembla. The Pacific walrus is no longer seen south of the Aleutian Islands, and does not pass eastward of Point Barrow, nor much west of Bering Strait.



PACIFIC WALRUS.

Walruses pass most of their time in the ocean near shore, resting in crowded bands on the floating ice, and do not often go ashore except in early summer, when the females produce their one or two young. The period of gestation is said to be about nine months. Their food consists mainly of clams, dug with the tusks; seaweed is also eaten. The flesh is an important factor in the sustenance of the natives of Arctic coasts, but is not well liked by civilized men. The diminution of the Pacific walrus has been a very serious deprivation to the natives of Alaska and the neighboring part of Siberia, threatening famine there. Their greatest natural enemy is the polar bear. The oil yielded is inferior in both quantity and quality to that of seals; but the thick hide is used largely in Russia and Scandinavia as sole-leather and for harness and ship-rigging, while the ivory is valuable. This commercial importance has led to a steady hunting of the animal everywhere, and the race is rapidly diminishing in all accessible parts of its habitat. Occasionally a young one is captured alive, and shows docility and some intelligence, but none have long survived captivity.

Consult Allen, *North American Pinnipeds* (Washington, 1880), which contains an exhaustive treatment and bibliography of the subject.

WALSH, ROBERT (1784-1859). An American author. He was born in Baltimore, was educated at the Jesuit College of Georgetown, and for a short time practiced law. From 1811 to 1813 he published the first quarterly in the United States, the *American Review of History and Politics,* revived by him in 1827-37. From 1821 to 1837 he edited the *National Gazette,* and in 1822 the *Museum of Foreign Literature and Science.* In 1837 he removed to Paris, where from 1845 to 1851 he was United States consul. He contributed to many publications of the time, and his books include a *Letter on the Genius and Disposition of the French Government* (1810), *Correspondence Respecting Russia* (1813), an *Essay on the Future State of Europe* (1813), and *An Appeal from the Judgments of Great Britain* (1819).

WALSH, THOMAS (1730-59). An English Wesleyan Methodist preacher. He was born at Ballylin, near Limerick, Ireland. His parents were Roman Catholics, but in 1748 he united with the established Church; two years later, influenced by the preaching of Wesley's itinerants, he united with the Methodists. He began to preach immediately and was very successful. In 1753 Wesley called him to London and here his eloquence again brought great success. While in London he became an enthusiastic student of Greek and Hebrew. In a short time he taught Hebrew to private students from the University of Cambridge. His sermons were edited by James Morgan (London, 1764), who also published his *Life* (ib., 1762; republished, New York, 1843).

WALSH, WILLIAM J. (1841—). An Irish Roman Catholic prelate. He was born in Dublin, and educated at Maynooth College, where he became professor of dogmatic and moral theology in 1867. He was made vice-president in 1878, and in 1881, on the death of Dr. Russell, was unanimously chosen president by the Irish bishops. He was consecrated Archbishop of Dublin in 1885, and since then has been a member of many important Government commissions, besides having had great influence in the framing of the Irish Land Act of 1881, of which he published a *Plain Exposition* in the same year. His other works include a *Harmony of the Gospel Narratives of the Passion* (1885), and *Bimetallism and Monometallism* (1893).

WALSH, WILLIAM PAKENHAM (1820—). An Irish prelate, born at Mote Park, Roscommon County, Ireland. He graduated at Trinity College, Dublin; became a canon of that institution in 1872; and from 1878 till 1897 was Bishop of Ossory, Ferns, and Leighlin. Among his published works are: *The Moabite Stone* (1874); *Heroes of the Mission Field* (1879; 2d ed. 1880); *Modern Heroes of the Mission Field* (1880; 3d ed. 1888); and *Echoes of Bible History* (1886).

WALSALL, wŏl'sąl. A manufacturing market town, municipal and Parliamentary borough, in Staffordshire, England, on an eminence near the Tame, eight miles northwest of Birmingham (Map: England, E 4). The town has fine ecclesiastical and municipal buildings, gas, electric lighting, and modern sewerage works, and markets and a free library; it has built artisans' dwellings and it owns the tramways and other works. Coal, iron, limestone, and clay are obtained in the neighborhood; tanning, malting, and the manufacture of hardware and saddlery are the industries. Walsall was fortified early in the tenth century and received charters from Edward III. and Henry IV., confirming prior royal privileges. Population, in 1891, 71,790; in 1901, 86,440. Consult Willmore, *History of Walsall* (1887).

WALSINGHAM, wŏl'sĭng-*a*m, Sir Francis (c.1530-90). An English statesman. He was born either in London or in Kent, about the year 1530. He studied at King's College, Cambridge, but appears not to have graduated. He was a zealous Protestant and lived abroad during the five years of Mary's reign, acquiring a knowledge of foreign languages and politics which was of the utmost value to him in his conduct of England's foreign affairs under Elizabeth. Burleigh sent him on a difficult mission to France in August, 1570. He remained in Paris until April, 1573, and acquitted himself so well that he was made one of the principal secretaries of State, a member of the Privy Council, and knighted. Next after Burleigh he was Elizabeth's most important Minister, but he occupied himself principally with foreign affairs. The keynote of his policy was hostility to Spain. He accordingly labored incessantly for intervention in the Netherlands and the suppression of Catholic plots which Spain encouraged in England. His administration was founded upon a most complete system of bribery, espionage, and deception. Though Elizabeth recognized his abilities and disinterestedness, she seldom followed his advice, and it was with the greatest difficulty that she brought herself even to a half-hearted adoption of his policy. In 1578 Walsingham was sent to the Netherlands with the unwelcome task of trying to pacify the country by diplomacy; in 1581 he was sent to France and in 1583 to Scotland. In 1585 he brought Elizabeth to a momentary support of the Dutch, but the results did not meet his expectations. In 1586 he unearthed the Babington plot, the object of which was the murder of Queen Elizabeth, and Walsingham produced letters in Mary's cipher, which, if genuine, proved beyond a doubt Mary's complicity in the conspiracy. (See Babington, Antony.) Walsingham was one of the commissioners by whom Mary was tried and condemned, and he was one of the most active in bringing Elizabeth to the point of signing the death warrant. In 1587 and 1588 Walsingham's secret service kept him completely informed of the plans and progress of the great Armada (q.v.), but, as usual, he was unsuccessful in persuading the Queen to take proper measures to meet the emergency. During Walsingham's last years he was greatly embarrassed by debt, due in part to expenditures in the service of the State, but Elizabeth gave him no relief. He died April 6, 1590, and was buried privately at night in Saint Paul's Church.

Digges's *Compleate Ambassador* (London, 1655) contains Walsingham's dispatches during his first mission to France. The Camden Society has published *Sir Francis Walsingham's Journal* from December, 1570, to April, 1583 (London, 1870). Consult: Thomas Wright, *Queen Elizabeth and Her Times, a Series of Original Letters* (ib., 1838); Cooper, *Athenæ Cantabrigienses* (Cambridge, 1858-61); Hume, *The Great Lord Burleigh* (London, 1898).

WALSINGHAM, Thomas (?-c.1422). An English monk and historian, supposed to have been born in Norfolk. He was connected with the Abbey of Saint Albans as precentor and scriptorarius, and in 1394 he became prior of Wymundham. He is thought to have composed: *Chronicon Angliæ*, covering the period from 1328 till 1388 ("Rolls Series" for 1874); *Gesta Abbatum*, history of the abbots of Saint Albans ("Rolls Series" for 1867-69, in 2 vols.); *The Saint Albans Manuscript*, covering the years 1272-1393; *Historia Anglicana*, covering the years 1272-1422 ("Rolls Series" for 1863); *The Ypodigma Neustria*, a history of the dukes of Normandy ("Rolls Series," 1876), and other works. Although he was a chronicler rather than an historian, his works form the chief source upon the reigns of Richard II., Henry IV., and Henry V., including the career of Wyclif and the insurrection of Wat Tyler.

WALTER, wąl'tẽr, Hubert (c.1150-1205). An English statesman and ecclesiastic. In 1186 he became Dean of York, and in 1189 was one of the justices of the Curia Regis. Richard appointed Hubert Bishop of Salisbury, and he accompanied the King on the Crusade and distinguished himself by his courage, astuteness, and charity. In 1193 Hubert Walter returned to England and superintended the collection of money for Richard's ransom. At the same time he was chosen Archbishop of Canterbury, and when at the end of this year King Richard returned from his German prison, he appointed Hubert justiciar of the realm, and left him virtual ruler of England. But the Cathedral Chapter objected to the employment of the Archbishop in the royal service, and in 1198 Innocent III. compelled him to resign by forbidding priests to hold secular offices. Nevertheless Hubert still continued to exert considerable influence, and acted as a restraint on John, which was sadly missed after his death. Consult Stubbs, *Constitutional History of England*, vol. i. (6th ed., Oxford, 1897).

WALTER, John (1739-1812). An English coal merchant, underwriter, and printer, the founder of the London *Times*. He was born in London, the son of a coal merchant, to whose business he succeeded in 1755. He was very successful and established the coal exchange. In 1781, however, he retired from the coal business in order to take up the vocation of an underwriter. While at first successful, the events of the American Revolution caused him in 1782 to fail. He succeeded in paying his creditors, who thereupon made him a gift of money. With this sum Walter purchased the patents of a new printing process and established the printing office in Blackfriars (1784), which is still the seat of the *Times*. On January 1, 1785, appeared the first issue of *The Daily Universal Register*, which on January 1, 1788, was changed to *The Times, or Daily Universal Register*, and on March 18th of that year became simply *The Times*. From the first it showed that attention to Parliamentary debates and that independence of attitude which have always been its distinguishing characteristics. Indeed, Walter was twice imprisoned and five times fined for libel, in consequence of the freedom of his comments. See TIMES, THE.

WAL'TER, MASTER. The title character in Sheridan Knowles's comedy *The Hunchback*. Julia is his professed ward; but he proves to be, in reality, her father, the Earl of Rochdale. The rôle was created at Covent Garden, April 5, 1832, by the author himself.

WALTER, THOMAS USTICK (1804-87). An American architect, born in Philadelphia. He was the pupil of William Strickland in that city and of William Mason, the water-colorist. Establishing himself in Philadelphia in 1830, he constructed during the following year the Philadelphia County prison at Moyamensing. In 1833 his design for Girard College was accepted and five years later he was sent by the directors to Europe to study the best methods of fitting up the institution. During the next ten years he designed the breakwater at La Guaira, Venezuela; Saint George's Hall, the Preston Retreat, the Philadelphia Savings Bank, the Chester County Bank, and several churches, all in Philadelphia; and the Biddle and Cowperthwaite mansions on the Delaware. In 1848, when the enlargement of the Capitol at Washington was under discussion, he was commissioned by President Fillmore to superintend the work. During the fourteen years that he remained in Washington Walter completed as well the wings of the Patent Office, the enlargement of the Post Office, the hospital for the insane, and the Treasury building. He also built the marine barracks at Brooklyn and at Pensacola. After his return to Philadelphia in 1862 he did little professional work. The American Institute of Architects, which he had founded in 1837, and assisted to reorganize in 1857, elected him president in 1876.

WALTHAM, wŏl'tham. A city in Middlesex County, Mass., 10 miles west of Boston; on the Charles River, and on the Boston and Maine Railroad (Map: Massachusetts, E 3). It is situated on both banks of the river, and is well laid out. Among the institutions of the city are the Waltham Nurses' Training School, the Massachusetts School for the Feeble-Minded, the Waltham New Church School, Notre Dame Normal Training School, Leland Home for Aged Women, and the Waltham Hospital. There is a public library with 27,000 volumes. The city has also a public park, Prospect Hill. Waltham is chiefly an industrial city, and is especially noted for its watch-making interests, one of its watch factories, the American Waltham, being among the largest concerns of its kind in the world. Other important establishments are iron and brass foundries, and manufactories of watch tools, dials, cotton cloth, bicycles, etc. In the census year 1900 the invested capital in all industries was $9,152,169, and the output was valued at $6,934,381. Under the charter of 1893 the government is vested in a mayor, chosen annually, and a unicameral council. The majority of the administrative officials are appointed by the mayor. The school board is chosen by popular vote. The water-works are owned and operated by the municipality. Population, in 1890, 18,707; in 1900, 23,481. Until separately incorporated as a town in 1738, Waltham formed a part of Watertown. It was chartered as a city in 1884. Consult: Rutter, *Historical Address* (Waltham, 1877); and Hurd, *History of Middlesex County* (Philadelphia, 1890).

WALTHAM ABBEY, or WALTHAM HOLY CROSS. A market town in the County of Essex, England, on the Lea, 12 miles north of London (Map: London, A 8). The town takes its name from the Abbey of the Holy Cross, founded by King Harold, who is buried there. The reconstructed Temple Bar, which from 1670 to 1880 stood at the west end of Fleet Street, London, marks one of the entrances to Theobald's Park. The Government gunpowder and flour mills, operated by the water-power of the Lea, the celebrated Government Enfield factory for rifles, etc., at Enfield Lock, and large cordite factories at Quinton Hill just outside the town, are the chief industrial establishments. Population, in 1901, 6547. Consult Stubbs, *Foundation of Waltham Abbey* (London, 1860).

WALTHAMSTOW, wŏl'tham-stō. A town in Essex, England, 6 miles northeast of Saint Paul's London (Map: London, C 8). Its public works include electric lighting and septic sewage disposal plants. It maintains a free library and reading rooms, public baths, and recreation grounds. Population, in 1891, 46,346; in 1901, 95,125.

WALTHER VON DER VOGELWEIDE, väl'tĕr fōn dĕr fō'gel-vī'de (c.1165-c.1230). A Middle High German minnesinger. Under Reinmar der Alte, Walther learned the art of Minnesong (see MINNESINGERS) at Vienna, where he seems to have remained till the confusion that followed the death of the German Emperor Henry VI. in 1197 and of the Austrian Duke Frederick the Catholic, in 1198, made him a wandering singer. Walther became a partisan of Philip, Duke of Swabia, who had been chosen King in March, 1198. After Philip's assassination (1208) he was for a while in the service of the Landgrave Hermann of Thuringia, and he was influenced deeply by Saint Elizabeth of Hungary. By his songs he continued to influence the art and politics of his time, till at length Frederick II., in recognition of his services to the German national cause, granted him an estate near Würzburg (1220). It was for this Emperor's long postponed Crusade that Walther wrote (c.1227) his noble *Kreuzlied*. He died at Würzburg, where his grave is still shown. In his poetry Walther passed from a period of introspective analysis, through a protest against the artistic conventions of traditional Minnesong to a virile criticism of literary sentimentality and social degeneracy, so that his maturer work is prevailingly ethical, politically or religiously didactic. His patriotism was broadly German. He appears at his best in the *Sprüche*, models of didatic compactness. His opponents called him a demagogue, and he certainly was a political agitator of unflinching courage, but he was also Germany's greatest lyric poet before Goethe.

Walther's *Works* are edited by Lachmann (Berlin, 1827), Wackernagel and Rieger (Giessen, 1862), Pfeiffer (Leipzig, 1864), Paul (Halle, 1882), and Wilmanns (ib., 1883). There are modern German versions by Simrock (Berlin, 1833), Woiske (Halle, 1852), Schröter (Jena, 1881), and Menzel (Plauen, 1888); and *Lives* by Uhland (Stuttgart, 1822), Menzel (Leipzig, 1865), Burdach (ib., 1880), Wilmanns (Bonn, 1882), and Schönbach (Berlin, 1895). Consult the *Bibliography* by Leo (Vienna, 1880), and Hornig, *Glossarium* (Quedlinburg, 1844).

WALTON, wạl'ton, BRIAN (c.1600-61). The editor of Walton's polyglot Bible. He was born probably at Hilton, Yorkshire, studied at Cambridge, was ordained in 1623, and became rector of Saint Martin's Orgar, London, 1628; and also of Sandon in Essex, 1636. Being involved in the troubles of the times, he was deprived of his rectories; but, undismayed, he planned the famous polyglot Bible, for which £9000 was subscribed. It was published in London in 1657. (See POLYGLOTS.) He had various learned helpers, but the editorship devolved on himself. The work was finished in four years. At the Restoration Walton regained his preferments, and he was consecrated Bishop of Chester in 1660. Consult his memoirs by Todd (London, 1821).

WALTON, GEORGE (1740-1804). An American lawyer. He was born in Frederick County, Va., began his career as a carpenter's apprentice, but devoted his leisure to study, and was admitted to the Georgia bar in 1774. He was very active in opposing the policy of the English Government toward the Colonies; was a delegate to Congress 1775; was a colonel of militia; and was wounded and taken prisoner when Savannah was captured by the British in 1778. He was released in 1779 and was elected Governor of Georgia; he was Chief Justice of that State, 1783-93; was a justice of the United States Supreme Court in 1793; and United States Senator 1795-96. He was one of the signers of the Declaration of Independence. He died at Augusta, Ga., in 1804.

WALTON, IZAAK (1593-1683). An English author. He was born in the Parish of Saint Mary, Stafford, August 9, 1593, and seems to have gone to London about 1611. The belief almost universally expressed by biographers until recent years that he was a 'sempster' or a linendraper is contradicted by the records of the Ironmongers' Company, which show that Walton was made a member of that company in 1618; and the license for his first marriage in 1626 describes him as an ironmonger. He was living in Fleet Street, London, in 1624, and the books of Saint Dunstan's Parish show that from 1628 to 1644 his home was in Chancery Lane, where Dr. John Donne was his friend and neighbor. After a few years (until 1651) spent partly at Stafford and partly in visiting "the families of the eminent clergymen of England, of whom he was much beloved," he took up his residence probably at Clerkenwell, where he was living in 1653, when the first edition of *The Compleat Angler* appeared. When the Restoration was effected he made his home for the most part with Bishop Morley of Winchester and Bishop Ward of Salisbury, and died at Winchester, December 15, 1683.

The earliest of Walton's writings that we have is "An Elegie," added to the 1633 edition of Donne's poems. When Donne's sermons were published in 1640 they were prefaced by a *Life* from Walton's pen, revised and separately published in 1658. The affectionate intimacy of its tone, and its artless blending of simplicity, piety, and humor, well show why Walton was so lovingly regarded by Wotton, Hales, Drayton, and other famous contemporaries, and give ample credence to Boswell's statement that the book was a favorite of Dr. Johnson's. Similar in spirit are his biographies of Sir Henry Wotton (1651), of Richard Hooker (1665), which was prefixed the following year to Hooker's *Ecclesiastical Polity*, of George Herbert (1670), and of Robert Sanderson (1678). All save the last appeared in one volume in 1670. Yet the work for which Walton is best known and loved is the most careless and least practical of all, *The Compleat Angler, or the Contemplative Man's Recreation*, of which Lamb said, "It would sweeten a man's temper at any time to read it." It is a rambling dialogue on all that pertains to the angler's art, charming in its pastoral freshness and the archaic quaintness of its style, and full of the gentle, kindly, sincere spirit of the man. It is of little value now in its intended function of a treatise, but will always live as a fishing idyll of great beauty. Appearing in five editions during Walton's lifetime, it has since been published more than a hundred times; and the demand for 'Waltoniana' has given a high value to the earlier copies. A supplement upon fly-fishing, by his close friend, Charles Cotton, was added to the fifth edition and now forms the second part of the work. Consult: Westwood and Satchell, *Bibliotheca Piscatoria* (London, 1883); Marston, *Walton and Some Earlier Writers on Fish and Fishing* (ib., 1894).

WALTON-LE-DALE. A manufacturing town in Lancashire, England, a suburb two miles southeast of Preston (q.v.) (Map: England, D 3). Population, in 1901, 11,271.

WALTON-ON-THAMES. A favorite pleasure, angling, and residential resort in Surrey, England, five miles southwest of Kingston. Population, in 1891, 7988; in 1901, 10,329.

WALTZ (Ger. *Walzer*, round dance, roller, from *walzen*, OHG. *walzan*, AS. *wealtan*, obsolete Eng. *walt*, to roll; connected with Goth. *walus*, AS. *walu*, staff). A round dance, originally of French origin, but so modified in Germany as to belong really to that country. It became popular on the Continent at the beginning of the nineteenth century, and was introduced into England in 1812. It is danced to music of ¾ time by any number of couples, who wheel rapidly round on an axis of their own, advancing at the same time round the room. The two great composers of the waltz are the two Johann Strausses (father and son). The waltzes written by some of our classical masters are not intended for dancing. They are high art forms, having little more in common with the real dance than the three-fourth time. Chopin is the originator of this form of waltz. Since then many eminent composers have cultivated this form. They generally add some qualifying adjective to the title, as 'valse noble,' 'valse characteristique,' 'valse mélancholique.'

WALWORTH, wąl'wûrth, JEANNETTE HADERMANN (1837—). An American author, born in Philadelphia, Pa. When her father died the family moved to Louisiana. Her first book was *Forgiveness at Last* (1870). In 1873 she married Major Walworth and for five years lived on a plantation in Arkansas, where she wrote but little. They moved to Memphis and after two years to New York City, where Mrs. Walworth soon gained great popularity. She wrote: *The Silent Witness* (1871); *Dead Men's Shoes* (1872); *Heavy Yokes* (1874); *Nobody's Business* (1878); *At Bay* (1887); *True to Herself* (1888); *Uncle Scipio and an Old Fogy* (1896).

WALWORTH, REUBEN HYDE (1789-1867). An American lawyer. He was born at Bozrah, Conn., spent his early years on a farm, and taught school at Hoosick, N. Y., at sixteen years of age; at seventeen he began the study of law and in 1809 was admitted to the bar. In 1810 he settled at Plattsburg, N. Y., and in 1811 was made master in chancery. During the War of 1812 he served in the New York militia in the vicinity of Plattsburg. He was a member of Congress (1821-23) and a justice of the United States Circuit Court (1823-28), in which year he was appointed chancellor of New York, which position he held for twenty years, until the office was abolished. His decisions are reported in the New York cases of Hill, Wendell, Denio, Barbour, and Page. He published *Rules and Orders of the New York Court of Chancery* (1829), and an elaborate genealogy of the Hyde family.

WAM'BA. The faithful jester of Cedric the Saxon, in Scott's *Ivanhoe*. He preserves his master from death in the defense of Front de Bœuf's castle and shares many of Ivanhoe's adventures.

WAMPANOAG, wŏm'pȧ-nō'*ag* (People of the eastern country). An important Algonquian tribe, sometimes known as Pokanoket from their principal village, formerly holding the eastern shore of Narragansett Bay, in the present Rhode Island and Massachusetts. Their principal village, Pokanoket or Sowams, was at the present Mount Hope, near Bristol. They also ruled over several smaller tribes east and south, including the island of Martha's Vineyard. When the English first settled at Plymouth in 1620 the Wampanoag were said to have thirty villages and had been estimated at several thousand warriors before the great pestilence of 1617, which nearly depopulated the southern New England coast. In King Philip's War (see PHILIP, KING) the Wampanoag and Narraganset were practically exterminated, and the survivors fled to the tribes in the interior or to Canada. Many hundreds were sold into slavery. The few spared were settled with some friendly Indians at Saconnet, near Compton, R. I., where the entire body became extinct about the end of the eighteenth century.

WAMPUM, wŏm'pŭm (from Algonquian *wompi*, white). A name adopted from the New England tribes to designate the aboriginal shell beads (see SHELL MONEY) used everywehere east of the Mississippi for dress ornamentation, for weaving into symbolic belts, and as a currency medium. The beads were of two colors, white and purple, the latter being the more valuable. They were drilled, shaped, and polished with great care, and were sewn upon shirts, moccasins, belts, and other garments in various ornamental designs. Having a fixed value and being of convenient carriage and in constant demand, they came to be recognized as a regular aboriginal currency among all the Eastern tribes as well as by the early colonists, who by various governmental enactments gave them a legal value in comparison with the English and Dutch coins then in circulation.

Perhaps the most important use of wampum was in the symbolic record belts and strings which gave the stamp of authority to every intertribal transaction. No message from one tribe or council to another was considered official without the delivery at the same time of a string or belt of wampum, which was thenceforth preserved by the recipients as the proof and reminder of the negotiation, the belt being handed over to the keeping of the hereditary or chosen custodian of the records. Such belts usually had the beads arranged in symbolic figures more or less suggestive of the transaction thus ratified. Wampum belts were used in the ratification of every important treaty negotiated with the Eastern tribes from the early colonial period down to the great intertribal treaty of Prairie du Chien in 1825. In 1843, at the intertribal council at Tahlequah, the Cherokee produced the belts which attested the peace made with the Iroquois before the Revolutionary War. The Iroquois themselves still preserve several of their ancient record belts; and others of historic importance are preserved among the archives of New York State at Albany and elsewhere.

Wampum, as commonly understood, seems to have been unknown among the tribes of the plains and mountains, but shell ornaments of various kinds were made and used on the Pacific coast for decoration and as a currency medium.

WAMPUM SNAKE. See HOOP-SNAKE.

WAN'AMAKER, JOHN (1838—). An American merchant and Cabinet officer, born in Philadelphia, Pa. He received a common school education, and for a time was an errand boy. In 1856 he entered mercantile life in Philadelphia and gradually built up an enormous retail business. In 1896 he reopened the department store founded in New York by A. T. Stewart. He was president of the Young Men's Christian Association in Philadelphia from 1870 to 1883, was one of the founders of the Christian Commission at the time of the Civil War, and was the founder of Bethany Sunday-school, of which he was for many years the superintendent. From 1889 to 1893 he was Postmaster-General in President Harrison's Cabinet.

WANDALA, wȧn-dä'lȧ. A negro kingdom of Africa. See MANDARA.

WANDERING CELL. See PHAGOCYTE.

WANDERING JEW, THE. A legendary Jew doomed to wander over the earth until the day of Judgment. According to the usual version of the story, which is probably ultimately Oriental in origin, Christ, while on his way to Calvary, stopped to rest for an instant before the door of a man named Joannes Buttadeus. This man drove the Saviour away, striking him and saying in mockery: "Go, why dost thou tarry?" At these words, Christ, looking sternly on him, replied: "I go, but thou shalt tarry till I come." In consequence Buttadeus became undying, for at the end of each century he suffers a sickness which rejuvenates him to the age of thirty. By the doom pronounced upon him, his entire character was changed. Not only did he become gifted with supernatural wisdom, but his cruelty was turned to repentance, and in his journeys through every land he exhorted men to be mindful of their sins, and thus avoid the wrath of God.

The legend of the wandering Jew is based apparently upon the account in John xxi. 21-23, where Christ says of John: "If I will that he tarry till I come, what is that to thee?" This passage is then confused with the account of the servant of the high priest, Malchus, whose ear was cut off by Peter for laying hands upon the Lord on the night of the betrayal (John xviii. 10; Matt. xxvi. 50-51; Mark xiv. 46-47). According to the Italian legend of the fifteenth century, however, Malchus was doomed to circle forever beneath the earth about the pillar to which Christ had been bound when scourged. The legend is a comparatively recent one. The earliest mention of it is in the English chronicle of Wendover, who died in 1236. According to him, an Armenian archbishop, who visited Saint Albans in 1228, had eaten and conversed many times with a certain man baptized as Joseph, but once known as Carthaphilus or Cartaphilus, who had been the door-keeper of Pontius Pilate. The same story is told by Matthew Paris and by the Flemish chronicler Philip Mouskes (about 1243). The name of Carthaphilus, however, is practically unknown, the Jew being called almost universally in the Latin versions Joannes Buttadeus, or John the God-smiter. In Provence he was called Boutedieu, in Brittany Boudedes, in Belgium Isaac Laquedem, in Saxony Bedeus; but in Spain Juan Espera-en-Dios, and in Portugal João de Espera-em-Deos, or John Hope-in-God, the latter form of the name indicating a change in the point of view from which the legend was regarded. Here he bears a black fillet and a flaming cross which consumes his brain as fast as it is renewed. Although the wanderings of the Jew are vaguely stated to be world-wide, he resided, according to the version reported by the chronicler of Wendover, in Armenia. Italy seems, however, to have been his usual place of abode. In 1267 he was at Forli, and in 1400, according to the chronicle of Sigismondo Tizio, he passed through Siena. In 1542 Paul von Eitzen, the Bishop of Schleswig, declared that he had seen the Wandering Jew in the Church at Hamburg, where he said that he had been a shoemaker. In 1602 he was in Lübeck. He was also in Naumburg, and early in the eighteenth century he visited France, Hungary, Holland, and England. In Germany his name is changed to Ahasuerus, and his wanderings are made to symbolize the wanderings of his people for their rejection of Christ. The legend gained wide currency in Germany through the publication in 1602 at Leyden of a chap-book entitled *Kurtze Beschreibung und Erzählung von einem Juden mit Namen Ahasverus*. The belief in the legend has survived until a comparatively recent time, especially in Germany, France, Belgium, Denmark, and Sweden, and is doubtless yet held in some of the remoter districts.

The legend of the Wandering Jew has been an attractive theme in literature. In Germany may be mentioned the epic fragment *Der ewige Jude* of Goethe in 1774, and *Die Wanderungen des Ahasverus* (also fragmentary) by Zedlitz (*Gedichte*, 5th ed., Stuttgart, 1855). Other poetic versions have been made by Mosen (Dresden, 1838), Giseke (1864), Heller (2d ed., Leipzig, 1868), Hammerling, (*Ahasverus in Rome*, 23d ed., Hamburg, 1892), and Carmen Sylva (*Jehovah*, Leipzig, 1882); besides a large number of briefer poems. Dramatic versions are the tragedy *Ahasverus* by Klingemann (Brunswick, 1827); the *Jerusalem* by Herrig (Leipzig, 1874); and *Der ewige Jude* by Haushofer (ib., 1886). In France, Quinet wrote a remarkable mystery *Ahasvère* (Paris, 1833), while the novel of Eugène Sue, *Le Juif errant* (ib., 1845), has won a world-wide reputation.

Consult: Grässe, *Der Tannhäuser und ewiger Jude* (Dresden, 1861); Bässler, *Ueber die Sage vom ewigen Juden* (Berlin, 1870); Helwig, *Die Sage vom ewigen Juden* (ib., 1874); Schoebel, *La légende du Juif errant* (Paris, 1877); Paris, *Le Juif errant* (ib., 1880); Conway, *The Wandering Jew* (London, 1881); Neubaur, *Die Sage vom ewigen Juden* (2d ed., Leipzig, 1893); Cassel, *Ahasverus, Die Sage vom ewigen Juden* (Berlin, 1885); Morpurgo, *L'Ebreo errante in Italia* (Florence, 1890).

WANDERING JEW, THE. A work by EUGENE SUE. See JUIF ERRANT, LE.

WANDEROO (Singhalese *vamdurā*, monkey, Hind. *bandar, bānar*, monkey, from Skt. *vānara*). The name of several species of monkey; probably a langur (*Semnopithecus cephalopterus*) of Ceylon. It feeds chiefly on the berries and buds of trees, and is seldom seen on the ground. Twenty or thirty are generally found together in a troop. When alarmed, they display marvelous agility in leaping, or rather swinging from branch to branch, using their powerful arms alternately. In captivity the wanderoo is remarkable for the gravity of its demeanor, and for an air of melancholy in its expression and movements which is completely in character with its snowy beard and venerable aspect. Its disposition is extremely gentle and affectionate; it is intelligent and docile, and very cleanly in its habits. The long-tailed monkey (*Macacus silenus*) of Western India is ofter called 'wanderoo.'

WANDSBEK, vänts'bĕk. A town of the Province of Schleswig-Holstein, Prussia, three miles northeast of Hamburg, of which city it is practically a suburb (Map: Germany, G 4). It has breweries, distilleries, oleograph establishments, and a large horse market. Population, in 1900, 27,966.

WANKS. A river of Nicaragua. See SEGOVIA.

WANTAGE, wŏn'tȧj. A market town in Berkshire, England, 13 miles southwest of Oxford, and 60 miles west of London (Map: England, E 5). It is noted as the birthplace of Alfred the Great, and of Bishop Butler. It has a fine statue of King Alfred by Count Gleichen, erected in 1877. Population, in 1901, 3766.

WAPAKONETA, wä'pȧ-kŏn-ĕt'ȧ. The county-seat of Auglaize County, Ohio, 85 miles south by west of Toledo; on the Auglaize River, and on the Cincinnati, Hamilton and Dayton and the Toledo and Ohio Central railroads (Map: Ohio, B 4). It is surrounded by a fertile district engaged in farming and having an abundance of petroleum and natural gas. The most important manufactured product is furniture. The water-works and the electric light plant are owned by the municipality. Wapakoneta was once a well-known Indian village. Population, in 1890, 3616; in 1900, 3915.

WAPENTAKE. In English law, an equivalent of the word 'hundred,' meaning a subdivision of a county. Originally it signified a gathering of the male citizens of a district to prepare for a military expedition or defense, the word itself being derived from two Saxon words meaning to take or touch weapons. By popular usage the term was later applied to a district from which a certain number of men capable of bearing arms were raised. The term was also applied to a Saxon court held at regular intervals by the chief men of a hundred. The wapentake is obsolete as a subdivision of a county, although the word is sometimes used as a matter of description in speaking of a district. Consult Stubbs, *Constitutional History of England.*

WAPITI (from Cree Indian, *wapitik*, white deer). A large North American deer (*Cervus Canadensis*), closely allied to the European red deer (see Deer), but considerably exceeding it in size, being five feet in height at the shoulder and sometimes weighing 1000 pounds. It is a native of North America, and formerly was found all over the continent from the Carolinas to Alaska. But it has been so persistently slaughtered that it is now confined mainly to the northern Rocky Mountain region in the United States, and northward to the middle of Alberta. It is yellowish brown on the upper parts; the sides gray; a pale yellowish or white patch on each buttock, bounded by a black line on the thigh; the neck, a mixture of red and black, with long, coarse, black hair, falling down from it in front like a dewlap; a black mark at each angle of the mouth. The hair is crisp and hard, but there is a soft down beneath it. The antlers are large, much like those of the stag, but the first branch bends down almost over the face. The wapiti is usually called *elk* in America, although very different from the moose. (See Elk; Moose.) This fine deer was an inhabitant of plains and prairies rather than of the forest regions. It feeds upon grass rather than upon leaves. Its general habits resemble those of the gregarious deer, and it was accustomed in the autumn in the West to gather in bands in the foothills of the mountains, where it spent the winter, pawing down through the snow when necessary to get at the dried grass. These bands would join others until herds numbering many thousands would move about in company until spring. The animal was of great importance to the Indians as food, and its hide was used as material for covering their lodges. See Plate of North American Deer; and consult authorities cited under Deer.

WAPPÄUS, vȧ-pä'ụs, Johann Eduard (1812-79). A German geographer and statistician, born in Hamburg. He was educated at the universities of Göttingen and Berlin, interrupting his studies in 1833-34 for a trip to the Cape Verde Islands and South America. This journey, which afforded material for much of his future work, was the occasion of the first adequate presentation to the German people of the possibilities of South America as a field for national enterprise. In 1845 he was made professor extraordinary, and in 1854 professor at Göttingen. His publications include: *Untersuchungen über die geographischen Entdeckungen der Portugiesen unter Heinrich dem Seefahrer* (1842); *Die Republiken von Südamerika* (part i., *Venezuela*, 1843); *Deutsche Auswanderung und Kolonisation* (1846 and 1848); *Allgemeine Bevölkerungsstatistik* (1859-61, by order of the Government of Hanover); and *Einleitung in das Studium der Statistik* (published posthumously by Gandil, 1881). The great work of Wappäus's life was the editing of the seventh edition of the monumental *Handbuch der Geographie und Statistik* by Stein and Hörschelmann. The preparation of the ten volumes occupied him from 1847 to 1871. He himself contributed the introductory volume of universal geography (1849) and the three volumes devoted to the American continents (1855-67).

WAPPERS, Gustave, Baron (1803-74). A Belgian historical and genre painter. He was born at Antwerp, studied in the Academy there, and then became a pupil of Van Bree and of Herreyns, after which he devoted himself to the old Flemish masters, Rubens, Van Dyke, and Jordaens. He went to The Hague and to Amsterdam to study the Dutch masters and to Paris for the old Venetians. At Paris he fell under the classical influence, and in 1823 painted a "Regulus" in that manner. Upon his return to Antwerp in 1830 he exhibited "The Sacrifice of Burgomaster van der Werff at the Siege of Leyden" (Utrecht Museum), a picture which showed the influence of the old Flemish masters in its splendid color and sensuous fullness of life, and he was hailed as the deliverer of Belgian art from French bondage. In 1832 he became professor and in 1840 director of the Antwerp Academy. He was president of the National Museum (1846-53). In 1859 he removed to Paris, where he died. His "Episode of the Belgian Revolution of 1830" (1834, Brussels Museum), confirmed his position as the leader of a new renaissance, which was in fact a reaction against classicism, like that of Delacroix in France. His pictures are chiefly to be found in the various museums of Holland and Belgium. Aside from subjects illustrating historical events of the Netherlands he painted "Charles I. Taking Leave of His Children," "Execution of Anne Boleyn," "Louis XI. at Plessis les Tours," etc.

WAPPING OLD STAIRS. An English song, of a sailor and his sweetheart, by John Percy, written in the latter part of the eighteenth century and sung to an old English air. The last stanza was added by James Powell.

WAR. All definitions of war, in the sense of international law, may be said to agree in one fundamental essential, that war is a public and State act as distinguished from the acts of private individuals. The Supreme Court of the United States, in an oft quoted sentence, laid down the following definition: "Every contention by force between two nations in external matters, under the authority of their respective governments, is not only war, but public war." (*Bas vs. Tingy*, 4 Dallas 37). A more elaborate definition, in the nature of a description, is found in the following: "It is a contest," says Bynkershoek, "carried on between independent persons for the sake of asserting their rights." Where society does not exist—where there is no such institution as that which we call government—these individuals, being strictly independent persons, may carry on war against each other. But whenever men are formed into a social body, war cannot exist between individuals. The use of force among them is not war, but a trespass, cognizable by the municipal law. If war, then, to be the act of a nation, whatever is done in the prosecution of it, must either expressly or implicitly be under the national authority, whatever private benefits result from it must be from a national grant. "War," says Vattel, "is that state in which a nation prosecutes its right by force." The right of making war belongs to the sovereign power. Individuals cannot control operations of war, nor commit any hostility (except in self-defense), without the sovereign's order. "The generals," adds that writer, "the officers, the soldiers, the partisans, and those who fit out private ships of war, having all commissions from the sovereign, make war by virtue of a particular order. And the necessity of a particular order is so thoroughly established, that even after a declaration of war between two nations, if the peasants themselves commit any hostilities, the enemy, instead of sparing them, hangs them up as so many robbers or banditti." (*United States vs. The "Active,"* 24 Fed. Cas. 755.) These statements apply to hostilities between sovereign and independent nations, but they fail to include armed contention between different parts of the same nation as in the case of the Civil War in the United States. A third decision, arising out of the circumstances of the Civil War, will supplement and complete the fundamental conception of war. "That they (the Confederates) were liable to be regarded as 'enemies' is undoubtedly true. This implies the existence of 'war.' But every forcible contest between two governments, *de facto* or *de jure*, is war. War is an existing *fact* and not a legislative decree. Congress alone may have power to 'declare' it *beforehand*, and thus cause or commence it. But it may be initiated by other nations, or by traitors, and then it *exists*, whether there is a declaration of it or not. It may be prosecuted without any declaration; or Congress may, as in the Mexican War, declare its previous existence. In either case it is the *fact* that makes 'enemies,' and not any legislative act." (*Dole vs. Merchants' Mutual Marine Ins. Co.*, 51 Maine, 465.) A mere insurrection, however, is not war; to entitle the armed forces to the rights and privileges of belligerents it would seem that they should possess at least the power to make the issue doubtful, and that the Government which they serve must be organized so as to be in a position to meet the duties necessarily resting upon belligerents, namely to maintain law and order within the regions subjected to their control, and to carry on war on a large scale on land or sea. If these elements are absent, the uprising is treated as a rebellion, and rebels as such have no rights. The parties to a civil war, such as the Civil War in the United States, have equal claim to the protection accorded by the modern law of war.

Publicists have divided wars into formal and informal; perfect and imperfect; offensive and defensive; national and civil; but these classifications are practically worthless. War is a fact; its existence is proved as a fact, and it is nothing more than the contention on land or sea of armed bodies acting under orders from and commissioned by a *de jure* or *de facto* sovereign, and both parties to the contest, whether equal or unequal in size, legally or illegally existing, enjoy equal rights. Examples of this are the Civil War, the South African War, and more lately the state of affairs in the Philippines after their cession to the United States.

It is likewise immaterial whether the war begins formally with a declaration, or informally by an act of hostility. It is necessary, however, to fix the exact date of the outbreak; for the effect of war when once existing is wide-reaching both as regards the belligerents and neutral nations. A nation may formally declare war, as in the case of the ultimatum served upon the British Government by the Transvaal in 1899; the nations may drift into war, as was the case with China and Japan in 1894; or the date of the war may be fixed by act or proclamation subsequent to the outbreak of hostilities, as was done by the act of Congress of April 25, 1898, which declared war to have existed "since the twenty-first day of April, *Anno Domini* eighteen hundred and ninety-eight, including said day, between the United States of America and the Kingdom of Spain."

As with kinds, so with causes of war. Publicists have amused themselves with divisions into permissible and non-permissible, just and unjust wars, and have classified the various causes as just and unjust. But this, however interesting in itself, is not helpful. A sovereign nation has no superior, and therefore admits of no judge as to the justice or iniquity of the war into which it plunges. When nations are inflamed by real or imaginary violations of their rights, as in the case of the Mexican War, justice is largely an afterthought. Patriotism, too often jingoism, appears to control. The most that may be said is that when a nation's demand, just or unjust, is met by a denial, it is for the nation to decide whether it will attempt to force by arms the rejected demand. The question of responsibility is moral rather than a question of international law.

War is not an end in itself; it is a means to an end, namely peace. The *Instructions for the Government of Armies of the United States in the Field* (prepared by Dr. Lieber in 1863 and reissued in 1898) say in articles 29 and 30: "Peace is their (nations') normal condition; war is the exception. The ultimate object of all modern war is a renewed state of peace. The more vigorously wars are pursued, the better it is for humanity. Sharp wars are brief. Ever since the formation and coexistence of modern nations, and ever since wars have become great national wars, war has come to be acknowledged not to be its own end, but the means to obtain great ends of State, or to consist in defense against wrong; and no conventional restriction of the modes adopted to injure the enemy is any longer admitted; but the law of war imposes many limitations and restrictions on principles of justice, faith, and honor."

The history of warfare is at best a sorry tale. In ancient times contending armies literally devastated with fire and sword the countries they overran, and either killed or enslaved their captives. The wars of the Middle Ages continued a scourge notwithstanding the doctrines of Christianity. As Sir Henry Maine says: "The Reformation brought with it a new fury of fighting, and the wars of religion were among the most ferocious that mankind had waged. Armies did not then so much consist of rival potentates, as of hosts in which each individual detested every man on the other side as a misbeliever. This ferocity is generally believed to have culminated in the storming of Magdeburg," when the whole town, with the exception of the cathedral and about 140 houses, was burned to the ground, and 30,000 of its 36,000 inhabitants were butchered without regard to sex or age. The Thirty Years' War fills us with horror, but a better day was dawning and the hour and the man were at hand. In 1625, in the very midst of this contest, Grotius (q.v.) published his immortal work, *De Jure Belli et Pacis*, a protest at once and a guide in which he outlined the permissible and the infamous with a firm and masterly touch. Basing himself on the Scriptures, the principles of morality, and a supposed law of nature, he subjected the history of warfare to a careful examination, separated humane from ferocious precedents, and digested in an incomplete but admirable way the principles to be derived from their study. The weight of his influence gave to the result something of the consistency and the authority of a code. "The effects of the *De Jure Belli et Pacis*," continues Maine, "both in respect of its general influence and of the detailed propositions which it laid down, were exceedingly prompt and have proved extremely durable. At about the middle of his reign Louis XIV. of France adopted two measures by which he was thought to have carried the severity of war to the furthest point. He devastated the Palatinate (q.v.), expressly directing his officers to carry fire and sword into every corner of the province, and he issued a notice to the Dutch, with whom he was at war, that, as soon as the melting of the ice opened the canals, he would grant no more quarter to his Dutch enemies. The devastation of the Palatinate has become a proverb of savageness with all historians, though fifty years earlier it might at most have been passed as a measure of severity, or might even have been defended; but the proclamation to the Dutch called forth a burst of execration from all Europe, and the threat to refuse quarter was not acted upon. The book of Grotius was making itself felt, and the successors of Grotius assure us that it was his authority which deterred the French King and the French generals from the threatened outrage." (*International Law*, p. 23.)

The book not only made its own way, but its principles were popularized by Grotius's successors, particularly Pufendorf, Bynkershoek, and Wolf. To Vattel, however (see VATTEL, EMERICH DE), belongs the supreme merit of supplying a text which at the present day is appealed to by theorist as well as practitioner. Indeed, it is almost impossible to overestimate his services as a popularizer of a system of international law to which he contributed but little. The improvement produced in the conduct of warfare in the century and a quarter from the publication of Grotius's work is seen in the statement of Vattel that he was struck by the extreme gentleness of the wars of his day, and of "the standard of gentleness proper to war. Vattel," according to Maine, "was a severe judge."

A curious and well-nigh contemporary illustration of 'gentleness' is supplied by the statement of the British historian (Stedman, *History of the American War*), cited in a very valuable and illuminating note on the conduct of the war in Fiske, *American Revolution*, vol. ii. (pp. 116-118), to the effect that "the conduct of the Americans upon this occasion (the storming of Stony Point) was highly meritorious: For they would have been fully justified in putting the garrison to the sword: not one man of which was put to death but in fair combat." Indeed, as late as 1820 the Duke of Wellington stated: "I believe it has always been understood that the defenders of a fortress stormed have no right to quarter." But in justice it should be said that he never made any use of this alleged right.

These citations are made to show by what slow and laborious processes humanitarian theories have incorporated themselves into actual law and practice. At the present day, however, such details have merely historical or antiquarian interest; for the theory and practice of modern civilized nations in their dealings with one another regard useless slaughter as murder, and consider all slaughter useless, if not indispensable to the end in view, namely, the fair, manly, and open conduct of war in the interest of its speedy termination. To this end, cruel and pain-giving instruments are forbidden, for the purpose of the combatant is to wound or incapacitate rather than to kill if there be a choice of means, as in battle there can rarely be. Poisoning of streams and food supplies; the killing of non-combatants generally, not to speak of innocent women and children; the refusal to give quarter, even in the heat of battle, except as retaliation, have long been given over as barbarous and unworthy of men in any state of civilization; and while stratagems and deceits are allowable, if not involving perfidy, it may be said that modern warfare is carried on in a constantly increasing spirit of fair play as becomes honorable and Christian people. It is no less true that the rules of international law bind civilized nations in their intercourse with uncivilized peoples, as well as with those which, for one reason or another, are not yet included in the family of nations. This was clearly manifested by Japan's treatment of China in the war of 1894.

As regards the prosecution of hostilities, war is waged on land and sea, and the difference in the elements necessarily gives rise to differences in the methods and means by which they are carried on. The usages, customs, and agreements of civilized nations formulate as it were a code or system of laws of war, the violation of which would convict the offending country of barbarism.

The United States, it would seem, was the first power to codify these various rules and regulations in the form of a manual, and the previously referred to *Instructions* of Dr. Lieber—known in army circles as *General Orders No. 100*—have been the basis of all subsequent codifications of the laws of land war. These were reissued in 1898 for the guidance of officers in the recent war with Spain, and required but slight modification to meet the purposes of The Hague Conference of 1899.

In June, 1900, the Navy Department issued a Naval Code—known as *General Orders No. 551*—prepared by Captain Charles H. Stockton. Article 54 of this enlightened work explains the relation between the land and naval codes, and the supplemental nature of the latter. A perusal of these two brief and admirable documents gives a clear understanding of war as practiced by the United States and by civilized nations generally; for there is fortunately little, if any, difference in practice among nations at the present day.

For the successive steps by which the mitigation of the hardships incidental to the conduct of war have been brought about and the means and instruments of war changed, see GENEVA CONVENTION; RED CROSS SOCIETIES; SAINT PETERSBURG, DECLARATION OF; and HAGUE PEACE CONFERENCE. Under these appropriate headings it will be seen that the medical corps service on land has been neutralized; that the principles of the Geneva Convention establishing the immunity of hospital and medical corps on land have been extended to hospital ships on sea, and that the restrictions in the case of deadly weapons and explosives formulated in the Declaration of Saint Petersburg have been further extended by the humanitarian spirit pervading the Hague Conference.

The outbreak of war produces an immediate and widespread effect. In the first place, treaties of all kinds contemplating peaceful relations are suspended, while provisions in contemplation of war come into effect. Treaties intended to set up a permanent state of affairs, such as boundary-stipulations, revive on the close of war: but it seems to be generally admitted that commercial treaties are wiped out of existence by war and do not revive on its termination unless there be a particular clause to that effect in the treaty of peace. (See TREATIES.) Ambassadors and diplomatic agents are recalled or dismissed; and all trade ceases between the belligerents, as trading would not only embarrass military or naval operations, but would enable the enemy to carry on the war itself. War makes the contending nations enemies, and their respective subjects or citizens share this quality, as do alien residents for the purpose of war. The same quality infects the products of enemy soil, as well as houses of trade, whether principal or branch.

A theory dating from Portalis would confine the enemy character to actual combatants. "War," he said in 1801, "is a relation of State to State, and not of individual to individual. Between two or more belligerent nations the private persons of whom those nations are composed are only enemies by accident; they are not so as men, they are not so as citizens, they are so only as soldiers." There is indeed a difference between the combatant and non-combatant, due to the fact that the one is dangerous and must be disarmed, wounded, or killed if necessary, but should not be injured if he is incapable of doing harm. The non-combatant will be respected as long as he preserves his passive character; but the moment he becomes actually employed in the struggle he loses his claim to protection. Articles 21-25 of the *Instructions* make the distinction as well as the reason therefor clear. "(23) Private citizens are no longer murdered, enslaved, or carried off to distant parts, and the inoffensive individual is as little disturbed in his private relations as the commander of the hostile troops can afford to grant in the overruling demands of a vigorous war. (24) The almost universal rule in remote times was, and continues to be with barbarous armies, that the private individual of the hostile country is destined to suffer every privation of liberty and protection, and every disruption of family ties. Protection was, and still is with uncivilized people, the exception. (25) In modern regular wars of the Europeans, and their descendants in other portions of the globe, protection of the inoffensive citizen of the hostile country is the rule; privation and disturbance of private relations are the exceptions." The combatant is armed, organized, uniformed, and acts under military order or commission, and may be killed in battle if necessary or taken prisoner if possible and held in captivity until exchanged. During such time he should be well treated and subjected to no indignity of any kind.

The question is often raised whether volunteer troops, raised on the spur of the moment, and acting without military commission or organization should be entitled to the privileges of the regular soldiers. The *Instructions* answer this question in the negative, but the practice is sanctioned at present by the Hague Conference of 1899; and it may be said that the volunteer and auxiliary, as distinguished from regular navy, stands upon the same footing. If levies *en masse* are taken in arms, or if volunteer vessels are captured on water, the captives in either case would be entitled to be treated as prisoners of war. The wounded in all cases, whether in the land or naval forces, and of either belligerent, are entitled under the Geneva Convention and the Hague Conference to hospital service and medical treatment.

In the next place, war affects property of the enemy. If this be public property situated within the territory of the other, it is occupied if realty, and administered during hostilities for the benefit of the local State: if it be public movable property, it is subject to confiscation and probably will be confiscated. Articles 34-36 of *Instructions* are obviously intended for the guidance of a victorious army of occupation in enemy's territory, but would certainly exempt from seizure works of art and scientific and educational property of the enemy wherever found. Private property of one enemy within the territory of the other may, indeed, be confiscated by strict international law; but in the United States it may not be, unless there is a positive legislative act to that effect. This was clearly and explicitly laid down by Chief Justice Marshall in the leading case of *Brown vs. U. S.*, 8 Cranch, 110. It is, however, safe to say that the power inherent in the United States will not be exercised. Merchant vessels of the enemy lying in harbor may likewise be seized and confiscated, but this too is no longer done. They are given thirty days within which to leave port (*Naval Code*, Art. 15), and enemy merchant vessels which have left American ports are allowed to proceed to their destinations without fear of molestation unless engaged in carrying contraband or in the enemy's service. Indeed, enemy vessels which shall have sailed from any foreign port before the declaration of war to an American port are allowed to enter, unload their cargoes, and proceed to a port not blockaded.

Public debts due enemy citizens are never confiscated and the interest thereon is payable even during the war; private debts, that is, debts due enemy citizens by private citizens, are, indeed, confiscable; but the weight of authority is against the exercise of this harsh right. They may not be collected during the continuation of hostilities, but may be after the termination of the war.

The conqueror is a usufructuary of the realty, but private property is commonly not liable to seizure. This is, perhaps, stating the matter too broadly, for private property may be seized by way of contribution if in money; by requisition if in kind. In both cases receipts or quittances are given by the military commander, so that the dispossessed citizen may collect the property or its equivalent from his proper sovereign upon the return of peace. (See CONTRIBUTION; REQUISITIONS.) This appears clearly from articles 31-39 of *Instructions*, but receives its most recent international formulation in the Hague Conference: "Art. 46. Private property cannot be confiscated. Art. 47. Pillage is formally prohibited. Art. 48. If, in the territory occupied, the occupant collects the taxes, dues, and tolls imposed for the benefit of the State, he shall do it, so far as possible, in accordance with the rules in existence and the assessment in force . . . Art. 49. If . . . the occupant levies other money taxes in the occupied territory, this can only be for military necessities or the administration of such territory." Articles 50, 51, 52, provided that burdens due to military occupation shall be as equitable as possible, and that payment shall be made for contributions. "Art. 53. An army of occupation can only take possession of the cash, funds, and property belonging strictly to the State, depots of arms, means of transport, stores, and supplies, and generally all movable property of the State which may be used for military operations. Railway plants, land telegraphs, telephones, steamers, and other ships, apart from cases governed by maritime law, as well as depots of arms, and, generally, all kinds of war material even though belonging to companies or to private persons, are likewise material which may serve for military operations, but they must be restored at the conclusion of peace, and indemnities paid for them. Article 55. The occupying State shall only be regarded as administrator and usufructuary of public buildings, real property, forests, and agricultural works belonging to the hostile State, and situated in the occupied country. It must protect the capital of these properties, and administer it according to the rules of trusteeship. Article 56. The property of municipalities and that of religious, charitable, and educational institutions and those of arts and science, even when State property, shall be treated as private property. All seizure, destruction of, or intentional damage done to such institutions, to historical monuments, works of art or science, is prohibited, and should be made the subject of civil and criminal proceedings."

Such in brief is the international law applicable to public and private property on land.

"In war," said Mr. Chief Justice Waite, "the capture of property in the hands of the enemy, used or intended to be used for hostile purposes, is allowed by all civilized nations, and this whether the ownership be public or private. The title to movable property in hostile use, captured on land, passes to the captor as soon as the capture is complete; that is to say, as soon as the property is reduced to possession. The absolute title to immovable public property owned by the enemy does not pass until the war is ended and peace restored. Then, unless provision is made to the contrary by the treaty of peace or otherwise, the ownership is changed if the conquest is complete." (*Kirk vs. Lynd*, 106 U. S., 315.) A fundamental difference, however, between property captured on land and sea is admirably stated by the late Justice Gray in *Oakes vs. U. S.*, 174 U. S., 778: "By the law of nations, as recognized and administered in this country, when movable property in the hands of the enemy, used, or intended to be used, for hostile purposes, is captured by land forces, the title passes to the captors as soon as they have reduced the property to firm possession; but when such property is captured by naval forces a judicial decree of condemnation is usually necessary to complete the title of captors."

Public property on the high seas, that is vessels of war and public vessels generally—except those engaged in purely charitable or scientific pursuits, in voyages of discovery, or as hospital ships (*Naval Code*, Art. 13)—are always liable to capture. Enemy merchant vessels as well as enemy property thereon are likewise confiscable; but the title thereto only passes to the individual captor after adjudication in a prize court. (*Naval Code*, Art. 9-11; 14; 46-50.) (See PRIZE.) Enemy merchant vessels engaged in coast fishing 'innocently employed' are exempt from capture (*Naval Code*, Art. 14), but this exemption does not apply to deep-sea fisheries. (*The 'Paquette Habana*,' 175 U. S., 677.) It should be said in passing that the decisions of prize courts of the Confederacy were curiously not recognized by Federal courts. (*The Lilla*, 2 Sprague, 177.)

On the outbreak of war trade of all kinds stops between enemies, that is to say trade across the lines, for an enemy residing within enemy lines may trade with the citizen untrammeled by any regulation. If he is permitted to stay—and custom if not positive law allows this —he owes temporary allegiance, and in consequence has the rights and privileges of other alien residents not incompatible with his enemy character. That is to say, he may carry on business; may sue and be sued as if war did not exist, for his enemy character is merged in that of a resident. An act of unfriendliness may lead to expulsion, and aid or comfort given to the enemy, that is his home Government, is treason. While his temporary allegiance secures his protection, he may not be compelled to serve in the armed forces of his residence, for no Government could well compel him to commit treason against the country of his paramount allegiance. It likewise follows that his property on the high seas bears the character of his residence or domicile and is seizable by the authorities of his home country as enemy property. Internal trade is thus assimilated to trade of citizens and does not depend upon enemy character. Foreign trade, that is trade beginning within one enemy country and crossing into the country of the other, is trading across enemy lines, and is strictly and absolutely prohibited. This inhibition may be removed by a general or particular license to trade, granted by the sovereign powers of the respective belligerents. Such a permission eliminates the war for the purposes of trade. For a full and accurate account of this important subject, see the two leading cases of *The Sea Lion* (5 Wallace, 630) and *Kershaw vs. Kelsey* (100 Mass., 561). For a short summary of the influence of war on trade in its various branches, see INTERNATIONAL LAW.

There are, however, some relations into which belligerents are permitted to enter. Indeed, these relations can only arise in war; and if provided for during peace, the agreements concerning them are made in contemplation of war. These matters pertain to flags of truce, passports, safe-conducts and safeguards, cartels, armistices, capitulations, and ransom bills. Negotiations between hostile forces are opened up by flags of truce—a white flag—borne by a member of the opposing force who advances to the enemy. The practice is sufficiently illustrated by Articles 111-114 of *Instructions*. A passport is a permission in writing to an enemy subject to travel generally within belligerent territory from which he would otherwise be excluded. A safe-conduct differs from a passport in that it is a special permission to an enemy subject or vessel to travel or pass within defined points; while a safeguard, as its name implies, is a guard granted for protection to enemy property or his person. Article 86 of *Instructions* explains this and defines the authorities by whom the permission in question may be granted. "All intercourse between the territories occupied by belligerent armies, whether by traffic, by letter, by travel, or in any other way, ceases. This is the general rule, to be observed without special proclamation. Exceptions to this rule, whether by safe-conduct, or permission to trade on a small or large scale, or by exchanging mails, or by travel from one territory to the other, can take place only according to agreement approved by the Government, or by the highest military authority. Contraventions of this rule are highly punishable." Cartels are more formal matters, and, according to the most eminent authority of the day, they are "a form of convention made in view of war or during its existence in order to regulate the mode in which such direct intercourse as may be permitted between the belligerent nations shall take place, or the degree and manner in which derogations from the extreme rights of hostility shall be carried out. They provide for postal and telegraphic communication, when such communication is allowed to continue, for the mode of reception of bearers of flags of truce, for the treatment of the wounded and prisoners of war, for exchange and the formalities attendant upon it, and for other like matters." (Hall, *International Law*, §193.) The term is most familiar in the form of cartel ships, and in this connection signifies a vessel sailing to defined points under a safe-conduct for the exchange of prisoners of war. The purpose and the safe-conduct exempt from capture; but the slightest hostile act, or engaging in an otherwise forbidden act such as trade, forfeits the privileged character. The vessel is unarmed, although a gun may be carried for purposes of salute or signals. The various provisions relating to the exchange or parole of prisoners are found in *Instructions*, Articles 105-110; 119-134.

Armistices and capitulations are sufficiently defined in *Instructions*, 135-137 and 139-147. As regards naval operations the provisions of the *Naval Code*, Articles 51-52, obtain. "Article 51. A truce or capitulation may be concluded, without special authority, by the commander of a naval force of the United States with the commander of the forces of the enemy, to be limited, however, to their respective commands. A general armistice requires an agreement between the respective belligerent governments. Article 52. After agreeing upon or signing a capitulation the capitulator must neither injure nor destroy the vessels, property, or stores in his possession that he is to deliver up, unless the right to do so is expressly reserved to him in the agreement or capitulation." In addition to these more formal and indefinite suspensions of hostilities, truces for short periods are entered into for the burial of the dead.

Ransom bills are perhaps the most complete exception to the rule prohibiting trade, for they are contracts not only made by individual enemies, but also enforceable during the continuance of war. They are nothing more nor less than the repurchase by the original owner of a vessel captured at sea. The contract is made in duplicate, one copy of which is given to the master of the captured vessel, and serves as a safe-conduct protecting the vessel from seizure by the enemy country or its allies as long as a prescribed course is kept for the port of destination agreed upon. Variations from this course, unless arising from necessity, subject to second capture, and any excess of the ransom price in the amount realized on a sale goes to the second captor. If the captured vessel is taken with the ransom bill on board, the bill is discharged. The system of ransom is of advantage to owner and captor; the owner repurchases at a lower figure and saves the crew from detention as prisoners, and the captor is freed from the necessity of sending the prize into port.

As previously explained, war renders enemy property with certain specific exceptions liable to capture on the high seas. See PRIVATEERING; PRIZE. On the time within and the conditions upon which enemy property will, if recaptured, be restored to the original owner, see RECAPTURE.

Upon the termination of war, however brought about, the belligerents cease to be enemies and the residents of both countries resume their peaceful pursuits, as if the war had never happened. All rights and obligations existing at the outbreak of war may now be enforced, provided their nature is not such as to render their performance through lapse of time or change of circumstances useless or impossible. Statutes of limitation cease to run at the outbreak of war, and on the declaration of peace they begin again as at the time of the beginning of the war. In this way the war, legally speaking, is simply wiped out. Otherwise to hold would be manifest injustice; for one can hardly be blamed for not enforcing his right during the time of the statute when the court is closed to him. Official relations between the belligerents are resumed, for war of course puts an end to diplomatic intercourse. During the continuance of war it is customary for a neutral to offer its services so that the interests of the particular belligerent may not unduly suffer. In this way Mr. E. B. Washburn, the American Minister to France, was of great service to Germany during the Franco-Prussian War.

War may terminate in three ways: by treaty; by cessation of hostilities; by conquest. The treaty is the usual method and is the best; for the parties to the war can, do, and should thus settle by a careful and formal document the various issues that caused the war, and provide for peaceful and harmonious relations in the future. In cases of war indemnity and cession of territory, a treaty is well-nigh indispensable. It should be said that, for purposes of public right or sovereignty, the treaty speaks from its signature; but private rights determine or vest from date of ratification. (*Haver vs. Yaker*, 9 Wallace, 32.) See TREATY.

The cases of mere cessation of hostilities are exceedingly rare; for it is hard to conceive how nations willingly choose to go on after, as before the war, with no precise and formal settlement of the outstanding difficulties or causes of the war. "The war between Sweden and Poland in 1716, and also the war between France and Spain in 1720, came to an end in this way. The war between Spain and her American colonies ceased in 1825, but no diplomatic relations were established with them till 1840, and the independence of Venezuela was not recognized till 1850. After the hostilities between France and Mexico (1862-67), no diplomatic relations were entered into till 1881." (Wilson and Tucker, *International Law*, p. 271.) In justice to neutrals, an official statement of the termination of hostilities should be made; otherwise the uncertainty of the exact status will seriously interfere with neutral trade. If, however, no treaty or declaration be made, peace may be established as a fact and dates from the last warlike act. As regards conquest made during the war, the principle of *uti possidetis* obtains, that is each belligerent retains what it holds or occupies at the conclusion of hostilities. If territory is thus occupied and possessed, the laws and customs remain in force until changed by the new sovereign, and the same is true in case of a treaty unless specific rules and regulations are agreed upon and incorporated into the document. A leading case on this subject is *Leitensdorfer vs. Webb* (20 Howard, 176), and the subject incidentally underwent much discussion in the recent Insular cases (182 U. S., 1 et seq.). In the case of conquest, the conquered State or Territory is absorbed in the conqueror, and, succeeding to its rights and merits, it likewise assumes its debts and obligations. If part of a State or province be absorbed, the rights and duties are apportioned between the belligerents.

While the parties to a contest are more intimately concerned by its effects, third parties or neutrals are nevertheless interested. Their trade is necessarily interrupted and at times suspended; for military and naval operations do not accord well with trading and peaceful pursuits. The theory of neutrality is that the stranger to the contest takes no part whatever in it, and prevents its subjects directly or indirectly so far as possible from aiding either belligerent. Nor should it allow its ports to be used as a basis for hostile operations, supply stations, or ports of shelter. A neutral may, however, trade with either belligerent or both, in all articles except those denominated contraband of war. (*Naval Code*, Arts. 34-36.) (See CONTRABAND; INTERNATIONAL LAW.) The neutral should not seek to enter a blockaded port of a belligerent, for by so doing it interferes with military or naval operation and furnishes the blockaded port with supplies and articles of trade. (*Naval Code*, Arts. 37-45.) (See BLOCKADE; INTERNATIONAL LAW.) To see that neutral vessels do not carry articles of contraband and that such neutral vessels are not destined for a blockaded port, belligerents possess and exercise the right to visit and search neutral vessels. (*Naval Code*, Articles 30-33.) This is strictly a war right and does not exist in peace. See SEARCH, RIGHT OF; NEUTRALITY.

An unrecognized rebellion is treated according to the law of the country where it occurs: for rebels as such have no standing in international law. (See REBELLION; TREASON.) Vessels of unrecognized insurgents on the high seas are treated as technical pirates; but if they confine their operations to the vessels and commerce of the mother country they are clearly not guilty of piracy. See PIRACY.

For embargo, reprisal, retorsion, pacific blockades, military commissions, and martial law, see these articles.

PRISONERS OF WAR. "A prisoner of war is a public enemy armed or attached to the hostile army for active aid, who has fallen into the hands of the captor . . . by individual surrender or by capitulation. All soldiers, of whatever species of arms; all men who belong to the rising *en masse* of the hostile country [not already occupied by an invading army; Art. 52]; all those who are attached to the army for its efficiency and promote directly the object of the war . . . ; all disabled men or officers on the field or elsewhere, if captured; all enemies who have thrown away their arms and ask for quarter [which may not be refused except in 'great straits' or in retaliation; Arts. 60-66], are prisoners of war and as such exposed to the inconveniences as well as entitled to the privilege of a prisoner of war." (*Instructions for United States Armies*, Article 49). In addition, sutlers, editors, reporters of journals, or contractors may be made prisoners of war (Art. 50). Chaplains, officers of the medical staff, apothecaries, hospital nurses, and servants are not prisoners of war

(Art. 53). Hostages, rarely given and accepted to-day, are treated as prisoners (Arts. 54-55).

The recognized naval forces are as follows: "The officers and men of the navy, naval reserve, naval militia, and their auxiliaries; the officers and men of all other armed vessels cruising under lawful authority." (*United States Naval War Code*, Art. 9). The personnel of all public unarmed vessels owned or in the enemy's service; the personnel of merchant vessels, who in self-defense and in protection of the vessel resist attack, as well as "the personnel of the armed forces or armed vessels of the enemy, whether combatants or non-combatants, are entitled to receive the humane treatment due to prisoners of war" (Art. 10). Hospital ships and their personnel if strictly neutral are not liable to capture (Arts. 21-25), and the religious, medical, and hospital personnel of any vessel captured during hostilities are inviolable, and on leaving ship may carry with them articles and instruments of surgery which are their private property (Art. 26).

In battle, the enemy may be wounded or killed; unresisting he has the right to quarter; as prisoner of war, his life, person, and property are placed under the protection of the captor. This applies to soldier and sailor; to the able-bodied, sick, wounded, or shipwrecked (*Instructions*, Arts. 71-72; *Naval Code*, Arts. 27-29). The captured enemy is deprived of his arms and thus loses his enemy character. He has, however, a right to support and nourishment ("plain and wholesome food," *Instructions*, Art. 76), and if able-bodied may be made to work (though not to perform military service) for the benefit of the captors' government (*Instructions*, Art. 76). Prisoners are subject to confinement or imprisonment such as may be necessary either for their own or the captor's safety; but they are subject to no intentional suffering or indignity. They should be treated with humanity and the sick and wounded receive medical treatment, according to the ability of the medical staff (*Instructions*, Arts. 75, 79; *Naval Code*, Arts. 27-29).

The status of prisoner, once established, continues as long as the captor retains control of the person. It ends by a successful escape, but an unsuccessful attempt entails stricter confinement. An escaping prisoner may, however, be shot or otherwise killed (*Instructions*, Art. 77). The status likewise ends by exchange, officer for officer of equal rank, private for private, and a stated number of inferior for superior officers, according to the cartel or formal agreement of the belligerents (*Instructions*, Arts. 105-110). Or the prisoners may be paroled, that is, set free, upon an express promise not to serve in a military capacity against the captor during the continuance of the war. Only an officer may pledge his honor, that is, give his word or parole for himself and soldiers; if the parole thus given be rejected by his Government officers and soldiers must return to the enemy. Violation of the parole is punishable, on recapture, by death (*Instructions*, Arts. 119-34). An escaped prisoner who joins his army is not punishable if subsequently captured (*Instructions*, Art. 78). It should be noted that armed bands acting without commission or authorization of any kind are not treated as prisoners, but as highway robbers or pirates (*Instructions*, Art. 82).

Such is the present treatment of prisoners of war, the most recent formulation of which is found in the proceedings of the Hague Peace Conference of 1899. In ancient times the enemy was put to the sword or enslaved, according to the captor's pleasure; in the Middle Ages little difference seems to have been made between combatant and non-combatant. The doctrine is, however, settled beyond need of argument that only the enemy in battle may be wounded or killed; that the unresisting enemy on the field or the vessel is entitled to quarter; and in captivity to like treatment, as far as circumstances permit, with the soldier and sailor of the captor.

BIBLIOGRAPHY. In addition to authorities appended to the article on INTERNATIONAL LAW, consult Taylor, *Public International Law* (Chicago, 1901); Davis, *Elements of International Law* (revised ed., New York, 1900); Wilson and Tucker, *International Law* (ib., 1901); Scott, *Cases on International Law*, part ii. (Boston, 1902); Maine, *International Law* (London, 1888); Harcourt, *Letters by Historicus* (ib., 1863); Wildman, *Institutes of International Law*, vol. ii. (ib., 1850); Sheldon Amos, *Remedies for War* (ib., 1880); Holls, *Peace Conference at The Hague* (New York, 1900). This work is indispensable for a correct understanding of the subject. The *Instructions for the Government of Armies of the United States in the Field* (1863) and *The Laws and Usages of War at Sea* (1900) are given in convenient form in the appendix to Wilson and Tucker. For War in its purely military aspect see STRATEGY; TACTICS; ARMY ORGANIZATION.

WAR, DEPARTMENT OF. An executive department of the United States Government, created by act of Congress of August 7, 1789. It has at its head a secretary appointed by the President by and with the advice and consent of the Senate for a period of four years. He ranks third among the Cabinet members in the line of succession to the Presidency and receives a salary of $8000 per year. He has charge of all matters relating to military affairs, subject to the direction of the President, the distribution of stores, the Signal Service, the survey and improvement of harbors, and the administration of the insular possessions. He is required to make an annual report of the conduct of the department showing the number and distribution of the military forces together with a statement of the expenditures, of contracts for supplies and services, river and harbor improvements, the administration of the insular territories, etc. The business of the War Department is distributed among a number of subdivisions or bureaus, each of which is under the supervision of a chief and under the general supervision of the chief of staff. These include: the headquarters of the Army, through which the orders of the President are issued by the chief of staff; the office of the adjutant-general, which conducts the army correspondence, supervises the recruiting and enlistment service, receives reports from army officers, issues commissions, and preserves the records of the army; the office of the inspector-general; the office of the quartermaster-general; the commissary department; the office of the surgeon-general; the office of the paymaster-general; the office of the chief of engineers; the ordnance department; the signal office; the office of the judge-advocate-general; the record and pension office; and the Bureau of Insular Affairs. The last is charged with supervision of the administration of the recently acquired insular territories. Since 1890 the Secretary of War has been aided by an Assistant Secretary.

WAR AND PEACE. An historical novel by Tolstoy (1865-68). The plot is laid in the reign of Czar Alexander I. and reveals the social and political conditions of Russia during the Napoleonic invasion, as they are symbolized in the history of two families.

WARASDIN, văr′åz-dĕn (Hung. *Varasd*). A town of Croatia-Slavonia, 150 miles southwest of Budapest, on the left bank of the Drave (Map: Austria, E 3). The town has manufactures of tobacco, liquors, acetic acid, and anchors. Population, in 1900, 12,930.

WARBECK, wạr′bĕk, PERKIN (1474-99). A pretender to the English throne. He was born at Tournay, the son of John Osbeck or Warbeck, a citizen of that town. In 1491 he went to Cork and agreed at the instigation of opponents of Henry VII. to set up a claim that he was Richard, Duke of York, second son of Edward IV. For a while he received some support, especially among foreign powers hostile to England and Henry VII. James IV. of Scotland even gave him his own cousin, Catherine Gordon, as wife in 1495. In 1497 he made an expedition into England, but was captured. He confessed his imposture and was allowed considerable liberty, but when he engaged in new conspiracies he was condemned to death and executed at Tyburn on November 23, 1499. Consult Gairdner, *Richard III.* (London, 1898), to which the story of Perkin Warbeck is appended. See HENRY VII.

WARBLE-FLY. Any one of several species of flies of the family Œstridæ, which lay their eggs upon different animals, and whose larvæ eventually form a swelling or 'warble' under the skin. The name 'ox-warble' is specifically applied to the swellings made by the bot-fly of the ox (*Hypoderma lineata*); and the bot-fly of the rabbit (*Cuterebra cuniculi*) produces similar warbles under the skin of rabbits. See BOT; BOT-FLY.

WARBLER (from *warble*, from OF. *werbler*, from MHG. **werbelen*, Ger. *wirbeln*, to warble, whirl, turn, frequentative of MHG., Ger. *werben*, OHG. *werban*, to turn, twist, AS. *hweorfan*, Goth. *hwairban*, to turn, move; perhaps connected with Gk. καρπαλιμός, *karpalimos*, swift). A small song-bird; properly one of either of two passerine families, namely, the American Mniotiltidæ and the Old World Sylviidæ. The former includes the warblers of North and Middle America, numbering about 200 species, according to Ridgway, few of which are as much as six inches long. With few exeeptions they are woodland birds, wholly insectivorous, and prettily, if not gorgeously, colored. The males are much more brilliantly colored than the females except in a few cases. They are highly migratory, and of the 60 or more species found in the United States all but one or two winter south of Mason and Dixon's line and nearly all spend the coldest months in the tropics. As many of the species breed in the far north, they are the most striking feature of the migrations in many parts of the United States. They are extremely active birds, and only a few species resort to the ground for food. Although several species sing well, the majority have weak voices and make no pretense of singing. Among our numerous warblers a few are specially notable. Perhaps the most beautiful species is the prothonotary (*Protonotaria citrea*), the male of which has the whole of the head, neck, and under parts rich orange and the back greenish yellow. It is rarely seen north of Washington and winters in the tropics. The genus Helminthophila includes about 10 species known as the 'swamp warblers' (q.v.), some of which are beautifully colored. The genus Dendroica is the largest group, containing not less than 35 species. The best known of these is the common yellow or 'summer' warbler (*Dendroica æstiva*), familiar in gardens and orchards throughout nearly all North America. It is five inches long, bright yellow dimly streaked with rufous; it has a sweet, trilling song, and makes a pretty nest of hempen materials, lodging it in some upright forking of the branches of a shrub or small tree. Another familiar and widely distributed species is the redstart (*Setophaga ruticilla*), black and red, or in the female black and orange-yellow, which is notable for its gayety of manner as well as of dress, and sings well. Very brilliant also is the orange, black, and white Blackburnian warbler (*Dendroica Blackburniæ*), seen in passing to and from its Canadian breeding-home. Townsend's warbler is a Pacific Coast representative of this genus. Another noteworthy Western warbler is the hermit (*Dendroica occidentalis*), which breeds in the high mountains of California, forming an exquisite nest out of 'graybeard moss' hanging from spruce boughs. Another genus contains the Maryland yellowthroat (q.v.), and its handsome relative, the Kentucky warbler (*Geothlypis formosa*), whose habits and method of nest-making keep them close to the ground. The striking manner in which yellow and black are often contrasted in the plumage of these charming birds is well displayed in the genus Sylvania, two species of which are displayed on the accompanying Colored Plate of WOOD-WARBLERS. See also CHAT; OVEN-BIRD; REDSTART, etc.

The 'warblers' of the Old World are small birds of the subfamily Sylviinæ, closely related to the thrushes and our kinglets and gnatcatchers; many are known by separate popular names, as blackcap, nightingale, hedge-sparrow, redbreast, redstart, whitethroat, etc. (qq.v.). About 100 species are catalogued—all belonging to the Old World, except one in Alaska. The best known European species are the following: Grasshopper warbler (*Locustella locustella*), found in most parts of the centre and south of Europe. It is of a greenish-brown color, the centres of the feathers dark brown, producing a spotted appearance; the lower parts pale brown. It is a shy bird, hiding itself in hedges and bushes, but very active, often darting out like a mouse from the bottom of the hedge, and receives its name from its chirping, grasshopper-like note. The sedge warbler (*Acrocephalus phragmitis*) is the most common British species, and is generally found where aquatic herbage is thick and strong. It is brown, with the chin and throat white, and the under parts buff. The red warbler (*Acrocephalus arundinacea*) is found in summer in marshy situations in many parts of Europe, and its range extends to the north of India. It is a uniform pale brown, with a tinge of chestnut; the chin and throat white; the under parts pale buff color. Its nest is remarkable; it is attached to the stems of three or four reeds, and formed by winding the branches of their panicles together with a little wool; and is conical and deep, so that the eggs or young may not be shaken out when the reeds are shaken by the wind. The wood warbler or wood wren (*Phylloscopus sibilatrix*) is common in the wooded districts of England in summer, particularly in old plantations of oak and beech. It is olive green, tinged with yellow, the wings brown, the primaries and secondaries edged with bright yellow, the tertials with a broader edge of yellowish white; the lower parts yellow and white. The willow warbler or 'wren' (*Phylloscopus trochilus*) is very common in the south of England in the summer. It frequents woods and bushes and builds its nest on the ground. It is of dull olive-green, the wing and tail feathers dark brown, the under parts whitish. The only American representative of this family is an Asiatic species (*Phylloscopus borealis*), which regularly visits Alaska in summer, and is known to American ornithologists as Kennicott's willow warbler. See Plate of Wrens, Warblers, etc.

Consult Newton, *Dictionary of Birds* (London, 1893-96), and other authorities cited under Bird for the Sylviidæ; for the Mniotiltidæ, consult American ornithologies, especially Ridgway, *Birds of North and Middle America*, part ii. (Washington, 1902), and Coues, *Birds of the Colorado Valley* (Washington, 1878).

WAR'BURTON, Bartholomew Elliott George (1810-52). An Irish miscellaneous writer, generally known as Eliot Warburton, born near Tullamore, King's County. He was educated at Queen's College and Trinity College, Cambridge, was admitted to the Irish bar at King's Inns in 1837, and in 1843 traveled through Syria, Palestine, and Egypt. In 1851 he was sent by the Atlantic and Pacific Junction Company as its representative to make terms with the Indians of the Isthmus of Darien. He met his death in the burning of the steamer *Amazon* off Land's End. He edited the *Memoirs of Horace Walpole and His Contemporaries* (2 vols., 1851), and published: *The Crescent and the Cross* (2 vols., 1844), descriptive of Eastern travel; *Zoë: An Episode of the Greek War* (1847); *Memoirs of Prince Rupert and the Cavaliers* (1849); *Reginald Hastings* (1850), and *Darien, or the Merchant Prince* (3 vols., 1852). Consult the *Fortnightly Review*, vol. xvii. (London, 1872).

WARBURTON, Peter Egerton (1813-89). An English traveler in Australia, born near Norwich and educated at Orleans and Paris. He traveled through the northwestern part of Australia on camel-back and several times was near to starvation in the desert. He wrote *Major Warburton's Diary* (1866), and *Journey Across the Western Interior of Australia* (1875).

WARBURTON, Sir Robert (1842-99). An English soldier, born in a fort between Tagdallak and Gandamak. He was educated at the Royal Military Academy at Woolwich. He took part in the Abyssinian war of 1867-68, when he entered the Bengal staff corps and served in the Afghan war. He filled the position of political officer of the Khyber Pass from 1879 to 1882 with great ability. He was especially successful in winning the friendship of the Khyber Afridis. In 1897-98 he served with the Tirah expedition. He wrote *Eighteen Years in the Khyber* (1900).

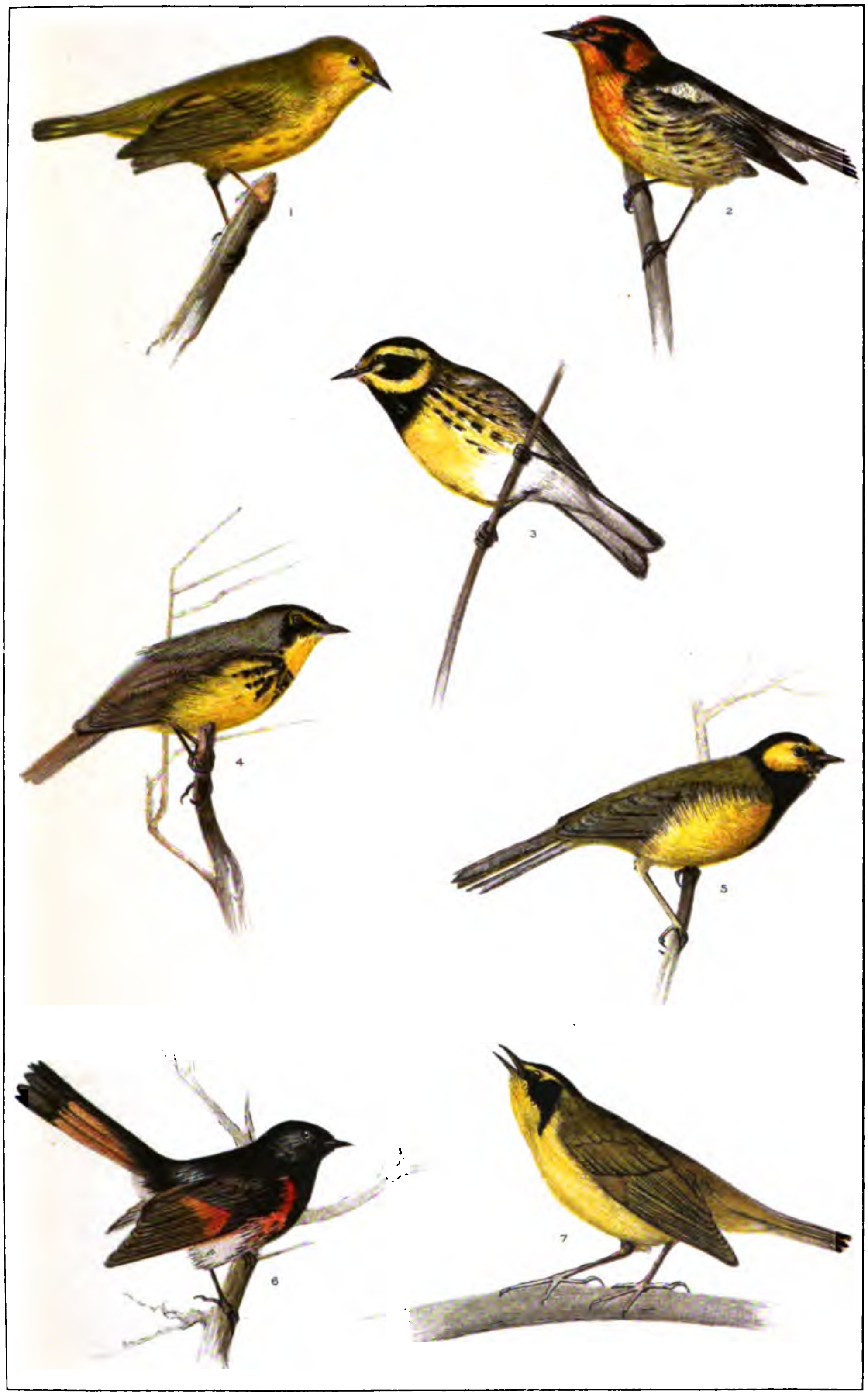
WARBURTON, William (1698-1779). An English prelate and author. He was born at Newark and was educated at the school of his native town, and afterwards at Oakham in Rutlandshire, which he left in the year 1714, returning home to pursue the profession of his father, who had died some years before. He practiced as an attorney at Newark for some years, but his natural bent was toward literature, and he had all along expressed a desire to take orders in the Church of England. He did so in 1723, and in 1728 became rector of Brant-Broughton, in the diocese of Lincoln, where he remained for many years. He issued, in 1736, a treatise entitled *The Alliance Between Church and State, or the Necessity and Equity of an Established Religion and a Test Law*. In January, 1737-38, it was followed by the first volume of the celebrated work, *The Divine Legation of Moses, Demonstrated on the Principles of a Religious Deist, from the Omission of the Doctrine of a Future State of Rewards and Punishments in the Jewish Dispensation.* In 1739 a new and revised edition of the first part of the work appeared. This was followed in 1741 by the publication of the second part. The third and concluding section was published posthumously. Becoming involved in the controversy which followed the appearance of Pope's *Essay on Man*, Warburton undertook the defense of the poet, and, in 1739-40, issued a series of seven letters, entitled *A Vindication of Mr. Pope's Essay on Man, by the Author of the Divine Legation*. A warm friendship was the result, which only terminated with the death of Pope in 1744.

Warburton's services to literature and religion did not for a long time bring him any substantial preferment. In 1757 he was promoted to the deanery of Bristol; and finally, in 1760, Pitt bestowed on him the Bishopric of Gloucester. In the later years of his life his mind became impaired; and he was utterly prostrated by the loss of his only son, whom he did not long survive. He died at Gloucester.

Warburton was a keen polemic and deeply engaged in all the intellectual warfare of his time. In nearly everything he wrote there is the impress of a vigorous and fertile mind, with an arrogance of tone, which tends, in his treatment of adversaries, to degenerate into truculence and scurrility. His scholarship was never deep or accurate, though he had wide reading and undoubted intellectual vigor. A complete edition of his works, in 7 volumes, was published in 1788 by his friend, Bishop Hurd, who prefaced it with a biography (new edition, 12 vols., 1811). Consult his biography by Watson (London, 1863); also an essay in Mark Pattison, *Essays* (Oxford, 1889).

WAR COLLEGE, United States Army. An organization having for its object the direction and coördination of the instruction in the various service schools, the extension of the opportunities for investigation and study in the army and militia of the United States, and the collection and dissemination of military information. The college, which is located at Washington, is un-

AMERICAN WOOD-WARBLERS



COPYRIGHT 1902, BY DODD, MEAD & COMPANY

JULIUS BIEN & CO. LITH. N.Y.

1 SUMMER YELLOWBIRD (DENDROICA ÆSTIVA)
2 BLACKBURNIAN WARBLER (DENDROICA BLACKBURNIÆ)
3 TOWNSEND'S WARBLER (DENDROICA TOWNSENDI)
4 CANADIAN WARBLER (SYLVANIA CANADENSIS)
5 HOODED WARBLER (SYLVANIA MITRATA)
6 REDSTART (SETOPHAGA RUTICILLA)
7 KENTUCKY WARBLER (GEOTHLYPIS FORMOSA)

der the immediate direction of the Secretary of War and the General Staff of the Army. The Naval War College is located at Newport, R. I. See Naval Schools of Instruction.

WARD. An infant who has been legally placed under the care of a guardian, who stands *in loco parentis*. See Guardian and Ward. The term ward is also employed to denote a subdivision of a city. It originated in the idea of 'war ding' or protecting a hundred under the old English law, and was formerly applied only to certain districts with reference to police protection. However, to-day most cities are divided into wards for many civic purposes, as convenient election districts, police districts, and for convenience in describing the location of property for taxation, etc.

WARD, Adolphus William (1837—). An English historian of the English drama, born at Hampstead, London. He was educated at Peterhouse College, Cambridge, of which he was elected fellow in 1861; and he also studied in Germany. In 1866 he was appointed professor of history and English literature in Owens College, Manchester, and from 1870 to 1877 he was its principal. In 1900 he became master of Peterhouse College. His *History of English Dramatic Literature to the Death of Queen Anne* (2 vols., 1875, revised in 1899) is the standard work on this subject. Besides this work and numerous essays and appreciations contributed to reviews, encyclopædias, biographical dictionaries, and anthologies, he translated Curtius's *History of Greece* (5 vols., 1868-73); wrote for the "English Men of Letters Series" *Chaucer* (1880) and *Dickens* (1882); and edited Pope's *Poetical Works* (1869), Marlowe's *Doctor Faustus*, and Greene's *Friar Bacon* (1878 and many editions), and the *Poems of John Byrom* (1894-95). In 1897 he published a *Life of Sir Henry Wotton*, and in 1899 *Great Britain and Hanover* (Ford Lectures at Oxford).

WARD, Artemas (1727-1800). An American soldier and jurist, born at Shrewsbury, Mass. He graduated at Harvard in 1748, served first as a major and then as a lieutenant-colonel in the French and Indian War, and on May 19, 1775, soon after the outbreak of the Revolution, was appointed to the chief command of the Massachusetts forces. Until the arrival of Washington, he conducted the siege of Boston, and on June 17, 1775, was appointed by Congress first major-general in the Continental Army, next in rank to Washington, but ill health forced him to resign at the close of 1776. He became Chief Justice of the Court of Common Pleas at Worcester in 1776; served as president of the Massachusetts Executive Council in 1777; was for sixteen years a member of the Massachusetts Legislature; and was a member of Congress from 1791 to 1795.

WARD, Artemus. The pseudonym of the American humorist Charles Farrar Browne (q.v.).

WARD, Edgar Melville (1839—). An American genre painter, born in Urbana, Ohio. He studied at the National Academy of Design in New York City and then in Paris under Cabanel. In 1883 he became a member of the National Academy, and afterwards was made a professor in that institution. His paintings include "Brittany Washwomen" (1876); "The Sabot Maker" (1878); "The Collar Shop" and "The Quilting Party" (1892).

WARD, Edward Matthew (1816-79). An English historical painter, born at Pimlico. He studied in the schools of the Royal Academy, for nearly three years at Rome, and at Munich under Cornelius. Returning to London in 1839, and exhibiting his "Cimabue and Giotto," he received immediate recognition. In 1853 he painted eight historical pictures for the corridor of the House of Commons, remarkable as technical experiments. Ward was made an Academician in 1855. In 1857 he was commissioned by the Queen to paint "Napoleon III. Invested with the Order of the Garter at Windsor," and the "Visit of Queen Victoria to the Tomb of Napoleon I." The subjects of his paintings were chiefly drawn from English and French history, but his reputation rests chiefly upon his successful pictures of English social life during the eighteenth century. His principal paintings include "Doctor Johnson in the Anteroom of Lord Chesterfield" (1845), and the "South Sea Bubble" (1847), both in the National Gallery London; and "Charles II. and Nell Gwyn" (1848), in South Kensington Museum. His works are widely known through engravings.

WARD, Elizabeth Stuart (Phelps) (1844—). An American philanthropist and author, born in Andover, Mass. Before her marriage with the Reverend Herbert D. Ward, in 1888, Miss Phelps lived in Andover, where she was widely known for her work in temperance reform and as the writer of many books of a religious, quasi-mystical character, as *The Gates Ajar* (1868). Among her books are: *Ellen's Idol* (1864); *Mercy Gliddon's Work* (1866); *Men, Women, and Ghosts* (1869); *Hedged In* (1870); *The Silent Partner* (1871); *Poetic Studies* (1875); *The Story of Avis* (1877); *An Old Maid's Paradise* (1879); *Doctor Zay* (1882); *Beyond the Gates* (1883); *Songs of the Silent World* (1884); *Jack the Fisherman* (1887); *The Gates Between* (1887); *The Struggle for Immortality* (1889); with her husband, *Come Forth* (1891); *A Singular Life* (1895); *The Story of Jesus Christ* (1897); *Within the Gates* (1901); and some volumes of tales for children.

WARD, Frederick Townsend (1831-62). An American military adventurer, born at Salem, Mass. He was educated at the high school in his native town, became a sailor, fought with the French in the Crimea, and was with Walker in Nicaragua. He then became for a time a ship-broker in New York, but went to China during the Taiping Rebellion. Having organized an irregular force of about 100 desperadoes, Ward offered his services to the local Chinese authorities, and for a reward of $200.000 recaptured Sungkiang, and garrisoned it. Having received a commission from the Chinese, he began drilling natives with foreign adventurers as officers, increased his following to nearly 4000, the nucleus of the force later known under Gordon as 'the ever-victorious army.' This force was of great assistance to the British and French admirals in protecting Shanghai, and maintaining a neutral belt of 30 miles around the city. During a skirmish near Ningpo Ward was killed; he was buried at Sungkiang, where a shrine was erected to his memory in 1875.

WARD, Geneviève, Countess de Guerbel (1838—). A singer and actress. She was born in New York, but from childhood lived much abroad, studying music both in New York and in Italy. After her romantic and unhappy marriage to the Russian officer Count Constantine de Guerbel (1854), she made her début as an opera singer at Milan in 1856 under the name of Madame Guerrabella. She met with great success both on the Continent and in England. Soon after she came to America in 1862, she lost her voice through illness, and for a time gained a livelihood by teaching singing while she studied for the theatre. Her appearance as Lady Macbeth, at Manchester, England, in 1873, proved the beginning of her fame in many tragic rôles, among them Lucrezia Borgia, Queen Katharine, and especially Stephanie, in *Forget-Me-Not*. She first appeared on the American stage in 1878. In 1893 she was Queen Eleanor in the production of *Becket* by Irving at the Lyceum, and she continued with him till 1897, afterwards residing in England. Consult: Wickoff, ***Memoir of Ginevra Guerrabella*** (New York, 1863); Gustafson, ***Geneviève Ward*** (Boston, 1882).

WARD, Henry Augustus (1834—). An American naturalist, born at Rochester, N. Y. He attended Williams College and the Lawrence Scientific School of Harvard, and at the latter institution was a pupil and also assistant of Louis Agassiz. He traveled in Egypt, Arabia, and Palestine; studied for several years at the Jardin des Plantes, the Sorbonne, and the School of Mines in Paris, and at the universities of Munich and Freiburg; and afterwards traveled in West Africa and the West Indies, making natural history collections. After his return to the United States in 1860 he was professor of natural science at Rochester University until 1865; and in 1871 was naturalist to the United States Commission to Santo Domingo. He then devoted himself entirely to the work of making natural history collections, and founded at Rochester, N. Y., Ward's Natural Science Establishment, which collected specimens from all parts of the world, and then sold them to colleges and museums. He published: ***Notices of the Megatherium Cuvieri*** (1863), and ***Description of the Most Celebrated Fossil Animals in the Royal Museums of Europe*** (1866).

WARD, H. Marshall (1854—). An English botanist, educated at Owens College, Manchester, and at Christ's College, Cambridge. From 1880 to 1882 he was cryptogamic botanist to the Ceylon Government. He was professor of botany in the Forest School, Cooper's Hill, from 1885 to 1895, when he became professor at the University of Cambridge. His works include: ***Timber and Some of Its Diseases; The Oak; Sachs's Lectures on the Physiology of Plants; Diseases of Plants;*** and ***Grasses.***

WARD, Mrs. Humphry, maiden name Mary Augusta Arnold (1851—). An English novelist, granddaughter of Dr. Thomas Arnold (q.v.), the famous head master of Rugby, and a niece of Matthew Arnold (q.v.), the poet and critic. She was born at Hobart, in Tasmania, June 11, 1851. Her father, becoming a Roman Catholic, returned to England with his family in 1856, and subsequently held appointments in the Roman Catholic University at Dublin and in the Oratory School at Birmingham, and in 1885 took up his residence at Oxford, where he remained for several years. These details of family history are of interest as showing whence the novelist derived her intense moral nature and the consequent passion for ethical problems. She attended schools in the Lake district and at Clifton, and began her literary career in the atmosphere of Oxford under the inspiration of her father and the society that surrounded his home. On April 6, 1872, she married Thomas Humphry Ward, then a fellow and tutor of Brasenose College. In 1880 they left Oxford and settled in London. Mrs. Ward contributed four biographical introductions to the first volume of her husband's well-known *English Poets* (1880-81), many articles to Smith's ***Dictionary of Christian Biography*** (1877-87), and wrote reviews for ***Macmillan's Magazine***. In 1885 she published a translation of *Amiel's Journal*, a task for which she was spiritually adapted.

Her first experiments in fiction were ***Milly and Olly*** (1881), a child's story, and ***Miss Bretherton*** (1886), the heroine of which bears some resemblance to Mary Anderson, the popular actress of the time. Mrs. Ward found her public on the publication of *Robert Elsmere* (1888), undoubtedly the best problem-novel that had ever appeared in English. It was reviewed by Gladstone in *The Nineteenth Century* for May, 1888, and an enormous sale followed in England and in the United States. The aim of the novel, as succinctly stated by Gladstone, was "to expel the preternatural element from Christianity, to destroy its dogmatic structure, yet to keep intact the moral and spiritual results." Subsequently Mrs. Ward took up other phases of contemporary thought in religion and politics with perhaps a firmer grasp upon her themes, but did not surpass the brilliancy of this effort. A common criticism of her work is that the purpose of it all stands out too prominently. In this respect Mrs. Ward differs greatly from George Eliot, with whom she has often been compared by her enthusiastic admirers. Mrs. Ward's characters are invariably clearly drawn, and her technique she studied carefully. Her novels after ***Robert Elsmere*** comprise ***The History of David Grieve*** (1892); ***Marcella*** (1894); ***The Story of Bessie Costrell*** (1895); ***Sir George Tressady*** (1896); ***Helbeck of Bannisdale*** (1898); ***Eleanor*** (1900); and ***Lady Rose's Daughter*** (1902). Her miscellaneous literary work includes contributions to English periodicals, and editions, with introductions, of the novels of the Brontë sisters (Haworth ed., 1899-1900). In harmony with the scheme set forth in ***Robert Elsmere***, Mrs. Ward took an active part in founding University Hall (1890), a settlement among the poor of London. A lecture delivered at Essex Hall in 1894 was published under the title ***Unitarianism and the Future.***

WARD, James (1769-1859). An English animal and genre painter and engraver, born in London. He studied engraving under J. R. Smith, after which he was apprenticed for nine years to his brother, William James Ward, a mezzo-tint engraver. He also studied painting, exhibiting his first picture in 1790, and four years afterwards was appointed painter and mezzotint engraver to the Prince of Wales. Ward's early paintings were principally genre pictures in the manner of his brother-in-law, George Morland, but he won high distinction in animal subjects, by the exhibition of his "Bull-Baiting" (1797) and the "Lioness" (1816). His paintings are treated in an original and vigorous style, and show a strong but peculiar feeling for color. Among the principal are the "Alderney Bull, Cow, and Calf," painted in rivalry with Paul Potter's "Bull," and a "Cattle Piece" (1807), in the National Gallery; the "Fighting Bulls" and "Donkey and Pigs," in South Kensington Museum. A very characteristic painting is his portrait of himself, painted when he was seventy-nine years old (National Portrait Gallery). Among the best of Ward's plates are the "Centurion Cornelius," after Rembrandt; "Daniel in the Lion's Den," after Rubens; and "Mrs. Bellington," after Reynolds. Ward was elected an Academician in 1811. Consult his *Autobiography* (London, 1853).

WARD, James (1843—). An English philosopher, born at Hull. He was educated at Liverpool Institute, but left school early and was articled to a firm of architects. Afterwards he studied at Spring Hill College and at the universities of Berlin and Göttingen, and upon his return from abroad entered the Congregational ministry. For a year he preached at Emmanuel Church, Cambridge, but then changed his religious belief and entered the University of Cambridge, where he was made scholar of Trinity College in 1872 and fellow in 1875. In 1895-97 he was Gifford lecturer at the University of Aberdeen, and in 1897 was appointed professor of mental philosophy at Cambridge. His writings include a large number of contributions to philosophical periodicals, *Psychology* (1885), and *Naturalism and Agnosticism* (1889).

WARD, John Quincy Adams (1830—). One of the principal American sculptors of the nineteenth century. He was born at Urbana, Champaign County, Ohio, and began the study of law, but in 1850 took up sculpture under H. K. Brown of Brooklyn, with whom he worked for seven years, assisting in many important works, chief among which was the equestrian statue of Washington in Union Square, New York. In 1857-59 he resided in Washington, D. C., where he executed the busts of Alexander Stephens, Joshua R. Giddings, John P. Hale, Hannibal Hamlin, and others, and in 1861 he opened a studio in New York City. For the purpose of studying the American Indians, he visited the Western frontier in 1863, and the following year completed his "Indian Hunter," the first statue erected in Central Park. He is also well represented in Central Park by his bronze statues of the "Freedman," the "Private of the Seventh Regiment" (1868), the "Pilgrim" and "Shakespeare" (1870-71). Among his memorial statues are the colossal George Washington on the steps of the Treasury Building, New York, General Thomas in Washington, Israel Putnam, Hartford, Conn., and the Beecher monument, City Hall, Brooklyn. He also executed the "Crowning Group of Victory" for the Naval Arch, erected in New York City for Dewey's reception. Ward was one of the founders of the National Sculpture Society (1893) and was made its president upon its incorporation. He also took prominent part in the affairs of the National Academy of Design, of which he was president in 1874.

WARD, Lester Frank (1841—). An American geologist and paleontologist, well known as a sociologist and philosophical writer. He was born at Joliet, Ill., and obtained his early education in that State. After serving in the Federal Army during the Civil War he was graduated from the Columbian University, Washington, D. C., in 1869, and two years later from the Law School of the same university. After seven years of work in the United States Treasury Department he became an assistant geologist under the United States Geological Survey, and after 1888 was a paleontologist of the Survey. Already for many years Ward had been deeply interested in the broader aspects of evolution, and especially in the problems of social evolution. Accepting in its broader outlines the philosophy of Spencer, he modified it in certain particulars as a formulation of physical phenomena, and radically in its application to society. In 1883 he published a large work in two volumes, entitled *Dynamic Sociology,* in which he outlined a complete system of cosmic philosophy. As a contribution to sociology it was recognized as a powerful and original work. The psychological character of all social phenomena was again insisted upon and more fully expounded in *The Psychic Factors of Civilization* (1893). Certain views were further developed in the *Outlines of Sociology* (1898), and in *Pure Sociology* (1903). In 1903 he was president of the Institut Internationale de Sociologie of Paris. Among his more important contributions to geology and paleontology are: *The Flora of Washington* (1881); *Sketch of Paleontological Botany* (1885); *Synopsis of the Flora of the Laramie Group* (1886); *Types of the Laramie Flora* (1887); and *Geographical Distribution of Fossil Plants* (1889).

WARD, Nathaniel (1578-1652). An American colonial clergyman and pamphleteer, born in Haverhill, England, best known as the author of the *Simple Cobbler of Agawam,* published under the pseudonym of Theodore de la Guard. He graduated at Cambridge, England, in 1603, and studied for the law, but, after practice in England and travel on the Continent, he studied theology and in 1618 became chaplain to English merchants at Elbing, Prussia. Returning to England, he lectured in London, and in 1628 was appointed rector of Stondon Massey, Essex. Here his pronounced Puritanism caused him to be summoned before Archbishop Laud, but he escaped excommunication. He was, however, deprived of his living in 1633, went to New England in 1634, and served as colleague to Rev. Thomas Parker at Ipswich, till ill health obliged him to surrender the charge (1636). At Ipswich he took a leading part in the compilation of the first code of laws, *The Body of Liberties* (1641). His notorious book, *The Simple Cobbler,* begun in 1645, printed in January, 1647, and speedily followed by three other editions, with important additions and changes (reëdited 1718 and 1843), was a partisan pamphlet and one of the most interesting productions of the Colonial period.

In 1646 Ward left the colony for England, and was made minister of the church at Shenfield (1648). He held that office till his death, publishing several religio-political pamphlets. For a good account of his fantastic book, which is full of extravagant satire, see Tyler's *History of American Literature*, vol. i.

WARD, Nathaniel Bragshaw (1791-1868). An English botanist, son of Stephen Smith Ward, born in London. The principle of 'the Wardian case' was suggested to him by noticing some seeds which had sprouted in a bottle. By means of these sealed cases plants were sent from one part of the world through extremes of temperature without being injured. Robert Fortune sent seventy thousand tea plants from Shanghai to the Himalayas, sufficiently proving the utility of the cases. He published *On the Growth of Plants in Closely Glazed Cases* (1842).

WARD, Robert Plumer (1765-1846). An English politician, jurist, and novelist, born in Mayfair, London, and educated at Westminster School and at Christ Church, Oxford. From 1785 to 1790 he studied at the Inner Temple and at thirty had made a name by his *Inquiry into the Foundation and History of the Laws of Nations in Europe* (1795). He was elected to a seat in the Commons in 1802, became Under-Secretary in the Foreign Office in 1805, held a place in the Admiralty Board, and from 1811 to 1823 was clerk of the Ordnance Department. He held many other important posts, sitting in Parliament again from 1807 to 1823 and keeping for many years a political diary, the value of which arises from his close relations to Perceval. His literary reputation was due no less to his law books than to his novels, and Canning, who was supposed to be the hero of *De Vere*, said that, if the law books were as interesting as novels, the novels were dull as law books. Among Ward's works of fiction, *Tremaine; or the Man of Refinement* (anonymous, 1825) and *De Vere; or the Man of Independence* (1827) were long popular for brilliant style, good character analysis, and serious purpose. He also wrote *A Treatise of the Relative Rights and Duties of Belligerents and Neutral Powers* (1801) and *An Historical Essay on the Real Character and Amount of the Precedent of the Revolution of 1688* (1838). Consult Phipps, *Memoirs of the Political and Literary Life of Robert Plumer Ward, Esq.*, with selections from the diary (London, 1850).

WARD, Wilfrid Philip (1856—). An English essayist and biographer, born at Old Hall, Ware, a son of William George Ward (q.v.). He was educated at Saint Edmund's College, Ware, Ushaw College, Durham, and the Gregorian University in Rome. Aside from his work as an author he was lecturer in philosophy at Ushaw College in 1890, examiner in the Royal University of Ireland in 1891-92, and in 1901 was made a member of the Royal Commission of Irish University Education. He published *William George Ward and the Oxford Movement* (1889), *William George Ward and the Catholic Revival* (1893), *Witnesses to the Unseen* (1894), and *The Life and Times of Cardinal Wiseman* (1897).

WARD, William George (1812-82). An English philosopher and Roman Catholic theologian, born in London, the son of William Ward, financier. He studied at Winchester College (1823-29), at Christ Church, Oxford (1830-33), and then at Lincoln College. He showed marked ability in mathematics and became famed as a debater in the Union Club. His theological views were ill-defined until he made the personal acquaintance of Newman, against whom he had previously been prejudiced, but who now by the single argument that the Catholic Church of the third or fourth century could never have developed from anything resembling modern Protestantism made him an ardent Tractarian and a bitter assailant of Anglican Protestantism. He became a deacon in 1838, a priest in 1840, editor of the Tractarian organ, the *British Critic*, in 1839, and, after 1841, when he openly defended Newman's *Tract xc.* and was deprived of his lectureship at Balliol, an open advocate of union with Rome. His position was definitely stated in 1844 in *The Ideal of a Christian Church Considered in Comparison with Existing Practice.* The book was censured by the Convocation of Oxford, and Ward was deprived of his degrees. This was in February, 1845, and in September of the same year he joined the Roman Catholic communion. He settled at Saint Edmund's College, Ware, became professor of moral philosophy there in 1852, and held this chair until 1858. He was made Ph.D. by the Pope in 1854. In 1861 he returned to Saint Edmund's. In the preceding year he had published *On Nature and Grace*, an able attack on agnosticism. He was editor of the *Dublin Review* in 1863-78, and as a leader of Ultramontanists and Infallibilists went to such startling lengths as to suggest that, were scientific hypotheses first submitted to the infallible Pope, science must surely and speedily advance. His breadth of vision and sympathy is indicated by his place as a founder of the Metaphysical Society (1869), and a fellow member in it of Huxley, of Martineau, and of Tennyson; and by his friendship with Archbishop Tait, his antagonist even in university days, with Newman and Manning, in spite of the difference between his mental mold and theirs, and with John Stuart Mill, though their views were so divergent. His son, Wilfrid Philip Ward, wrote *William George Ward and the Oxford Movement* (London, 1889) and *William George Ward and the Catholic Revival* (ib., 1893). See Oxford Movement.

WARD, William Hayes (1835—). An American editor and Orientalist, born at Abington, Mass. He graduated at Amherst College in 1856, and at Andover Theological Seminary in 1859, and supplied two churches in Kansas. He was teacher of natural science in Beloit College in 1857-58, and in Utica Free Academy in 1862. He became professor of Latin in Ripon College, Wis., in 1865. He joined the editorial staff of the New York *Independent* in 1868, becoming superintending editor in 1870. He gave special attention to Oriental studies, and when the Wolfe expedition to Babylonia went from America he accompanied it as the director. He contributed to the various biblical and Oriental journals, especially on Assyrian and Babylonian seals, and was one of the pioneers in Hittite research.

WARDEN (OF. *guardain*, *gardain*, *gardein*, Fr. *gardien*, from *garde*, *warde*, guard, from *garder*, *guarder*, *warder*, to guard, from OHG. *wartēn*, Ger. *warten*, AS. *weardian*, Eng. *ward;* connected ultimately with Gk. *ὁρᾶν*, *horan*, to look). In England, an officer appointed for the naval or military protection of some particular district of country. In order to keep the districts of England adjoining Scotland and Wales in an attitude of defense, great officers, called lords wardens of the marches, were appointed, to whom the duty of protecting the frontier was committed. The custodian of Dover Castle was created by William the Conqueror Warden of the Cinque Ports (q.v.) and guardian of the adjacent coast, an office originally comprising extensive jurisdiction, civil, naval, and military, the greater part of which was taken away by act of Parliament in 1855.

WARDEN, Church. An official of the parishes of the Anglican communion. In the Church of England the church wardens are a corporation intrusted with the care and arrangement of the goods belonging to the church of the parish. As a general rule all parishioners except aliens, Jews, minors, lunatics, and felons are eligible to election. As a rule, two are elected in each parish; one usually is selected by the incumbent and one elected by the parishioners. Their principal duties are to see to the making of church rates, the levying of voluntary contributions for church purposes, to arrange for the seating of the congregation, to enforce orderly behavior in church and churchyard during service, to take care of the benefice during a vacancy, and to make presentments to the Bishop of the diocese in the event of the misconduct of the clergy. The wardens of parishes of the Episcopal Church of the United States, two in number, are elected by the congregation at its annual meeting, and are *ex officio* members of the vestry. Their special duties are to see that all things required for the services of the church are provided, and in the absence of the rector or a vacancy in the rectorship that a clergyman is secured to conduct the services.

WAR′DEN, David Baillie (1778-1845). A French-Irish author, born in County Down, Ireland. He studied theology at Bangor, but after taking part in the attempted insurrection of the Orangemen in 1796-98 emigrated to America, where he studied and taught. About 1805 he went to Paris as secretary of the United States Legation and afterwards became consul. He had difficulty with the home Government on two or three occasions, and was definitely replaced in 1814, but continued to live in Paris. He was an ardent antiquary. His chief publications are: *A Statistical, Political, and Historical Account of the United States of America* (1819); *Bibliotheca Americana Septentrionalis* (1820); *L'art de vérifier les dates, chronologie de l'Amerique* (1826-44); *Bibliothèque américaine* (1831); and *Recherches sur les antiquités de l'Amérique* (1844).

WARDHOLDING (from *ward*, AS. *weard*, OHG. *warta*, watch, guard, from *wartên*, to watch, guard + *holding*). In the Scotch feudal system, military tenure of land by which a vassal held of a superior lord on condition of rendering military services when required by the latter. When such lands descended to an heir who had not attained his majority, and who therefore could not render satisfactory military services, the lord was allowed the guardianship of his person and possession of his lands during his minority. This right was sometimes waived in consideration of an annual tax. The lord of such vassal was also entitled to the payment of a sum of money upon the marriage of the latter. The vassal could not alienate his fee without the consent of the lord, and the estate was forfeited if he attempted to do so. This form of tenure was abolished in 1747 by statute.

WARDIAN CASE. A nearly air-tight glass case in which plants are either grown for ornament or are transported upon long sea voyages. Since they protect the plants from salt spray and injurious gases, prevent the undue escape of moisture, and permit sufficient light to enter them, and since they demand less attention than any other method of transporting living plants on such journeys, they are highly valued. It was found impossible to ship cinchona seedlings from South America to India until these cases were used. N. B. Ward (q.v.) invented them about the year 1836.

WARD′LAW, Elizabeth, Lady (1677-1727). A Scotch poet, born at Pitfirrane, Fifeshire, and married (1696) to Sir Henry Wardlaw, of Pitcruivie. There was published in 1719 a ballad entitled "Hardyknute," which had been previously circulated by her as the copy of an ancient manuscript found in a vault at Dunfermline. The authorship of this work has never been satisfactorily settled, but as no one ever saw the original manuscript and certain of Lady Wardlaw's friends stated positively that it was of her own composition, it seems probable that such was the case. Even though a forgery, "Hardyknute" is a remarkably fine imitation of the genuine ballads. "Sir Patrick Spens" has also been ascribed to Lady Wardlaw's pen, but this is untenable, though it is possible that she amended a copy of it as well as certain other ballads, such as "Gilderoy." Consult Child, *English and Scottish Popular Ballads* (Boston, 1882-96).

WARDLAW, Ralph (1779-1853). A Scotch Congregational minister. He was born at Dalkeith, in Midlothian, and began his studies in the theological school of the Associate Secession Church. Before he had completed his curriculum, however, he became convinced that congregational independency was the Scriptural system of church government. In 1800 he began to preach, and after some time settled in Glasgow as pastor of an independent church. In 1811 he was appointed professor of theology to the Congregational body in Scotland, and held the position, with his pastorate, till his death. Wardlaw was a voluminous author, often involved in theological controversy, and a prominent actor in the public religious and philanthropical movements of the day. The most important of his works are: *Essays on Assurance of Faith, and on the Extent of the Atonement and Universal Pardon* (1830); *Discourses on the Sabbath* (1832); *Christian Ethics* (1833); *Discourses on the Nature and Extent of the Atonement of Christ* (1843); *Congregational Independency* (1847); *Lectures on Systematic Theology* (1856). Consult the *Life and Correspondence of Ralph Wardlaw*, by Alexander (Edinburgh, 1856).

WARDLE, Mr. An open-handed, open-hearted old widower of the English lower middle class, with a wholesome love of good living and cricket, in Dickens's *Pickwick Papers*. He has two lively daughters, Emily and Isabella, and a maiden sister, Miss Rachel, of decided matrimonial predilections. He is barely able to save the latter from marriage with the designing Jingle (q.v.).

WARDSHIP AND MARRIAGE. An incident of a feudal tenure by knight service, consisting in the right of the lord to receive the income of the estate of a minor heir out of which the heir is supported, and to arrange the heir's marriage. See TENURE.

WARE. A market town in Hertfordshire, England, 2½ miles northeast of Hertford (Map: England, G 5). Malting and brewing are the chief industries. Ware is celebrated in Cowper's poem of John Gilpin, and at Rye House, four miles distant, removed from one of the inns of the town, is still to be seen the famous bed of Ware mentioned in Shakespeare's *Twelfth Night*. Population, in 1901, 5573.

WARE. A town in Hampshire County, Mass., 25 miles west of Worcester, on the Ware River, and on the Boston and Albany and the Boston and Maine railroads (Map: Massachusetts, C 3). Manufacturing is the most important industry, the leading products being cotton and woolen goods, and boots and shoes. The government is administered by town meetings. The water-works are owned and operated by the town. Population, in 1890, 7329; in 1900, 8263. Settled about 1730, Ware became a precinct in 1742, and a town in 1761. Consult Gay, *Gazetteer of Hampshire County* (Syracuse, 1888).

WARE, EUGENE F. (1841—). An American lawyer and poet, born in Hartford, Conn. He removed when a boy with his parents to Iowa and was educated in the public schools of Burlington, in that State. At the outbreak of the Civil War he enlisted as a private in the First Iowa Volunteer Infantry, and when mustered out of the service in 1865 held the rank of captain in the Seventh Iowa Cavalry. Settling in Kansas after the war, he studied law and was admitted to the bar at Fort Scott in 1871. He won rapid recognition in his practice and took an active part in Republican State politics, and served five years as a member of the State Senate. Upon the resignation of Henry Clay Evans as Commissioner of Pensions in May, 1902, he was appointed by President Roosevelt to succeed him. He became widely known as a contributor to the magazines, particularly through the verse written under the pseudonym 'Ironquill.' His publications include *Coronado's March* (1895), a prose translation from the French of Terneaux-Campans of Castaneda's narrative in Spanish, and *Rhymes by Ironquill* (10th ed. 1900).

WARE, HENRY (1764-1845). A Unitarian divine. He was born at Sherburne, Mass., and graduated at Harvard in 1785. He was pastor of the First Church in Hingham, Mass., 1787-1805, when he was called to the Hollis professorship of divinity at Harvard College. During his residence at Cambridge he became one of the Unitarian leaders, representing, however, the more conservative wing. He carried on a controversy with Dr. Leonard Woods, whose *Letters to Unitarians* he answered in *Letters Addressed to Trinitarians and Calvinists* (1820); *Answer to Dr. Woods's Reply* (1822); and *Postscript to an Answer*, etc. (1823). He also published *Foundation, Evidences, and Truths of Religion* (1842).

WARE, HENRY, Jr. (1794-1843). A Unitarian divine. He was born at Hingham, Mass., son of Henry Ware (1779-1853). He graduated at Harvard in 1812; was an instructor in Phillips Exeter Academy (1812-14); studied theology under his father, and in 1817 was settled over the Second Church (Unitarian) in Boston. He played a prominent part in organizing his denomination. He was professor of pulpit eloquence and pastoral care in the Harvard Divinity School, 1830-42. He was one of the editors of the *Christian Disciple*, afterwards the *Christian Examiner*, a Unitarian newspaper (1819-22). Among his works are *Hints on Extemporaneous Preaching* (1824) and *Life of the Saviour* (1832). His select writings were edited by Chandler Robbins (4 vols., Boston, 1846-47). Consult his memoir by his brother John (Boston, 1846).

WARE, WILLIAM (1797-1852). An American romancer, born at Hingham, Mass. He graduated at Harvard, 1816, studied for the Unitarian ministry, and preached mainly in New York (1821-36), and later in Massachusetts. From 1839 to 1844 he edited the *Christian Examiner*. In 1848-49 he traveled in Europe and later lectured at home on his travels. His reputation was chiefly gained by his historical romances, *Zenobia, or the Fall of Palmyra* (first published as *Letters from Palmyra*, 1836 and 1837), and *Aurelian* (first entitled *Probus*, 1838). *Julian, or Scenes in Judea*, appeared in 1841. Also among his writings are the *Life* of Nathaniel Bacon in Sparks's *American Biography* (1848) and *Lectures on Washington Allston* (1852).

WARE, WILLIAM ROBERT (1832—). An American architect, born at Cambridge, Mass., and educated at Harvard and at the Lawrence Scientific School. He practiced architecture in Boston from 1861 to 1881, and was professor of architecture in the Massachusetts Institute of Technology from 1865 to 1881. He then went to the School of Mines of Columbia College, where he had entire charge of the department of architecture. In 1881 he became a trustee of the Metropolitan Museum, New York. He designed the American School of Classical Studies at Athens, Greece, and, with Henry Van Brunt, Memorial Hall at Harvard and the First Church in Boston.

WAREHOUSEMAN. One engaged in the business of receiving and storing goods and merchandise for compensation. The United States Supreme Court has held that the business of warehousemen may under special circumstances become affected with a public use and thus become a public calling subject to regulation by State legislation. In some States statutes have been enacted making some classes of warehousemen public warehousemen with rights and obligations substantially like those of innkeepers and common carriers. They are bound to receive all goods tendered for storage at a reasonable charge so long as they have capacity to store them, but they may require the bailor to pay the charge in advance and are also generally given a statutory lien. Upon receipt of the goods it is customary for the warehouseman to deliver to the bailor a written receipt for them. This receipt is freely assignable and the assignor may transfer all his interest or right in the goods by assignment and delivery of the warehouse receipt. It is not, however, in the absence of statute negotiable in the sense that a bill or note is negotiable. One may become a warehouseman as an incident to other business which he is conducting. Thus the common carriers who receive goods for storage, before they are under any duty to transport them are liable as warehousemen and not as common carriers, and upon the expiration of a reasonable time after arrival of the goods at the end of the route common carriers are held generally to be liable for the goods only as warehousemen. In the same manner those who are engaged in business as factors and wharfingers may be liable as warehousemen for the merchandise which they hold for others.

Those warehouses designated by the Treasurer of the United States as depositories for imported goods until payment of customs duties, the owner or importer giving a bond for the payment of duties, are known as bonded warehouses. Bonded warehouses are private enterprises conducted under the direct supervision of a Government storekeeper, but it is held that the Government assumes no duty as bailee or warehouseman, the sole liability being assumed by the warehouseman. See BAILMENTS; CARRIER, COMMON; LIEN; SAFE DEPOSIT.

WAREHOUSE RECEIPT. A memorandum given by a warehouseman acknowledging the delivery of goods and chattels to him for storage, and usually containing the terms upon which he receives them. Technically, such receipts are not negotiable instruments, but they have been made so by statutes in many of the States, and everywhere by reason of the general rule that warehousemen cannot set up against an innocent purchaser for value a private agreement with the original bailor not set forth on the face of the receipt, they may be transferred from one person to another with almost as much safety as if they were negotiable. However, even an innocent purchaser only obtains such title as the person who stored the goods had; and, therefore, although he is protected as against the warehouseman, he does not always get good title to the goods mentioned in the receipt. Warehouse receipts are frequently delivered as collateral for loans of money. See BAILMENT, and consult the authorities there referred to.

WAREHOUSING SYSTEM. A plan for permitting the importer or manufacturer of goods which are subject to customs or excise duties to postpone the payment of such duties until withdrawal of the goods for consumption. Such goods must be deposited in warehouses, either public or private, but under the supervision and control of revenue officers. The advantages of such a system to merchant or manufacturer are the saving of interest on the sum of duty charges, the saving of duties on goods destroyed or damaged before withdrawal for consumption, and in the case of imported goods convenience in reëxportation. In Continental European countries the same end was attained in the eighteenth century by the creation of free ports, where goods might be stored, manufactured, and reëxported without paying customs duties, and the same practice is in use in some European countries to-day. In the United States, up to 1842, credit for duties was granted the importer, provided he could furnish satisfactory security that the duties would be paid within a specified time.

The warehousing system was introduced in England and France toward the close of the eighteenth century. In France the system was established on a broad basis in 1832, and has undergone little change. Goods are stored in either public or private warehouses, the latter requiring official sanction and official supervision. The importance of the private warehouse in France is relatively far greater than in England or America, owing to the greater prominence of excise duties in French finance. To establish public warehouses wherever dutiable articles are manufactured would call for too great a cost to the national treasury. In England, during the latter half of the nineteenth century the warehousing system underwent a great development. The merchant with goods in bonded warehouse has practically the same control over his property as he would have if they were in his own storehouse. Such operations as repacking may be performed in the warehouse, as also bottling of liquors, roasting of coffee, etc. If any waste accompanies such processes, a corresponding deduction is made from the quantity of goods on which duties must be paid.

In the United States the warehousing system was established in 1846, when it was enacted that goods might be deposited in public warehouses for a period not exceeding one year. In 1854 the establishment of private warehouses was permitted. According to the new law goods in warehouse not removed within one year, but within three, are subject to an additional payment equal to ten per cent. of the original duties, together with increased charges for storage and supervision. Since 1890 the period within which goods may be withdrawn without payment of additional duty has been three years. After this period has expired, the goods are forfeited and must be sold, the Secretary of the Treasury being authorized to pay the proceeds, over and above the duties and charges and expenses of sale, etc., to the consignee or owner of the goods.

Bonded warehouses for imported goods are classified under six heads. (1) Government bonded warehouses, the buildings being owned or leased by the Government, and in the immediate custody of the Collector of Customs. (2) Importers' bonded warehouses—private warehouses, established by the Secretary of the Treasury as a special provision for a large importer. (3) Private bonded warehouses conducted by private parties who carry on a general storage business. Permission from the Secretary of the Treasury is prerequisite to the establishment of such warehouses, and the Government retains control over them and the goods stored. (4) Private bonded warehouses consisting of yards or sheds for the storage of bulky products. (5) Private bonded warehouses consisting of bins, etc., exclusively for the storage of imported grain. (6) Private bonded warehouses exclusively for the storage of imported wines and spirits. The growth of American export trade has resulted in the establishment of nonenumerated bonded warehouses for the manufacture of articles from imported materials intended for exportation. Commodities otherwise subject to excise, but intended for exportation, may escape the tax if manufactured in these bonded manufacturing warehouses.

The rise of the internal revenue system as a result of the Civil War made it necessary to establish warehouses where the home manufacturer might leave his products under bond, becoming responsible for payment of taxes only upon their withdrawal for consumption. The plan was defended largely on the ground that otherwise the importer would have a great advantage over his domestic competitor. Bonded warehouses for the storage of distilled liquors were established in 1868, under the name of distillery warehouses. The rise of the manufacture of brandies led to the establishment of special bonded warehouses for the storage of distilled spirits made from fruit. A third class, general bonded warehouses, was established in 1894, to be used exclusively for the storage of spirits distilled from materials other than fruit.

WARFIELD, BENJAMIN BRECKENRIDGE (1851 —). An American Presbyterian theologian, born in Lexington, Ky., and educated at Princeton College (class of 1871), at Princeton Theological Seminary (class of 1876), and at the University of Leipzig. He taught New Testament literature and exegesis in the Western Theological Seminary from 1878 to 1887, and then became professor of didactic and polemical theology in Princeton Theological Seminary. He became a leader of the conservative party in the Presbyterian Church. He wrote *The Divine Origin of the Bible* (1882), *Inspiration* (1882), *Introduction to the Textual Criticism of the New Testament* (1886), *Systematic Theology as a Science* (1888), *The Right of Systematic Theology* (1897), and *The Significance of the Westminster Standard* (1898).

WAR GAME. An imaginary military operation conducted upon a map with movable pieces to represent the contending forces. A battle or a campaign, a sea fight or an attack on a fortress, may be represented. The war game, or *Kriegsspiel*, was invented by Herr von Reisswitz and elaborated by his son, an officer of the Prussian artillery. It met with favor among the Germans early in the nineteenth century. After the War of 1866 it was cultivated extensively in Austria, and the war of 1870 opened the eyes of all Europe to its importance. In the United States it was practiced extensively in the army after 1867 and in the navy after 1886. The war game is played upon a topographical plan, with small blocks representing the troops, which are proportioned to the scale of the map and occupy as much space upon it as the troops would occupy in the field. These blocks are moved simultaneously, under the direction of an umpire, and at rates proportioned to the mobility of the different arms which they represent. When the position of the blocks indicates that the hostile troops are within sight and range of each other, they may be supposed to open fire, if the players wish, and in this case it becomes the umpire's duty to decide the result upon the basis of experience. The rules of the game explain to him how to estimate the loss from this fire; for example, it may have been found that, in similar circumstances, the number of killed and wounded has varied from ten to twenty; by throwing a common die he decides whether to assign a greater or a less result to the case in view. The rules of the game also explain to him under what circumstances troops have been dispersed by the result of fire, and what would be the probable result of a hand-to-hand fight.

Since the time of von Reisswitz the game has been much modified and has assumed three different forms. The first form is conducted in accordance with a few arbitrary rules based upon general results. The second form is especially adapted to the Minor Kriegsspiel, in which but few troops are employed and minute records are kept of the losses of each company or fraction of a company. The third form is conducted by an umpire, who decides each case according to his own judgment. The method which has gradually been developed in the United States service, by the employment of several devices upon the plan itself, dispenses with the necessity of keeping records, while it offers facilities for instantly determining the results of calculations as minute as those of the Minor Kriegsspiel.

For naval operations the 'strategical game' is played upon an ordinary chart and the 'tactical game' upon a large table, the surface of which is divided into squares to facilitate the measurements of distances. The ships are represented in miniature and are moved over the table under the direction of the umpire, who calculates the effect of the gun, the ram, or the torpedo, and decides the result accordingly.

WARHAM, wạr'am, WILLIAM (c.1450-1532). An English churchman and statesman. He was born at Malshanger, Hampshire; was educated at Winchester College, and New College, Oxford, and then went to London, where he practiced as an advocate and whence he was sent on numerous diplomatic missions to Italy and the Low Countries in a professional capacity. In 1493 he was ordained and from that time pursued the double career of churchman and jurist, in 1494 being appointed master of the rolls. From 1496 to 1502 he was royal ambassador in several important diplomatic affairs, notably the negotiations for the marriage of Prince Arthur to Catharine of Aragon and for a league with the Emperor Maximilian. In 1502 he was consecrated Bishop of London, and became keeper of the great seal, and in 1504 became Lord Chancellor. Meanwhile, in 1503, he had been translated from the See of London to the Archbishopric of Canterbury. He continued to be employed by Henry VIII. on diplomatic missions and throughout his long tenure of office as Archbishop did his best to remedy and avoid ecclesiastical abuses. In 1509 he crowned Henry VIII. and Catharine of Aragon at Westminster, and in 1515 presented Wolsey with the cardinal's hat as representative of the Pope. The same year he retired from office and was succeeded by Wolsey as Lord Chancellor. In 1527 he was drawn into the inquiry as to the validity of Henry's marriage to Catharine. His vacillation in this matter was not altogether commendable, but he finally rebelled against the course of proceedings and at the time of his death was engaged in a vigorous contest for the rights of the Church.

Warham was a generous patron of learning, and from 1506 was chancellor of the Oxford University. His private life, as described by Erasmus, was simple and abstemious, while he was munificent in his public character. Consult: Campbell, *Lives of the Lords Chancellors* (London, 1845-46; new ed., New York, 1874-75); Dixon, *History of the Church of England,* vols. i. and ii. (London, 1884-91); and Hook, *Lives of the Archbishops of Canterbury,* new ser., vol. i. (ib., 1868).

WARING, wâr′ĭng, George Edwin, Jr. (1833-98). An American soldier and sanitary engineer, born at Poundridge, N. Y. He studied agriculture and agricultural chemistry under James Jay Mapes, and became a lecturer on these subjects. In 1855 Horace Greeley (q.v.) employed him to manage the Greeley farm at Chappaqua, N. Y., and two years later Waring became agricultural and drainage engineer of Central Park, New York. He served as major of the Thirty-ninth New York Volunteers in the first battle of Bull Run, and in August, 1861, he went to Saint Louis and raised six troops of cavalry, which he named the Frémont Hussars, and of which he was commissioned major. Later these troops were united with the Benton Hussars to form the Fourth Missouri Cavalry, and Waring was commissioned colonel of the new regiment, which he led through the western campaigns until the close of the war. He then managed the Ogden farm at Newport, R. I., until 1877, after which he devoted himself to sanitary engineering. In 1878 he was employed by the city of Memphis, which had just suffered from yellow fever, to change its drainage system, and in 1894 he was appointed assistant engineer of New Orleans. In December of that year he became Commissioner of Street-Cleaning under the Strong administration in New York City. He reorganized the force of street-cleaners, secured new equipment, and did what had been pronounced impossible—cleaned the streets of New York. But his work was only accomplished in the face of the strongest opposition, and when, at the end of Mayor Strong's administration, Tammany Hall again gained control, Colonel Waring was dismissed. On October 2, 1898, he was appointed a commissioner to report on the sanitary condition of Havana, and while in that city contracted yellow fever, of which he died soon after his return to the United States. He published a number of books, including *The Elements of Agriculture* (1854); *Draining for Profit and Draining for Health* (1867); *Whip and Spur* (1875); *A Farmer's Vacation* (1876); *Sanitary Condition of City and Country Dwelling Houses* (1877); *Village Improvements and Farm Villages* (1877); *Sewage and Land Drainage* (1889); and *Modern Methods of Sewage Disposal for Towns* (1894).

WAR′MAN, Cy (1855—). An American journalist and author, born near Greenup, Ill. In 1888 he established the *Western Railway,* a semi-monthly magazine, at Denver, and in 1892 the short-lived *Daily Chronicle* at Creede, Colo. General attention was first called to him by the New York *Sun* in 1892, in an article which characterized him as the "Poet of the Rockies;" and subsequently his verse and his railroad stories, which opened a new literary vein, became widely popular. His publications include: *Tales of an Engineer* (1895); *The Express Messenger* (1897); *Frontier Stories* (1898); *The Story of the Railroad* (1898); *The White Mail* (1899); *Snow on the Headlight* (1899); and *Short Rails* (1900). He also published a volume of verse, and wrote a number of songs, including the once popular *Sweet Marie.*

WARM-BLOODED ANIMALS. The birds and mammals. See Animal Heat.

WARMING. See Heating and Ventilation.

WARMOUTH, or Goggle-Eye. A small fresh-water bass (*Chænobryttus gulosus*), closely related to the rock-bass (see Bass) of the Eastern and Central United States, which is more elongate than the sunfish, very variable in color and markings, and noted for its large mouth and great voracity. See Plate of Perch.

WARMSPRING. A collective designation for several remnant tribes of Shahaptian stock (q.v.) now residing with the Wasco (q.v.) and Tenino (q.v.) upon the Warmspring Reservation in Northern Oregon, upon which they were collected under the terms of a treaty made in 1855. They speak the same language as the Tenino, and like them they were originally salmon-fishers, root-diggers, and berry-gatherers. Although now mostly living in houses and wearing citizen's dress, they are still the most conservative tribe on the reservation. It was chiefly by their aid that the Modocs (q.v.) were finally conquered in the war of 1872-73, the Warmsprings pursuing them into their retreat in the rocks of the Lava Beds, where the soldiers were afraid to venture. They number now about 400.

Some of the Apache of Arizona are also designated as the Warmspring band, from their former habitat in the vicinity of Aguas Calientes.

WARNECK, vär′nĕk, Gustav Adolf (1834—). A German theologian. He was born at Naumburg, studied at Halle, and served for many years as pastor. In 1897 he became honorary professor in Halle. Of his many writings on the subject of missions the most important are *Missionsstunden* (1878-84); *Die gegenseitigen Beziehungen zwischen der modernen Mission und Kultur* (1879; Eng. trans. 1883); *Abriss einer Geschichte der protestantischen Missionen von der Reformation bis auf die Gegenwart* (1882; Eng. trans. 1884); *Evangelische Missionslehre* (1893-97). In 1874 he founded the *Allgemeine Missionszeitschrift.*

WAR′NER, Anna Bartlett (1820—). An American writer, known under her pseudonym of Amy Lothrop. She was born in New York City, the younger sister of the once celebrated Susan Warner (Elizabeth Wetherell). With her she collaborated in *Say and Seal* (1860), *Ellen Montgomery's Bookshelf* (1863), *Books of Blessing* (1868), and *Wych Hazel* (1876). Her own books include *Sybil and Chrissa, Dollars and Cents* (1853), *My Brother's Keeper* (1855), *Stories of Vinegar Hill* (1871), *The Fourth Watch* (1872), and *Miss Tiller's Vegetable Garden* (1873).

WARNER, Charles Dudley (1829-1900). An American author, born in Plainfield, Mass. He graduated at Hamilton College, N. Y., in 1851. After spending a short time in sur-

veying on the Missouri frontier (1853), he returned to the East (1854) to take up the study of law. He graduated at the Law School of the University of Pennsylvania in 1856, and practiced his profession in Chicago until 1860, when he removed to Hartford. Here he became assistant editor and later editor-in-chief of the Hartford *Press*, and in 1867 co-editor of the Hartford *Courant*, with which he was connected till his death. In 1884 he took charge of the department of *Harper's Magazine* called "The Editor's Drawer," and in 1892 succeeded W. D. Howells in "The Editor's Study" of the same periodical. He made several visits to Europe and the East as correspondent of American newspapers and traveled extensively in the United States and Mexco, contributing papers of descriptive and social life to *Harper's Magazine*. His separately published work began in 1870 with *My Summer in a Garden*, a volume of genial sketches, and was afterwards varied and extended. Among his best known books are: *Saunterings* (1872); *Backlog Studies* (1872); *Baddeck, and That Sort of Thing* (1874); *Mummies and Moslems* (1876); *In the Levant* (1877); *Being a Boy* (1877); *Washington Irving* (1881); *Captain John Smith* (1881); *A Roundabout Journey* (1883); *Their Pilgrimage* (1887); *On Horseback* (1888); *Studies in the South and West, with Comments on Canada* (1889); *A Little Journey in the World* (1889), a novel; *Our Italy* (1891); *As We Were Saying* (1894); and *The Golden House* (1895), a novel. He was also editor of the *American Men of Letters* (1881), a series of biographies, and of the *Library of the World's Best Literature* (1896-97). In conjunction with S. L. Clemens ('Mark Twain') he wrote *The Gilded Age* (1873). Warner was greatly interested in prison reform and other philanthropic work, and by his travels and genial personality did much to bring North and South to understand each other. He was sympathetic with young authors and was a kindly critic, a refined humorist, and a helpful force in American letters.

WARNER, Olin Levy (1844-96). An American sculptor, born at West Suffield, Conn. In 1869 he went to Paris, working at the Ecole des Beaux-Arts, under Jouffroy, Falguière, and Mercier, and afterwards as assistant to Carpeaux. In 1870, on the proclamation of the French Republic, he entered the foreign legion, and did good service during the siege of Paris. On his return to New York he failed to win public recognition, and returned to his father's farm. A commission from Mr. Plant encouraged his return to art, and shortly afterwards he made the friendship of Daniel Cottier, through whose efforts the merit of his work was recognized and his success became established. To the Centennial Exposition of 1876 he sent his bust of President Hayes and the high relief portrait of Edwin Forrest; in 1879 he exhibited his graceful statue "Twilight."

His modeling is solid, severe and simple in style, displaying a fine feeling for the yielding elasticity of the flesh. Among other works of importance are the busts of J. Alden Weir (1880) and Lloyd Garrison (Boston), and the charming head of Maud Morgan, the harpist (1881). One of his most notable productions is the fountain at Portland, Oregon, with its Greek caryatids. In 1893 he designed the souvenir coin for the Columbian Exposition at Chicago, and modeled the colossal medallion heads of Michelangelo, Rembrandt, Raphael, Titian, and Velazquez, in high relief, on the entablature of the Art Building. Among his later works is the colossal head of Mozart (Buffalo, 1892). He died in New York City, August 14, 1896.

WARNER, Seth (1743-84). An American soldier, born at Roxbury, Conn. Removing with his father to Bennington, Vt., in 1763, he there became prominent as a leader of the 'Green Mountain Boys,' opposing New York's claim to the 'New Hampshire Grants' (later Vermont), and being outlawed in consequence by the New York Government, in 1771. In 1775 he led the detachment which on May 12th captured Crown Point, and on July 27th became by election lieutenant-colonel of the Green Mountain Boys, participating as such in General Montgomery's expedition to Canada. On July 5, 1776, he was appointed colonel in one of the Continental regiments, and on July 7, 1777, was in command at the disastrous battle of Hubbardton (q.v.), subsequently rendering efficient service at the battle of Bennington (q.v.), August 16, 1777. Early in 1782 he was forced by ill health to retire from the army, and returned to Roxbury, where he died. Consult Chipman, *Life of Colonel Seth Warner* (Middlebury, Vt., 1848).

WARNER, Susan (1819-85). An American novelist, born in New York, known also under the pen name of 'Elizabeth Wetherell.' Her first novel, *The Wide, Wide World* (1851), won much popularity, although it had been almost rejected by its publishers. *Queechy* (1852) was also popular. She next published *The Law and the Testimony* (1853), in which under appropriate headings are grouped the biblical texts establishing the cardinal doctrine of Christianity. This was followed by a story full of scenic description, *The Hills of the Shatemuc* (1856). Of several subsequent stories the more nameworthy are *The Old Helmet* (1836), *Melbourne House* (1864), and *Daisy* (1868). Miss Warner also collaborated with her sister Anna ('Amy Lothrop') in *Say and Seal* (1860) and several other juvenile books. Several of her works found acceptance in French, German, and Swedish translations, but none approached in merit or popularity *The Wide, Wide World*, which, next to *Uncle Tom's Cabin*, is perhaps the most widely circulated story of American authorship.

WARNER, William (1558?-1609). An English poet, born in London. He studied at Magdalen College, Oxford, but left without a degree, and settled in London as an attorney. He died March 9, 1609, at Amwell, in Hertfordshire, and was buried there. Warner is chiefly known for *Albion's England* (1586), a long poem in fourteen-syllable lines treating of history and legend from Noah to William the Conqueror. Originally in four books, the poem was enlarged in subsequent editions to sixteen books, and the history was brought down into the reign of James I. (1612; reprinted in Chalmer's *English Poets*, vol. iv., London, 1810). Warner also published a translation of the *Menæchmi* of Plautus (1595) and a collection of tales under the title *Pan His Syrinx* (1585).

WARNERIA. A popular name for plants of the genus Hydrastis (q.v.).

WARNING COLORATION. Certain animals are protected from the attacks of other kinds by secreting a repugnant fluid which is either ejected from special repugnatorial glands or which, in the case of insects, gives them a bad taste, so that they are not eaten by monkeys, birds, lizards, or by other insects. Such inedible species are often conspicuously marked with bright colors, spots, or bands, and such colors are said to warn off intruders, which after their first experience recognize them as unfit to eat. A familiar example is the skunk, whose conspicuous black and white markings render it visible even in a rather dark night. Warning coloration is especially common in insects, especially gaily colored caterpillars and butterflies, like our milkweed butterfly (*Anosia archippus*). The brightly colored caterpillars, like the currant worm and a number of others, when fed to birds are rejected by them with disgust. Hence they enjoy an immunity from the attacks of birds. Wallace, who first suggested the theory of warning colors, called attention to the fact that while most caterpillars are edible and also protectively marked (see PROTECTIVE COLORATION), the gaily colored ones are distasteful to birds; and this has since been experimentally proved. Whether, however, the colors have been actually acquired, as Wallace supposes, "for the purpose of serving as a warning of inedibility," still remains to be proved. It should be remembered that the bright red and blue colors of caterpillars and of butterflies are deep-seated and formed from the waste products of the blood, and that their deposition is a chemico-physical or physiological process quite independent of the visits or attacks of birds, etc.

WARNSDORF, värns'dôrf. A town in Bohemia, Austria, 59 miles north by east of Prague. It is especially known for its large cotton manufactures. Woolen and linen goods, velvet, cement, and machinery are also produced. Population, in 1900, 21,150.

WAR OF 1812, THE. See UNITED STATES.

WAR OF 1812, MILITARY SOCIETY OF THE. A patriotic society instituted in New York City on January 3, 1826, by officers of the War of 1812, and consolidated with the Veteran Corps of Artillery (organized in New York City as an independent military organization on November 25, 1790, by officers and soldiers of the War of the Revolution), on January 8, 1848. This society was incorporated as a military society on January 8, 1892. Its insignia consists of a Maltese cross of gold and blue enamel, superimposed by an eagle in gold, on the breast of which is an anchor in black and the legend 1812, pendant from a ribbon of red and blue. The society admits to membership acceptable male descendants of any commissioned officer of honorable record in the War of 1812. The membership is about 100, and the annual meeting is held on January 8th, the anniversary of the battle of New Orleans.

WAR OF 1812, SOCIETY OF THE. An hereditary patriotic society organized in Philadelphia, Pa., on January 8, 1891, by representatives of the Association of the Defenders of Baltimore in 1814 (organized in 1842), which became the State Society of Maryland, and by representatives of the Pennsylvania Association of the Defenders of the Country in the War of 1812 (organized in 1852). It has for its object the preservation of the memories and victories of the War of 1812. It admits to membership any lineal descendant of one who served in the War of 1812, in the army, navy, revenue marine, or privateer service of the United States. Since the formation of the national society, State organizations have been established in Massachusetts, Connecticut, Ohio, District of Columbia, New York, New Jersey, and Delaware, distributed among which is a total membership of about 700.

WARPING (from *warp*, AS. *weorpan*, Goth. *waírpan*, OHG. *werfan*, Ger. *werfen*, to throw; connected with OChurch Slav. *vrěšti*, Skt. *varj*, to throw, and possibly with Gk. *ῥίπτειν*, *rhiptein*, to throw). A mode of improving land by flooding, practiced where rivers bring down large quantities of mud, or where mud is brought up from estuaries by the tide. It is practiced in some of the valleys of the Alps, the rich soil brought down from the mountains being arrested and made to increase the fertility of fields. Warping has also been practiced in England and other countries, but is perhaps less common now than formerly. The process is considered most beneficial on sandy and peaty soils.

WARRANT (OF. *warant*, *guarant*, *garant*, warrant, protector, from OHG. *giwerēn*, Ger. *gewähren*, to grant). A writ issued by a judicial officer, directed to a sheriff, a constable, or other executive officer, requiring him to arrest a person named therein and bring him before the official who issued it. A warrant is usually issued only upon the oath of a complaining witness as to the probable or actual guilt of the person to be apprehended. The matter of the arrest of a person suspected of crime is regulated by statute in each State; but, in general, where a crime does not come to the actual notice of a peace officer a warrant should be issued for the arrest of a suspected person. In some States a person who is thus arrested may demand to see the warrant. See SEARCH WARRANT; ARREST; HABEAS CORPUS, etc.; also consult the authorities referred to under CRIMINAL LAW.

WARRANT OFFICER. A non-commissioned officer in the United States Army or Navy. In the army the company non-commissioned officers, corporals and sergeants, are appointed by the regimental or battalion commander on the recommendation of the company commander. The regimental non-commissioned staff is appointed by the regimental commander on the recommendation of the battalion commander. Each non-commissioned officer receives a certificate or warrant of rank signed by the appointing officer and countersigned by the adjutant. In the navy a warrant officer holds his position by virtue of a warrant issued by the Secretary of the Navy. Warrant officers rank next below midshipmen and consist of boatswains, gunners, carpenters, sailmakers, warrant machinists, and pharmacists. See CORPORAL; SERGEANT; BOATSWAIN; GUNNER; etc.

WARRANTY (OF. *warantie*, *garantie*, from *warantir*, *guarantir*, *garantir*, Fr. *garantir*, to warrant, from OF. *warant, guarant, garant,* warrant, protector). In law, an assurance of a fact coupled with an agreement, expressed or implied, to indemnify the promisee for all damage he may suffer if the fact prove not to be as represented. The term is most commonly applied to assurances in regard to the title or quality of goods and chattels, or as to the title of land. A warranty is a collateral agreement, and if broken does not affect the validity of a sale of goods to which it applies, but only gives rise to an action for such damages as may be suffered by reason thereof. In this respect it differs from a condition in a contract of sale, which if violated will render the contract null and void at the option of the purchaser. As a valid warranty can only be given by contract, it requires a consideration, which may, however, be the price of the goods to which it applies. A warranty may be made by express words, or may be implied from the facts and circumstances of the transaction. By the early common law, a vendor of chattels did not impliedly warrant that he had title, but as most sales were made in *market overt,* the purchaser was protected. However, by the weight of authority to-day, if the vendor has possession of the goods he is held to warrant that he has title. Where no special agreement is made as to the quality of personal property sold, and the parties have equal means of ascertaining it, the general rule is to apply the doctrine of *caveat emptor* (let the purchaser beware), that is, that there is no implied warranty of quality. In a number of States, if the purchaser has not the opportunity for inspection, but orders the goods relying upon a definite description of their kind and quality by the vendor, the law will imply a warranty that they shall correspond to the description. Where food is sold by a retail dealer for consumption by the purchaser, to the knowledge of the dealer, the latter is generally held impliedly to warrant that the food is reasonably wholesome and sound. This exception is not recognized where goods are sold by a wholesale dealer to another dealer. Where goods are sold by sample, there is held to be an implied warranty that they will be of the same quality as the sample, but not that there are no latent defects in the latter. If a person specifically describes goods to be manufactured for him, stating the purpose for which they are to be used, the manufacturer impliedly warrants that they will be reasonably suitable for the purpose mentioned. A warranty, to be binding, must be in clear and distinct terms, and relate to some material fact which would influence the purchaser in ordering the goods. Mere general praise or 'puffing' of wares, such as that they are 'stylish,' etc., will not bind the vendor, as it is considered but natural that a dealer should praise his own goods.

In real estate law, the term warranty usually denotes a covenant in a deed or conveyance, to the effect that the vendor warrants and defends the title against any one who may have a superior claim. For breach of such warranty the vendor is liable in damages to an amount not exceeding the purchase price of the property.

In insurance law, a warranty is a statement or promise as to a material fact relating to the risk, which is inserted in the policy, and which must be strictly true or complied with or the contract of insurance will be void. It is distinguished from a representation, which is mere collateral inducement, and which need be only substantially correct. See Sale; Contract, and the authorities there referred to.

WAR'REN. The county-seat of Trumbull County, Ohio, 53 miles southeast of Cleveland; on the Mahoning River, and on the Pennsylvania, the Erie, and the Baltimore and Ohio railroads (Map: Ohio, J 3). The public library has about 10,000 volumes. Warren is surrounded by a farming country, and has electrical apparatus and supply works, tube works, a rolling mill, and manufactories of fire extinguishers, bath tubs, automobiles, etc. The government is vested in a mayor, chosen biennially, and a council. Warren was incorporated in 1834. Population, in 1890, 5973; in 1900, 8529.

WARREN. The county-seat of Warren County, Pennsylvania, 70 miles southeast of Erie, at the confluence of the Allegheny River and the Conewango Creek, and on the Pennsylvania, the Western New York and Pennsylvania, and the Dunkirk, Allegheny Valley and Pittsburg railroads (Map: Pennsylvania, B 2). It is the seat of the State Hospital for the Insane, and has a public library with about 11,500 volumes. The borough is in a section noted for the production of natural gas and oil, and is engaged in oil refining, and the manufacture of furniture, iron and steel, etc. The government is vested in a burgess, elected triennially, and a unicameral council. Warren was settled in 1795, and was incorporated in 1832. Population, in 1890, 4332; in 1900, 8043.

WARREN. A town in Bristol County, R. I., six miles northwest of Fall River, Mass.; on Narragansett Bay, and on the New York, New Haven and Hartford Railroad (Map: Rhode Island, C 3). It has the George Hall Free Library with 8000 volumes. Manufacturing is the leading industry of the town, the most important products being cotton goods, twine, and braid. Warren occupies the site of the Indian village Sowams, the home of Massasoit (q.v.), and was settled by the whites, at least temporarily, as early as 1635. Until 1746, when it was incorporated by Rhode Island and named in honor of Admiral Sir Peter Warren, it was a part of Swansea, Mass. From it, in 1770, Barrington was taken. Population, in 1890, 4489; in 1900, 5108. Consult: Tusten, *A Discourse, May 8, 1845* (Providence, 1845); Baker, *The History of Warren, 1776-1783* (Warren, 1901).

WARREN, Gouverneur Kemble (1830-82). An American soldier, born at Cold Spring, N. Y. He graduated at West Point in 1850, and took part as chief topographical engineer in the Sioux Expedition of 1855 and participated in the action of Blue Water. From 1859 to 1861 he was assistant professor of mathematics at West Point, but in May of the latter year he accepted a lieutenant-colonelcy in the Fifth New York Volunteers. He took part in the battle of Big Bethel on June 10th, and in August he was commissioned colonel of his regiment. He took part in the Peninsular campaign, and later commanded a brigade of the Army of the Potomac during the Maryland campaign. A few days after the battle of Antietam he was commissioned brigadier-general of volunteers, but in February, 1863, he was relieved of his brigade, and was appointed chief topographical engineer of the Army of the Potomac, a position which he filled at the time of the battle of Fredericksburg. In May, 1863, he was promoted to be a major-general of volunteers, and soon afterwards was appointed chief engineer of the Army of the Potomac. At the battle of Gettysburg he was the first to recognize the importance of Little Round Top, and for his promptness and gallantry in securing possession of it he was brevetted colonel in the Regular Army. From March, 1864, to April, 1865, he commanded the Fifth Corps and participated in the important battles of the Richmond campaign. After the battle of Five Forks he was relieved of his command by General Sheridan. In May, 1865, he resigned his commission in the volunteer service, and during the following years he was employed on surveys and harbor improvements. He published several books, including *Explorations in the Dacota Country* (1855-56); *Preliminary Report of Explorations in Nebraska and Dakota in the Years 1855-57* (1858); and *An Account of the Fifth Army Corps at the Battle of Five Forks* (1866). Consult the *Biographical Memoirs of the National Academy of Sciences*, vol. ii. (Washington, 1886).

WARREN, HENRY (1794-1879). An English water-color painter. He was born in London, first studied sculpture with Nollekens, and afterwards painting in the schools of the Royal Academy. "Love Among the Roses" (1823) was his first picture exhibited, and among his principal oil paintings was a subject from Collins's "Ode to the Passions." In 1835 he changed to water-color, joining the New Society of Painting in Water-colors, of which he became president four years later. He was a member of the Royal Commission for the Paris Exhibition in 1855. Writing has also claimed his attention and he has published two books, *Notes upon Notes* (1832), and *Hints upon Tints*, with his own illustrations, besides several essays on art. He also illustrated Wordsworth's *Pastoral Poems*, Moore's *Paradise and the Peri*, and Lockhart's *Spanish Ballads*. "The Happy Valley" from "Rasselâs," containing both figures and landscape, was his first important water-color. Many of his later pictures are on Eastern subjects, as "Rebecca at the Well" and "Hagar and Ishmael." His works diplay great power of composition and coloring.

WARREN, HENRY WHITE (1831—). A Methodist bishop and author. He was born at Williamsburg, Mass., and graduated at Wesleyan University, Middletown, Conn., in 1853. He was instructor in natural science in his Alma Mater (1851-53), and professor of ancient languages at Weylesan Academy, Wilbraham, Mass. (1853-55). He entered the New England Conference (1855). After serving churches about Boston he was transferred to the Philadelphia Conference and there occupied the most prominent churches of his denomination until his election as bishop (1880). In 1863 he was a member of the Massachusetts Legislature. He was a prolific writer and published: *Sights and Insights* (1874); *The Lesser Hymnal* (1877); *Studies of the Stars* (1878); *Recreations in Astronomy* (1879); *The Bible in the World's Education* (1892); and *Among the Forces* (1898). He was editor of *The Study* (1896-1900).

WARREN, JOHN BYRNE LEICESTER, third and last Baron de Tabley (early pseudonym, WILLIAM LANCASTER) (1835-95). An English poet, born at Tabley House, in Cheshire, England. He was educated at Eton, and at Christ Church, Oxford, graduating in 1859. In 1860 he was called to the bar at Lincoln's Inn, but never followed the law. In 1887 he came to his title. In youth he traveled in Italy, and in 1868 he was a temporary attaché to Lord Stratford de Redcliffe at Constantinople. Being of sensitive temperament, he passed most of his life in seclusion, enjoying, however, the intimate friendship of several distinguished contemporaries, among whom were Gladstone and Browning. His volumes of verse comprise mainly: *Prœterita* (1863); *Eclogues and Monodramas* (1864); *Studies in Verse* (1865); two dramas, *Philoctetes* (1866) and *Orestes* (1867), his strongest works; *Rehearsals* (1870); *Searching the Net* (1873); and a long tragedy, *The Soldier's Fortune* (1876). Though admired by the few, his poetry won no recognition with the public. In 1893 Warren issued *Poems Dramatic and Lyrical* (followed by a second series in 1895), comprising old and new pieces, and at once met his full meed of praise. As a novelist he gained some success with *A Screw Loose* (1868) and *Ropes of Sand* 1869). He also wrote on numismatics, botany, and book-plates. Consult: Miles, *Poets and Poetry of the Century*, vol. iv. (London, 1891); and the appreciative essay by E. Gosse in *Critical Kit-Kats* (London and New York, 1896).

WARREN, JOHN COLLINS (1778-1856). An American surgeon, born in Boston. He graduated at Harvard in 1797; studied medicine with his father and in London and Paris; began practice in Boston in 1802; was assistant professor of anatomy and surgery at Harvard University (1806-15); professor (1815-47); and professor emeritus (1847-56). He was one of the founders and long an editor of the *Boston Medical and Surgical Journal* (1828). He was also one of the founders of the McLean Asylum for the Insane, and of the Massachusetts General Hospital in 1820, of which he was long chief surgeon. In 1846 he performed the first public operation on a patient anæsthetized by ether, in the Massachusetts General Hospital, Dr. W. T. G. Morton (q.v.) being the anæsthetist. He was an editor of the *Monthly Anthology and Boston Review* (1804) and the *Gospel Advocate* (1821). He made a fine collection of specimens in anatomy, osteology, and paleontology, now known as the Warren Museum, in which is included his own skeleton. Among his works are: *Diseases of the Heart* (Boston, 1809); *Comparative View of the Sensorial System* (ib., 1820); *Etherization* (ib., 1848); and *Mastodon Giganteus* (ib., 1855). Consult his *Life, Compiled Chiefly from His Autobiography and Journals* (Boston, 1860), by Edward Warren.

WARREN, JOSEPH (1741-75). An American patriot, born at Roxbury, Mass., June 11, 1741. He graduated at Harvard in 1759, then served for a brief period as master of the Roxbury Grammar School, studied medicine under Dr. James

Lloyd, and became a physician in Boston in 1764. In the early disputes between the colonists and the British Government he associated himself with Samuel Adams and other ardent Whigs, and was the orator at the second anniversary of the Boston Massacre, March 5, 1772. In 1772 he became a member of the Committee of Correspondence, and throughout the years immediately preceding the Revolution he was a frequent contributor to the patriot press. He drafted the extreme but influential 'Suffolk Resolves,' adopted in September, 1774, by a convention of Suffolk County, and forming the most radical statement of the American position which had up to that time been made. Not only did he serve on many important local committees, but he was also a member of the Provincial Congress of Massachusetts, and in April, 1775, was elected president *pro tem.* of that body. In March of that year he was again the orator at the anniversary of the Boston Massacre, refusing to be intimidated by the threats of British officers. He had much to do with the success at Lexington on April 19th, and in June was commissioned major-general. He opposed the occupation of Charlestown Heights, advocated by Putnam and Prescott, thinking the American supply of ammunition too small. Overruled by a majority of the council, which resolved to fortify Bunker Hill, he went there as a volunteer, refusing to take the chief command, offered him by both Prescott and Putnam. During the battle of June 17th he was instantly killed. Consult Frothingham, *Life and Times of Joseph Warren* (Boston, 1865).

WARREN, Lavinia (1841-c.1888). An American dwarf, exhibited by the showman, P. T. Barnum, born at Middleborough, Mass. She was descended from a French family named Bonpasse. Under Barnum's management her name was changed from Mercy Lavinia Bumpus. On February 10, 1863, she was married in Grace Church, New York City, to Charles S. Stratton (q.v.), or 'Tom Thumb,' her sister, Minnie Warren, and 'Commodore Nutt,' two other dwarfs, acting as bridesmaid and groomsman. Her height was considerably less than two feet. She traveled and was exhibited in Europe with her husband, and they accumulated a considerable fortune. One child sprang from their union, but died in early infancy. Two years after her husband's death, which occurred in 1883, she married Count Primo Magri, an Italian dwarf.

WARREN, Leo. A pseudonym of the German novelist Oskar Meding (q.v.).

WARREN, Mercy (1728-1814). An American dramatist, poet, satirist, and historian, born at Barnstable, Mass. She was a sister of the patriot orator James Otis, and wife of the Revolutionary leader James Warren. She was one of the most brilliant women of her time, and her intellectual versatility was prized alike by Thomas Jefferson and John Adams. Abigail, wife of John Adams, was her intimate friend through life. Her first dramas, *The Adulator* (1773) and *The Group* (1775), satirized the Massachusetts Tories. *The Squabble of the Sea Nymphs* (1775) was a comic epic on the Boston Tea Party. More conventional are the tragedies *Sack of Rome* and *The Ladies of Castile,* which may be found in her *Poems, Dramatic and Miscellaneous* (1790), a volume of extremely slight merit. She wrote also an elaborate and stilted *History of the American Revolution* (3 vols., 1805), which is important because of her close personal association with many persons involved in it. Consult Elizabeth F. Ellet, *Women of the Revolution* (1856; reprinted, 2 vols., 1900).

WARREN, Minton (1850—). A distinguished American Latin scholar, born in Providence, R. I. He graduated from Tufts College, Medford, Mass., in 1870, and took his Ph.D. at Strassburg in 1879. He was professor of Latin at Johns Hopkins University, Baltimore, Md., until 1899, when he was appointed to a similar position at Harvard University. He was director of the American School for Classical Studies at Rome, Italy, in 1896-97. His published work is chiefly upon epigraphy and Latin comedy.

WARREN, Sir Peter (1703-52). A British naval officer, born at Warrenstown, County Meath, Ireland. He entered the navy as a volunteer in 1717, and after seeing service in European and African waters, was in 1727 appointed captain of the 70-gun ship *Grafton.* The following years he spent mostly in the West Indies and along the coast of North America, and in 1744 he was promoted to the rank of commodore. In 1745, as commander of the fleet which coöperated with the colonial troops, he had an important part in the capture of Louisburg, and in addition acquired considerable wealth, his squadron having captured many valuable prizes. Two months later he was promoted to be rear-admiral of the blue, and in 1747, as second in command under Anson, helped to defeat the French near Cape Finisterre.

WARREN, Samuel (1807-77). A British lawyer and author. He was born in Denbighshire, Wales, and was the son of a clergyman. He studied medicine at Edinburgh, taking the prize in comparative jurisprudence; in 1828 began the study of law at the Inner Temple, London; practiced as a special pleader (1831-37); and in the latter year was called to the bar; in 1851 was appointed Queen's counsel; was Recorder of Hull (1854-74); was member of Parliament for Midhurst (1856); reëlected (1857); and resigned in 1859, having been appointed master in lunacy by Lord Chelmsford. He was a Conservative in politics, a strong supporter of Lord Derby, and in the interests of his party wrote *Ten Thousand a Year* (1839), a popular novel which first appeared in *Blackwood's Magazine,* and has gone through numerous editions and translations. His first work, *Passages from the Diary of a Late Physician* (1830-31), also went through several European and American editions. He also wrote several valuable legal treatises. A collection of all his writings was issued in five volumes (1854-55).

WARREN, Samuel Prowse (1841—). An American organist, born in Montreal, Canada. From 1861 to 1864 he studied at Berlin with Haupt, studied piano under Gustav Schumann, and instrumentation with Wieprecht. In 1865 he was appointed organist of All Souls' Church in New York and held the position for two years. Later he became organist at Trinity Church and gave a series of organ recitals while there. Afterwards he accepted the position of organist and musical director at Grace Church, and subsequently occupied a similar position in East

Orange, N. J. He has published church music, songs, and transcriptions for the organ.

WARREN, William (1812-88). An American actor, for many years connected with the old Boston Museum. He was born in Philadelphia, and there after his father's death in 1832 he made his début in the part of Young Norval, the character in which his father, also an actor, had begun his career upon the stage. He first appeared in New York in 1841, in London in 1845, and in Boston in 1846. The next year he became a member of the company at the Boston Museum, where he remained, with a brief exception, till he retired in 1883. He died in Boston. His semicentennial in 1882 brought out many deserved tributes to an admirable comedian and representative of the best traditions of the stage. He was at his best in such rôles as Dr. Pangloss, Sir Peter Teazle, and Dr. Primrose. Consult McKay and Wingate, *Famous American Actors of To-Day* (New York, 1896).

WARREN, William Fairfield (1833—). A Methodist Episcopal educator. He was born at Williamsburg, Mass., graduated at Wesleyan University, Middleton, Conn. (1853), and studied at Andover Theological Seminary and the universities of Berlin and Halle. He entered the New England Conference in 1855; became professor of systematic theology in the Methodist Episcopal Missionary Institute at Bremen, Germany (1861); professor of systematic theology in the Boston School of Theology (1866); dean of the faculty (1871); president of Boston University (1873), and at the same time professor of comparative theology and philosophy of religion; he resigned the presidency in 1903, but retained the professorship. He has published *The True Key of Ancient Cosmology* (1882); *In the Footsteps of Arminius* (1884); *Paradise Found—the Cradle of the Human Race at the North Pole* (1885); *The Quest of the Perfect Religion* (1886); *The Story of Gottlieb* (1890); *Constitutional Questions Now Pending in the Methodist Episcopal Church* (1894); *Religions of the World and the World Religion* (1900).

WAR′RENSBURG. The county-seat of Johnson County, Mo., 65 miles southeast of Kansas City; on the Missouri Pacific Railroad (Map: Missouri, C 3). It is near mineral springs, which have given the city some reputation as a summer resort. It is the seat of a State Normal School. Other prominent features are the court-house, Masonic Temple, and opera house, and the Pertle Springs Park. The section is noted for its blue and white sandstone quarries, and for its large farming and stock-raising interests. Warrensburg is the shipping centre for the products of this region, and has some industrial importance, having grain elevators, flouring mills, sawmills, and manufactories of broom racks, polish, etc. The government, under the revised charter of 1893, is vested in a mayor, chosen biennially, and a unicameral council. Warrensburg was settled in 1835, and was incorporated in 1856. It was chartered as a city of the third class in 1889. Population, in 1890, 4706; in 1900, 4724.

WAR′RINGTON. A county borough and important manufacturing town of Lancashire, England, on the right bank of the Mersey, at the head of navigation, 16 miles equidistant from Liverpool and Manchester (Map: England, D 3). On the east are situated the Latchford locks of the Manchester Ship Canal, which is spanned by five bridges at Warrington. The town is well built. The civic spirit is active; Warrington has owned a municipal free library, museum, and art gallery since 1848. Its chief industrial importance is in iron manufactures of all kinds; it also has breweries, and leather, glass, chemical, and soap works. The *Walintune* of Domesday, it was a place of military importance in the fifteenth century. Population, in 1891, 55,288; in 1901, 64,241.

WARRINGTON, George. A stanch friend and adviser of Arthur Pendennis in Thackeray's *Pendennis*, rough and cynical in manner, but of a gentle and generous nature.

WARRINGTON, Lewis (1782-1851). An American naval officer, born at Williamsburg, Va. He graduated at William and Mary College in 1798, and two years later became a midshipman in the navy. He served under Preble during the war with Tripoli, and in 1814 commanded the sloop *Peacock* when she captured the British sloop-of-war *Epervier*, off Cape Canaveral, Fla. Later he took 14 British merchantmen, mostly in Saint George's Channel and the Bay of Biscay. He was promoted to the rank of captain soon afterwards, and cruised in the Indian Ocean, capturing the English cruiser *Nautilus* in the Straits of Sunda on June 30, 1815, after peace had been declared. When assured of this he returned the vessel to the British Government. In 1824-26 he commanded a squadron in the West Indies for the suppression of piracy, and during the following four years he was a member of the Navy Commission Board. He remained in active service until the time of his death.

WARRNAMBOOL, wa̤r′n*a*m-bo͞ol. A seaport of Victoria, Australia, 166 miles west-southwest of Melbourne, on Lady Bay (Map: Victoria, B 5). Among the principal features are the art gallery and museum, a fine race course, Albert Park, and the botanical gardens. Population, in 1901, 6410.

WARSAW, wa̤r′sa̤ (Pol. *Warszava,* vȧr-shä′vȧ). A government of Russian Poland (Map: Russia, B 4). Area, 5625 square miles. It is mainly low and flat, but somewhat hilly along the lower course of the Vistula. This river forms the northern boundary of the government and is of great importance as a waterway. Warsaw has a poor soil, but agriculture is highly developed owing to the prevalence of large holdings. In manufacturing, Warsaw is one of the principal governments in the Empire. The annual value of its manufactures is about $50,000,000, of which the city of Warsaw produces three-fifths. Cotton and woolen goods, products of iron and steel, various articles of apparel (especially footwear), and sugar (for the production of which beets are extensively grown) form the bulk of the manufactures. Population, in 1897, 1,933,689, of whom the Roman Catholics formed 80 per cent. and the Jews about 12 per cent.

WARSAW. The capital of the Government of Warsaw, in Russian Poland, formerly the capital of the Kingdom of Poland. It is beautifully situated on a gently undulating, fertile plain, for the most part on the left bank of the navigable Vistula, on a cliffy terrace 100 feet high. It is 404 miles east of Berlin (Map: Russia, B 4). The suburb of Praga is on the right bank, and is flanked by a modern suburb—New Praga. Warsaw is defended by nearly 20 detached forts. Although it has lost in political status, it is increasing its prestige in all other directions. It is still the gay, active metropolis of Poland, whose literature and arts it dominates.

The main city lies close to the river in a compact form and is well built. The streets are regularly laid out except in the old city, where the ancient houses are quaint and the thoroughfares crooked and narrow. There are 11 gates, beyond which lie the new suburbs. Two bridges cross the Vistula—a railway bridge and the Alexander Bridge, the latter dating from 1865. The former is guarded by a strong fort on each side of the river, the Alexander Citadel (latterly much improved) being on the left bank. This fortress was completed in 1835 and contains a prison for political prisoners. The centre of life in Warsaw is the Palace Square, near the river, and the terminal of the Alexander Bridge. The Theater Square lies a short distance southwest and is flanked by the town hall, and by the fine Grand Theater, where operas and dramas are given. Two fine boulevards, in imitation of the Champs-Elysées district of Paris, are found in the southern part of the city—Ujazdowska and Jerusalem streets. Southwest of the Palace Square is the small but attractive Saxon Garden laid out by Augustus II. There are also the Krasinski gardens. Along the river in Praga stretches the Alexander Park.

There are 6 Russian and upward of 30 Catholic churches. The Catholic Cathedral of Saint John is north of the Palace Square, and is connected by corridors with the royal palace, which lies on the right and between the square and the river. The church was founded in 1360. A new Russian cathedral is in course of construction near the Saxon Garden. The Church of the Holy Cross lies southwest and dates from 1695. The numerous palaces of the nobility have generally been put to municipal service by the Russians. The ancient royal palace is occupied by the Governor-General. The Saxon Palace, in the Saxon Garden, formerly the residence of the Saxon-Polish kings, is also used by the public administration. In the Casimir Palace is the university. In the southern end of the city, near the river, is the Belvedere summer palace, with beautiful gardens embellished with ponds, etc. Adjacent is the Lazienki Palace, built by Poniatowski. There is an elaborate memorial, with eight reposing lions, to the Polish generals who in 1830 fell while remaining loyal to the Russians.

Warsaw is the great industrial and commercial centre of Poland. Machinery, carriages, food products, animal products, and woven goods are leading items among the many varied productions. There are nearly 50 book-printing establishments. Boots and shoes, millinery, plated ware, etc., are skillfully made. There are over 50,000 skilled artisans in the city. The output of hand work is very large. The city is the centre of the Polish interior trade, whose products it expedites to other countries, especially Russia. Leather, coal, and corn are leading commodities of trade. Warsaw is the seat of the Governor-General, the Governor, the superior courts, and of the high dignitaries of both the leading religious faiths. At the head of the city administration is a magistrate. Over him, however, stands a Russian general, who is in fact the chief of police. In public improvements, such as water-works, rapid transit facilities, etc., the city is backward.

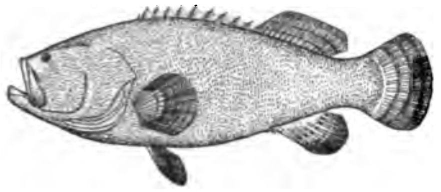
The inhabitants numbered 638,208 in 1897, about one-third being Jews. The Germans form a considerable part of the population, and the Russian garrison has over 30,000 men. At the head of the educational system stands the university. (See WARSAW, UNIVERSITY OF.) The medical school of Warsaw is famous, as also the school of art, with a fine museum. There are a conservatory of music, an institute of agriculture, etc. In nearly every educational institution in the city the instruction is given in Russian.

HISTORY. Warsaw was the residence of the mediæval dukes of Masovia. Early in the seventeenth century it superseded Cracow as the capital of the Polish Kingdom, although the kings continued to be crowned at Cracow. The city was taken by Charles X. Gustavus of Sweden in 1655. Here, on July 28-30, 1656, was fought a great battle in which the Poles were defeated by the armies of Sweden and Brandenburg. This was immediately followed by another Swedish occupation. In 1702 Charles XII. of Sweden entered Warsaw. In 1794, after the second partition of Poland, the city rose against the Russians. In the summer of that year it successfully withstood the forces of Frederick William II. of Prussia. In the fall a Russian army under Suvaroff advanced against it. Praga was stormed on November 4th, the Russians perpetrating a fearful massacre, and on the 8th Warsaw surrendered. In the third partition of Poland Warsaw fell to Russia. In 1807 it became the capital of the newly erected Duchy of Warsaw. (See POLAND.) In 1813 it passed to the Russians. The Polish uprising of 1830 began here on November 29th, the Grand Duke Constantine being forced to retire. The city held out until September 8, 1831, when it capitulated.

WARSAW. The county-seat of Kosciusko County, Ind., 122 miles north by east of Indianapolis; near the Tippecanoe River, and on the Pittsburg, Fort Wayne and Chicago, the Pennsylvania, and the Cleveland, Cincinnati, Chicago and Saint Louis railroads (Map: Indiana, D 1). It is in a picturesque lake region and has considerable reputation as a summer resort. The noteworthy features include Winona Park, the Winona Agricultural and Technical Institute, the public library, and the county court-house. Warsaw is surrounded by a farming and stock-raising country, and manufactures canned and pickled goods, flour, machinery, water heaters, etc. Population, in 1890, 3574; in 1900, 3987.

WARSAW. The county-seat of Wyoming County, N. Y., 48 miles east by south of Rochester; on the Erie and the Buffalo, Rochester and Pittsburg railroads (Map: New York, B 3). It has a Union School Library with more than 4500 volumes. Warsaw is surrounded by a farming section, and has extensive salt deposits. There are salt works and manufactories of knit goods, brooms, carriages, foundry products, ivory buttons, etc. The water-works are owned by the municipality. Population, in 1890, 3120; in 1900, 3048.

WARSAW (corruption of *guasa*). A large fish (*Promicrops guttatus*), common in the Gulf of Mexico and southward, which is valued both in market and by sportsmen. See Jewfish.



THE WARSAW.

WARSAW, University of. A university founded in 1816 and opened in 1818. After the Polish Revolution of 1830 the university was suppressed and its library transferred to Saint Petersburg. In 1857 a medical school was opened at Warsaw, and in 1861 a higher institution of learning was established, which was organized into a university in 1869. The statutes of 1884 which took away all academic freedom from Russian universities are also in force at the University of Warsaw. In 1902 it consisted of the following faculties: (1) History-philology; (2) physics-mathematics; (3) law; (4) medicine. It had an attendance of 1122. The library is particularly rich in Polish literature and history. It contains now over 450,000 volumes and 1375 manuscripts. The ethnographical museum also contains valuable manuscripts. In 1820 the astronomical observatory was erected.

WARSHIP. A vessel armed and equipped for purposes of war. All fully efficient fighting ships are designed and built as such, the characteristics of a warship and a merchant vessel being so different that it is impossible to transform the latter into an efficient fighting craft. Warships are divided into various classes, such as battleships, armored cruisers, protected cruisers, unprotected cruisers, and gunboats. Special types, such as torpedo vessels, monitors, rams, etc., may usually be classed under one of the previously given heads. Fleet auxiliaries such as supply ships, repair ships, colliers, etc., are not regarded as warships; if they carry armament it is only a light one. Battleships are those which are best armed and protected. They are commonly divided into three or four classes according to their size or general efficiency. They are also of two types, seagoing and coast-defense—to the latter type such craft as monitors belong. Armored cruisers differ from battleships in having more speed but less armor and armament. Protected cruisers have a curved armored deck (called the *protective deck*) like a turtleback protecting the boilers, engines, and other vital parts; it is about the height of the waterline amidship, but curves down at the sides so that its edge meets the side of the ship several feet below water. Unprotected cruisers have no such deck. Gunboats are small cruisers, usually without armor or protective deck. As to size, there is no exact point of division, but vessels of less than 1000 tons are nearly always called gunboats, while vessels of 2000 tons or more are always called cruisers. Vessels between 1000 and 2000 tons are sometimes called cruisers and sometimes gunboats—usually the former. See Navies; Ship, Armored; Cruiser; Frigate; Torpedo Boat; Ram, Marine; *Navy*, under United States; etc.

WART (AS. *wearte*, OHG. *warza*, Ger. *Warze*, wart; perhaps connected with AS. *wearre*, Lat. *verruca*, wart, Skt. *vrih*, to grow, or with OChurch Slav. *vrēdŭ*, eruption, Goth. *waúrts*, OHG. *wurz*, Ger. *Wurz*, AS. *wyrt*, Eng. *wort*, weed, and ultimately with Eng. *root*). An excresence of the skin due to hypertrophy of the papillæ, varying in shape, size, and position. Warts are generally round or oval, with roughened summits, more frequently on the hands, rarely on the face. They appear especially upon children. There are several varieties of wart or *verruca*. The ordinary form, *verruca vulgaris*, appears upon children between the ages of two and fourteen, remains a few years, and then disappears. Or they may last all through the patient's life. When a wart has been cut or burned, frequently small warts, called 'seed warts,' appear near by. *Verruca senilis* is a wart probably caused by the senile degeneration of the tissues of the skin, favored by irritation and want of cleanliness. These warts are generally placed upon the back, the arms, the face, neck, and trunk. They are rounded and irregular, dark in color, and of a greasy feel. Frequently they are the seat of troublesome itching. Venereal warts, or *condylomata*, occur as a result of the discharge of gonorrhœa (q.v.) or as an evidence of syphilis (q.v.). They are found upon the genitals or the mouth, between the toes, or beneath the breasts. Warts which are thread-like, usually appearing on the face or neck, are called *verrucæ filiformis*. Other varieties are of little importance. Treatment of warts consists of burning off with nitric acid, acetic acid, nitrate of silver, or the acid nitrate of mercury. Salicylic acid removes some, as also a strong alkali, frequently applied. Some may be snipped off with scissors close to their bases; but they frequently return. The electrocautery has been used with success. Most warts are susceptible to mere suggestion, and any treatment is of avail; hence the success of 'charms' to remove them.

WARTBURG. A castle near Eisenach in Saxe-Weimar, Germany, situated on a hill 565 feet above the town. (See Eisenach.) It was begun about 1070 and till the year 1247 it was the residence of the Landgraves of Thuringia, attaining its greatest splendor under Hermann I. (1190-1217), who was a noted patron of the arts. The castle is the occasional residence of the Grand-Duke of Saxe-Weimar. The restoration of the castle was begun in 1847 after designs by Ritzen, who reproduced with great faithfulness the original plan of the structure. The Hofburg, by means of mural paintings and antique furnishings, has been made as near a duplicate as possible to what must have been its appearance at its prime in the twelfth century. The Vorburg, in the same manner, has been refitted in the style of the early sixteenth century, when Luther passed nearly a year there (May 4, 1521, March 6, 1522), at work on his translation of the Bible.

The Sängersaal in the Hofburg is noted as the scene of the legendary Wartburg Krieg or Sängeskrieg of 1207, in which the most celebrated of German minstrels competed for supremacy. Walther von des Vogelweide, Wolfram von Eschenbach, and Heinrich von Ofterdingen participated in the musical tourney, and to the first of these fell the prize. This legend, dating from the early part of the thirteenth century, was blended in time with a West German tradition regarding the contest between the pious Wolfram and the magician Klingsor aided by the devil. The story in its modified form became the subject of an early poem which attained wide currency before the end of the thirteenth century. From this source Wagner, among others, drew part of his material for the libretto of *Tannhaüser*. On October 18, 1817, about 500 students of the various German universities assembled at the Wartburg, at the instance of the Jena Burschenschaft (q.v.) to celebrate the third centennial of the beginning of the Reformation and the anniversary of the battle of Leipzig (1813). In reality the meeting was a protest on the part of the German youth against the policy of reaction which, after the Congress of Vienna, Metternich forced upon Germany. The black, red, and gold colors of the Burschenschaft first appeared then. The works of Kotzebue and other champions of reactions were cast into the flames, and on the following day preparations were begun for extending the Burschenschaft throughout Germany. The German governments, alarmed by the spirit of revolution evinced in the proceedings at the *Wartburgfest*, entered upon a severe course of repression, placed the universities under police surveillance and prohibited membership in a Burschenschaft. See GERMANY.

WARTHE, vär′te (Pol. *Warta*). A river of Germany and Russian Poland, the largest tributary of the Oder. It rises in the southwestern part of Russian Poland and flows first in a northern direction and then west, entering Prussia at its junction with the Prosna (Map: Prussia, G 2). It traverses the Prussian Province of Posen in a generally western direction between low, marshy banks, and joins the Oder at Küstrin. Of its total length of over 540 miles, 265 miles are navigable. As the principal river of Posen the Warthe has a considerable traffic and is connected by canal with the Vistula.

WART-HOG. A large bush-ranging wild pig of Africa, of which there are two species, *Phacochœrus Africanus*, of Eastern Africa, called 'halluf' in Abyssinia, and *Phacochœrus Æthiopicus* of South Africa. Both have very long and broad heads with enormous tusks, and the face made ugly by pairs of great wart-like protuberances on each side of the nose, one pair just below the eyes.

WARTON, wạr′ton, JOSEPH (1722-1800). An English literary critic, born at Dunsfold, Surrey. He was educated at Oriel College, Oxford, took orders in 1744, and was curate at Basingstoke (1744-45), and subsequently at Chelsea. In 1744 he published a book of verse with the title *Ode on Reading West's Pindar*, and in 1746 a collection of *Odes on Various Subjects*, in which he declared against the didactic school of poetry represented by Pope. In 1753 he published a four-volume edition of Vergil in Latin and English, himself contributing translations of the *Eclogues* and *Georgics*, critical essays, annotations, and a *Life* of the poet. He was rector of Winslade in 1748-54, and of Tunworth in 1754-55, but failed of any important preferment in the Church, and in 1755 became second master of Winchester School. In 1766 he was appointed headmaster of the school, which post he resigned in 1793. During his residence at Winchester he published the two volumes (1757-1782) of his *Essay on the Genius and Writings of Pope*, his most important work. His edition of Pope's works (1797), which remained the best until the appearance of that by Elwin and Courthope, exhibits, according to Mark Pattison, the two editorial privileges—silence where explanation is needed, diffuseness where it is superfluous. Yet the annotations have in themselves much literary interest. Warton became prebendary of London in 1782, in 1788 obtained a prebend in the Cathedral at Winchester, and received successively the vicarage of Chorley (Hertfordshire), that of Wickham (Hampshire), the rectory of Easton, and soon after that of Upham, both in Hampshire.

WARTON, THOMAS (1728-90). An English poet and critic, born January 9, 1728, at Basingstoke. He was the younger brother of Joseph Warton (q.v.). From the tuition of his father he went to Trinity College, Oxford, graduating B.A. in 1747, and M.A. in 1750. He remained at the university all his life. In 1757 he was elected professor of poetry at Oxford—a position which he held for ten years. In 1767 he took the degree of B.D. To him fell two church livings—Kiddington in Oxfordshire (1771) and Hill Farrance in Somersetshire (1782). In 1785 he was appointed Camden professor of history at Oxford, and poet laureate in succession to William Whitehead. He died at Oxford, May 21, 1790.

Warton began writing verse in boyhood. His poems, consisting of sonnets, odes, and descriptive lyrics, collected in 1777, reached a fourth edition in 1789. Written in imitation of Spenser and Milton, they are most interesting as links between the older English poetry and the remarkable poetic outburst beginning with Wordsworth and Coleridge. Warton gained his reputation as a critic with *Observations on the Faery Queen* (1754; enlarged to 2 vols., 1762), a pioneer work in the revival of enthusiasm for magic and mystery. In 1774 appeared the first volume of his *History of English Poetry*. Two more volumes were added in 1778 and 1781, bringing the work down through the age of Elizabeth. A fourth volume, which was intended to carry the subject onward to Pope, was never written. In spite of many errors in fact and of generalizations proved incorrect by later investigations, the *History of English Poetry* still possesses very great value. Judged historically, it marks an epoch in English literary history. Warton's last important undertaking was an edition of *Poems upon Several Occasions by John Milton* (1785), which in the judgment of David Masson is the best critical edition of Milton's early poems ever published. Warton's *History of English Poetry* was reëdited with suppressions and additions by W. C. Hazlitt (London, 1874). The standard memoir is prefixed to the *Poems*, ed. by R. Mant (2 vols., Oxford, 1802).

WARWICK, wŏr′ĭk. The county town of Warwickshire, England, on the Avon, 21 miles southeast of Birmingham (Map: England, E 4). The most notable edifice is Warwick Castle, the principal residence of the earls of Warwick, beautifully situated on a rocky elevation 40 feet high, on the banks of the Avon. Of this edifice, Guy's Tower, 128 feet high, was built in 1394; and Cæsar's Tower, 147 feet high, is still more ancient. Warwick Castle possesses a valuable collection of paintings, armor, and other relics. There are a free library and a museum. The town has a general and agricultural trade. There are iron works and manufactures of gelatin. Originally a British settlement, Warwick was occupied by the Romans. It was destroyed by the Danes; William the Conqueror's presence is recorded in Warwick, where he erected strong fortifications, and the earls of Warwick are famous in British history. Population, in 1901, 11,889. Consult Cooke, *Historical Guide to Warwick Castle* (Warwick, 1859).

WARWICK, wạr′wĭck. A town including several villages, in Kent County, R. I., five miles south of Providence; on the Narragansett and Cowesett bays, the Pawtuxet and Providence rivers, and on the New York, New Haven and Hartford Railroad (Map: Rhode Island, C 3). It is important as an industrial centre, being especially known for the manufacture of cotton goods. There are also foundries and machine shops. In the census year 1900 the various manufacturing establishments had $8,418,333 capital and an output valued at $6,197,506. Population, in 1890, 17,761; in 1900, 21,316.

Warwick, founded in 1642 by a small company headed by Samuel Gorton (q.v.), was called Shawomet until 1648, when its present name was adopted in honor of the Earl of Warwick. Massachusetts at first claimed jurisdiction, and in 1643 almost completely destroyed the settlement. In 1676 Warwick suffered severely from an Indian attack. It was the birthplace and early home of Gen. Nathanael Greene. Consult Fuller, *The History of Warwick* (Providence, 1875).

WARWICK, wŏr′ĭk, Guy of. A hero of romance who is supposed to have lived in the tenth century and to have been the ancestor of the earls of Warwick. He was especially renowned for his victory over the Danish giant Colbrand. He is mentioned by Chaucer, Shakespeare, and some historians of the fifteenth century. Nothing is known definitely about such a person, and the earliest mention of him seems to have been in the Anglo-Norman poems of the twelfth century. The extant English version belongs to the fourteenth century. Consult *Guy of Warwick*, ed. by Zupitza for the Early English Text Society (London, 1875-76).

WARWICK, John Dudley, Earl of. An English statesman. See Dudley, John.

WARWICK, Richard de Beauchamp, Earl of (1382-1439). An English soldier. He succeeded to the title in 1401, and participated in the war with Owen Glendower and the Percys, and was at the battle of Shrewsbury (1403). In 1408 he set out on a pilgrimage to the Holy Land, and, after traveling widely, returned to England in 1410. In 1413 he went to France as a commissioner to treat for peace, and the next year attended the Council of Constance. In 1414 he was put in command of Calais. He was made Earl of Aumarle about 1419. After the death of Henry V. Warwick was in charge of the education of Henry VI. (q.v.). He was employed in many difficult matters, and finally in 1437 he was appointed lieutenant to rule France and Normandy; this office he held until his death, April 30, 1439.

WARWICK, Richard Neville, Earl of, popularly named The King-Maker (1428-71). A celebrated English warrior and statesman. He was born on November 22, 1428, the eldest son of Richard, Earl of Salisbury, and Alice, daughter and heiress of Thomas Montacute. He became the most powerful nobleman in the kingdom, by his marriage with Anne, daughter and heiress of Richard de Beauchamp, Earl of Warwick, and not only acquired by this alliance the lands of the Warwick family, but was created Earl of Warwick, with succession to the heirs of his wife. He is the most prominent figure in the Wars of the Roses (q.v.). Until 1453 Warwick remained neutral, but after that he was associated with Richard, Duke of York. The first battle, at Saint Albans, between the Yorkists and the Lancastrians in 1455 was won mainly by Warwick's impetuous onset. He was rewarded with the governorship of Calais. In 1457 he obtained command of the fleet for three years. In 1458, with five large and seven small vessels, he attacked a fleet of 28 ships, 16 of which belonged to the King of Castile. After a battle of six hours he withdrew, having captured six of the enemy's vessels. A little later, in spite of the truce with Lübeck, he seized a fleet bound thither. Upon the renewal of the civil strife in 1460 Warwick landed in Kent at the head of his Calais troops, and entered London amid the acclamations of the people. He defeated Queen Margaret's army, near Northampton (1460), with great slaughter, and obtained possession of the person of the King. The Duke of York now advanced his claim to the throne. Queen Margaret raised an army to rescue the King; and the Duke committed the monarch to the custody of Warwick, while he marched against the Lancastrians. In the battle of Wakefield, fought on December 31, 1460, the Yorkists were overthrown by the army of Queen Margaret. The Duke was taken prisoner and put to death, and Warwick's father, the Earl of Salisbury, with twelve other Yorkist chiefs, was beheaded at Pontefract. The second battle of Saint Albans was won by the Lancastrians (1461), but Edward, Earl of March, now Duke of York, accompanied by Warwick, marched boldly upon London, which was thoroughly Yorkist, and Edward was proclaimed King as Edward IV. The Lancastrians suffered a great defeat at Towton, and Edward, returning to London in triumph, was crowned June 22, 1461. Warwick now had his first misunderstanding with King Edward. He had been authorized to negotiate with Louis XI. of France for the marriage of his sister-in-law, the Princess Bona of Savoy, to King Edward, and was indignant at the King's sudden marriage with Elizabeth Woodville. He was now at the height of his power. To the earldoms of Warwick and Salisbury, with the estates of the Despensers, he added the offices of high admiral and great chamberlain, together with the lord-lieutenancy of Ireland and the government of Calais. But he was losing power in the King's council and the relatives of the Queen were becoming more prominent. After having been sent into honorable banishment by means of embassies to France, Burgundy, and Brittany, Warwick in 1469 gave his daughter in marriage to George, Duke of Clarence, the King's brother, without asking Edward's permission. He finally broke out into open revolt against Edward, and concluded a treaty with Queen Margaret, by which it was agreed that her son, Prince Edward, should espouse Anne Neville, Warwick's daughter, and that in failure of issue the crown should devolve on Clarence. King Edward escaped to Holland, and Henry VI., who had been confined in the Tower, resumed the sovereignty. Edward, however, raised a body of Flemings and Dutchmen, and, landing near Hull, advanced toward London. He gave battle to King Henry's army, commanded by Warwick, at Barnet, April 14, 1471. Warwick and his brother Montagu, betrayed by Clarence, were left dead on the field, and with them fell the greatness of the House of Neville. Consult: Oman, *Warwick the Kingmaker* (London, 1891); Stubbs, *Constitutional History of England*, vol. iii. (5th ed., Oxford, 1895); Ramsay, *Lancaster and York*, vol. ii. (Oxford, 1892).

WARWICK, Robert Rich, second Earl of (1587-1658). An English Puritan nobleman and naval commander. He was the eldest son of Lord Robert Rich, who was created Earl of Warwick in 1618; in the following year the son succeeded to the title. He was educated at Emmanuel College, Cambridge, studied law, and was admitted to the bar in 1604, and became member of Parliament for Maldon in 1610. He joined the Puritan movement; took great interest in the colonization of Rhode Island and other settlements; was a councilor of the New England Company, and a friend of Thomas Hooker, the founder of Hartford. In the Civil War he was a supporter of the Parliamentarian cause; in 1642 he served as lieutenant of the fleet under Northumberland, whom he succeeded as admiral; and during the Protectorship of Cromwell was chosen to bear the sword of state in the latter's presence. His grandson and heir married Cromwell's daughter Frances in 1657, dying, however, three months later, and two months prior to Warwick's death.

WARWICKSHIRE. A midland county of England, bounded by Leicester, Northampton, Oxford, Gloucester, Worcester, and Stafford (Map: England, E 4). Area, 902 square miles. The surface is generally level or gently undulating. The county is traversed by the river Avon; it was formerly covered with forest and there is still much woodland. Five-sixths of its area is under cultivation, including pastures; wheat is the chief crop, while dairying receives much attention. Mechanical industries are very important, especially founding and the manufacture of machinery, jewelry, and instruments. Nearly 3,000,000 tons of coal are mined annually, and the production of iron ore is increasing. Population, in 1891, 805,072; in 1901, 897,678. The county town is Warwick, and the largest cities are Birmingham and Coventry.

WASATCH (wa̤′săch *or* wa̤′săch′) **MOUNTAINS.** A mountain range of Utah belonging to the Rocky Mountain system (Map: Utah, B 2). It begins in the southeastern part of Idaho, and runs southward east of the Great Salt Lake and through the centre of Utah, gradually turning to the southwest, and ending at the southwestern corner of the State. It forms the eastern boundary of the Great Basin, from which it rises abruptly in great and very conspicuous rugged masses broken by deep cañons, and bearing large pine forests on its middle slopes. Its average height is about 10,000 feet, and several of its peaks are over 12,000 feet high. The range is a recent uplift, and of a composition similar to that of the minor Basin Ranges. It consists in the north of a ridge of Carboniferous rocks flanked by Tertiary and Cretaceous strata, and in the south of great masses of igneous rocks. Coal, iron, and silver constitute its chief mineral wealth.

WAS′CO (Tenino, grass people). The easternmost tribe of Chinookan stock (q.v.), formerly claiming the country on the south side of the Columbia River, about the Dalles, Oregon, and now gathered with other tribes upon the Warmspring Reservation in the same vicinity. They were essentially a fishing people. They are now civilized, prosperous, and industrious, working among the whites in the intervals of caring for their crops. They number about 250.

WASE′CA. The county-seat of Waseca County, Minn., 76 miles south of Saint Paul; on the Chicago and Northwestern and the Minneapolis and Saint Louis railroads (Map: Minnesota, E 6). It is in a productive grain-growing country, and has several grain elevators, and manufactories of flour, oatmeal, foundry and machine-shop products, etc. Adjoining the city on the east is Clear Lake, where the meetings of the Chautauqua of the Northwest are held. The new State grounds of the German Evangelical Association are also here. The water-works and the electric light plant are the property of the municipality. Population, in 1890, 2482; in 1903, 3500.

WASH, The. An estuary on the eastern coast of England, between the counties of Lincoln and Norfolk (Map: England, G 4). It is about 22 miles in length, 15 miles in average breadth, and receives the rivers Witham, Welland, Ouse, and Nen. The shores are low and marshy, and the estuary is occupied by sandbanks, dry at low water. Two wide spaces or pools of water, called Lynn and Boston Deeps, afford anchorage for vessels.

WASH′BURN. The county-seat of Bayfield County, Wis., 60 miles east by south of Duluth, Minn.; on Chaquamegon Bay, an arm of Lake Superior, and on the Chicago, Saint Paul, Minneapolis and Omaha and the Northern Pacific railroads (Map: Wisconsin, C 2). It has a handsome high school building and a public library. The harbor is well adapted to shipping, and considerable trade is carried on in the products of the vicinity—principally grain, lumber, and brownstone. There are a grain elevator, a brewery, lumber mills, and a box factory. A large dynamite plant has been established four miles from the town. The Jesuits founded a mission near here in 1665. Population, in 1890, 3699; in 1900, 6814.

WASHBURN, Cadwallader Colden (1818-82). An American soldier, political leader, and capitalist, born at Livermore, Maine. In 1839 he removed to Iowa and later to Illinois, where he studied law. In 1842 he began practice at Mineral Point, Wis. He entered into partnership with Cyrus Woodman in 1844, the firm devoting much of its attention to real estate and banking. Woodman retired in 1855 and subsequently Washburn made fortunate investments in timber lands and became one of the pioneers in the flour-milling industry. In 1854 he was elected to Congress by the anti-slavery element, and was twice reëlected, serving until 1861. There he joined his brothers, Israel Washburn and Elihu B. Washburne (q.v.). Soon after the outbreak of the Civil War he raised the Second Regiment of Wisconsin Cavalry and was mustered into the Federal service in February, 1862. He served under General Curtis in Arkansas from March to July of that year and was then promoted to be brigadier-general of volunteers. In November, 1862, he was promoted to be major-general and was given a division in the Army of the Tennessee. During the following spring (1863) he commanded a cavalry division of the Thirteenth Corps, but at Haines's Bluff, Miss., he had two divisions of the Sixteenth Corps. He was soon transferred back to the Thirteenth, however, and remained with it until 1864, when he was given command of the District of West Tennessee, which, with the exception of some months when he commanded the District of Vicksburg, he continued to administer until he resigned from the service on May 25, 1865. He was again a member of Congress from 1867 to 1871, and in 1872-74 was Governor of Wisconsin. He gave largely to education, built an observatory at the University of Wisconsin, and founded an orphan asylum at Minneapolis.

WASHBURN, Edward Abiel (1819-81). A Protestant Episcopal clergyman. He was born in Boston, graduated at Harvard College (1838), and studied theology at Andover and at the Yale Divinity School, graduating in 1842. He was licensed as a Congregational minister, but decided to enter the Episcopal Church, and was ordained in 1844. He became rector at Newburyport, Mass. (1844); at Hartford, and professor of Church polity at the divinity school, Middletown (1853); of Saint Mark's Church, Philadelphia (1862); and of Calvary Church, New York (1865). He visited Europe (1871) as a delegate of the evangelical alliance. Washburn was a member of the committee on Bible revision and a translator of part of Lange's commentaries. His publications include: *The Social Law of God, Sermons on the Ten Commandments* (1875; 6th ed. with sketch of his life and work, 1884); *Sermons* (1828); and a volume of poems, *Voices from a Busy Life* (1883).

WASHBURN, Emory (1800-77). An American jurist. He was born in Leicester, Mass.; studied at Dartmouth, but finished his education at Williams in 1817; was admitted to the bar (1821); practiced at Leicester until 1828, then at Worcester for thirty years. He served in both branches of the State Legislature, was a justice of the Common Pleas Court (1844-47), and Governor of Massachusetts (1854-55). In 1856 he was appointed Bussey professor of law in the Harvard Law School and served until 1876. He died in 1877. He published a number of pamphlets and lectures and the following legal treatises: *American Law of Real Property* (Boston, 1860); *American Law of Easements and Servitudes* (Boston, 1863); of which the first still remains the best exposition of American real estate law, and the second was one of the earliest treatises upon the subject of easements.

WASHBURN, George (1833—). An American Congregationalist clergyman, born at Middleboro, Mass., and educated at Amherst College and Andover Theological Seminary. In 1858 as a missionary under the American Board of Commissioners for Foreign Missions, he went to Turkey, where he labored until 1868. Then he became professor of philosophy and acting president from 1870 to 1877 of Robert College in Constantinople. In 1877 he became president, and because of his deep interest in Bulgarian independence received the order of Saint Alexander from the Prince of Bulgaria.

WASH'BURNE, Elihu Benjamin (1816-87). An American political leader and diplomat, born at Livermore, Maine. He attended the Kent's Hill Seminary in 1836; studied law in the Harvard Law School; and was admitted to practice in 1840. He soon afterwards settled in Galena, Ill. He was a delegate to the Whig national convention of 1844, and from 1853 until 1869 was a member of Congress. From 1855 until 1865 he was chairman of the Committee on Commerce, and he was also a member of the Joint Committee on Reconstruction. By his insistence on economy in the national service he gained the name of the 'Watch Dog of the Treasury.' Among the many bills he introduced was one for the establishment of national cemeteries. During and after the Civil War he was instrumental in advancing the fortunes of General Grant. When Grant became President, he made Washburne his Secretary of State, but Washburne soon resigned to become Minister to France. During the Franco-Prussian War he represented the German interests, and during the bloody days of the Commune was the only foreign representative who remained at his post. In 1877 he returned to the United States and settled at Chicago. He published *Recollections of a Minister to France, 1869-77* (2 vols., 1887), and edited *History of the English Settlement in Edwards County, Illinois* (1882), and *The Edwards Papers* (1884).

WASH-HOUSES, Public. In Great Britain and on the Continent, where public bath-houses, owned and operated by the municipality, have long been in existence, it is quite common to operate public laundries in connection with the bath-houses. (See Baths, Municipal.) Within recent years, however, there has been a tendency to separate these institutions and locate them in different buildings. In some of the English wash-houses a very important addition has been made in the form of a public crèche where women may leave their young children to be cared for while they are busy in the wash-house. The great use that is made of these European public wash-houses proves how important a public utility they are. Most of them are not self-supporting, and it has been pointed out that to make them so would probably thwart the primary object for which they are constructed—the betterment of the sanitary condition of the very poor. The first public wash-house in England was built in 1842 at Liverpool, in connection with a public bath-house. In the period 1890-95 the average annual number of washers was

16,268 and its maintenance involved an average annual loss of $832. The first public wash-house erected in Germany, having a public laundry, was built at Hamburg in 1855. Unlike the British wash-houses, it is said that most of the German wash-houses have proved self-supporting and sometimes yield a profit.

In America there are no municipally owned public laundries. In a few of the public bath-houses the bathers are supplied with conveniences for the cleansing of their wearing apparel. At the public bath-house in Rochester, N. Y., men and boys are allowed to wash their own clothes. This is also true at Buffalo, where the wash-room and drying-closets for underclothes were used by 1542 persons in 1897 and 3166 persons in 1899. In Philadelphia the Public Baths Association operates a public wash-house in connection with the bath-house. The laundry, which at first was reserved for men on certain days, is now open to women only.

WASHING MACHINES. See LAUNDRY MACHINERY.

WASHINGTON. A Western State of the United States, popularly called the 'Evergreen State.' It occupies the northwestern corner of the United States proper, lies between latitudes 45° 32′ and 49° N., longitudes 116° 57′ and 124° 48′ W., and is bounded on the north by British Columbia, on the east by Idaho, on the south by Oregon, and on the west by the Pacific Ocean. In the northwest a deep inlet formed by the Straits of Juan de Fuca and Georgia separates the State from Vancouver Island. The greater part of the southern boundary is formed by the Columbia River. The State is roughly of rectangular shape, with an extreme length from east to west of 360 miles, and an extreme breadth of 240 miles. The area is 69,180 square miles, including 2300 square miles of water. Washington ranks sixteenth in size among the States.

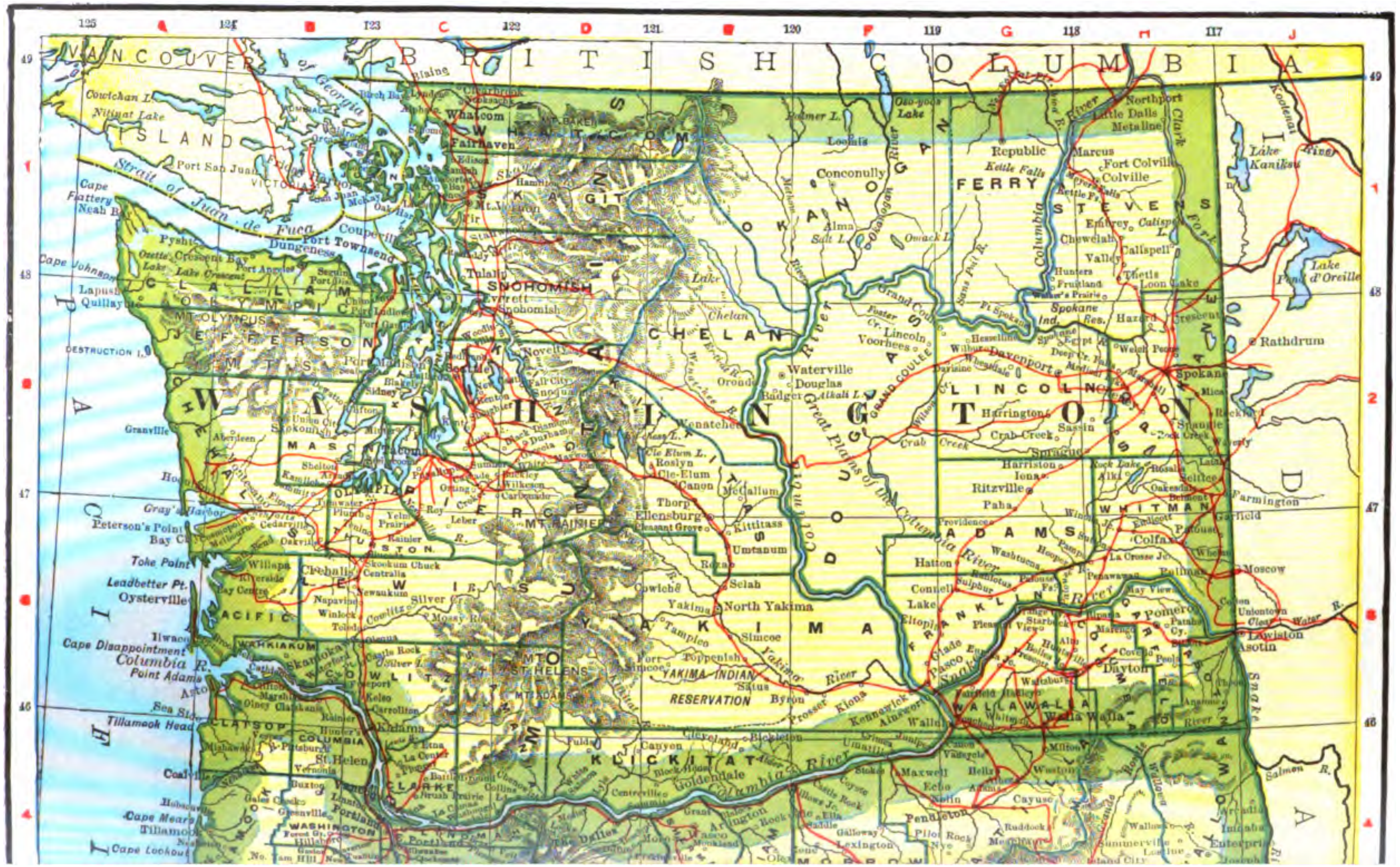
TOPOGRAPHY. Washington closely resembles Oregon in its main topographical features, and, as in Oregon, the Cascade Mountains divide the State into a smaller western and a larger eastern section, which are strongly contrasting in their climatic and other characteristics. The Cascade Mountains form a lofty plateau falling steeply on both sides, and eroded into a rugged complex of peaks and ridges nearly 100 miles wide. The main crest has an average altitude of about 5000 feet, but from the southern part of the plateau the three great volcanic cones of Mount Rainier (Mount Tacoma), which bears a number of glaciers, Mount Adams, and Mount Saint Helens rise, respectively, to altitudes of 14,526, 12,470, and 10,000 feet. In the northern part of the range the highest point is Mount Baker, with an altitude of 10,827 feet. From the eastern base of the Cascades and south of the Great Bend of the Columbia stretches the vast basaltic plateau, an undulating, treeless plain lying between 1000 and 2000 feet above the sea. Almost the only irregularities in its surface are the cañon-like valleys of the Columbia and its branches, and the *coulées*, more or less dry cañons, which indicate the former paths of the river. West of the Columbia, however, the lava field has been upturned in a series of monoclinal ridges running east and west as spurs of the Cascades, and south of the Snake River, in the southeastern corner of the State, there is another uplift, known as the Blue Mountains, exceeding 5000 feet in altitude. The northeastern quarter of the State, north of the Great Bend and the Spokane River, is rugged and mountainous, forming part of the Rocky Mountain system, and rising in some of its peaks to an altitude of over 6000 feet. The central feature of western Washington is the Puget Sound Basin, a longitudinal depression between the Cascade and Coast ranges corresponding to the Willamette Valley of Oregon. Its highest parts are scarcely over 100 feet above the sea, and it is penetrated through more than half its length by the numerous branching arms of Puget Sound, forming one of the most magnificent systems of harbors in the world. The Coast Range is not very pronounced in the south, consisting of broad irregular masses scarcely exceeding 2000 feet in altitude. In the north, however, it rises into a well-defined group called the Olympic Mountains, whose highest point is Mount Olympus, with a height of 8150 feet. The Pacific coast itself is straight and regular, practically the sole inlets being Grays and Willapa harbors.

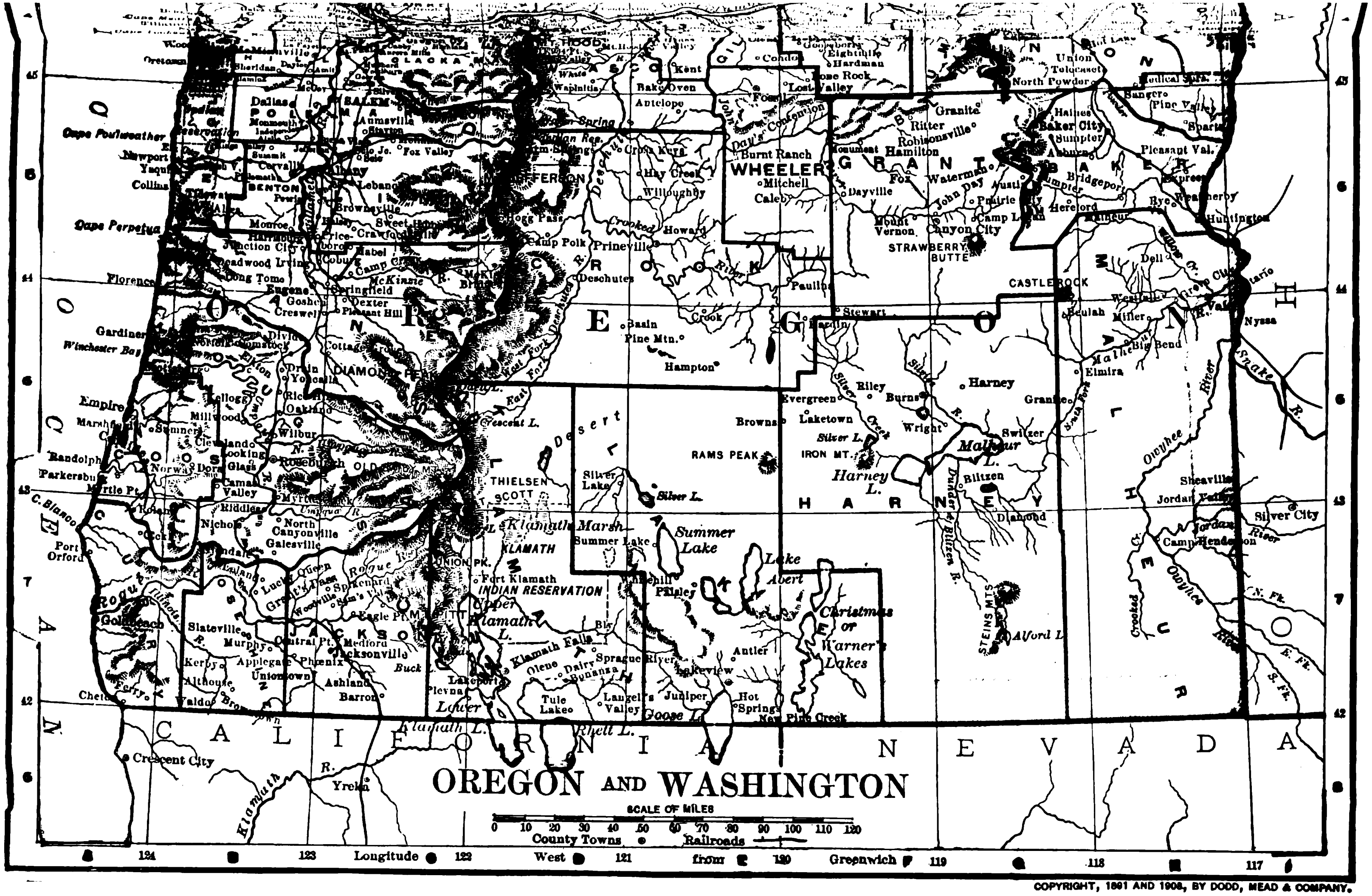
HYDROGRAPHY. The only large independent river in Washington is the Columbia, which drains the entire eastern section of the State. It enters the State near its northeastern corner and flows through the northern mountains and the lava plateau in a southwestward course with a large, winding bend. After turning finally westward it forms the southern boundary of the State until it enters the ocean. It would be navigable throughout its course within the State were it not interrupted at frequent intervals by rapids. Its principal tributaries within the limits of Washington are the Pend Oreille and the Spokane rivers in the northeast and the Snake River in the southeast. Its chief affluent from the east slope of the Cascades is the Yakima. Western Washington is drained by a large number of comparatively small streams flowing into Puget Sound and the ocean. The largest of those entering the sound are the Skagit in the north and the Nesqually in the south. Of the streams rising on the western slope of the Cascades only one, the Chehalis, breaks through the Coast Range and enters the ocean directly. There are a number of lakes in eastern Washington, but most of them are either expanded rivers, such as the long and narrow Lake Chelan, the largest in the State, or remnants of old river courses.

CLIMATE. There is a great contrast between the climates of western and eastern Washington, owing to the fact that the Cascade Range condenses the greater part of the moisture in the west winds and shuts out the tempering influence of the sea. In western Washington the climate is equable, with a mean temperature for January of 39° and for July of 62°, while the minimum is generally between 10° and 20° and the maximum about 95°. In eastern Washington the mean for January is 30° and for July 74°, while the extremes range between 112° and 30° below zero. Western Washington has a humid atmosphere with an annual rainfall ranging from 54 inches at Olympia to 132 inches at Clearwater, on the Pacific coast. In some years the rainfall on the coast may be even more than 150 inches, a quantity exceeded in few places on the globe. The average normal rainfall for the whole of eastern Washington is 16 inches, and except on

AREA AND POPULATION OF OREGON BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Baker	H 5	Baker City	2,275	6,764	15,597
Benton	B 5	Corvallis	677	8,650	6,706
Clackamas	C 4	Oregon City	1,861	15,233	19,658
Clatsop	B 4	Astoria	820	10,016	12,765
Columbia	B 4	St. Helen	677	5,191	6,237
Coos	A 6	Coquille	1,578	8,874	10,324
Crook	D 5	Prineville	7,756	3,244	3,964
Curry	A 7	Goldbeach	1,454	1,709	1,868
Douglas	B 6	Roseburg	4,861	11,864	14,565
Gilliam	E 4	Condon	1,123	3,600	3,201
Grant	F 5	Canyon City	4,560	5,080	5,948
Harney	F 6	Burns	9,986	2,559	2,598
Jackson	C 7	Jacksonville	2,721	11,455	13,698
Josephine	B 7	Grants Pass	1,684	4,878	7,517
Klamath	D 6	Klamath Falls	5,854	2,444	3,970
Lake	F 7	Lakeview	7,884	2,604	2,847
Lane	B 6	Eugene	4,380	15,198	19,604
Lincoln	B 5	Toledo	1,008	......	3,575
Linn	C 5	Albany	2,311	16,265	18,603
Malheur	H 6	Vale	9,784	2,601	4,203
Marion	C 5	Salem	1,170	22,934	27,713
Morrow	F 4	Heppner	2,021	4,205	4,151
Multnomah	C 4	Portland	429	74,884	103,167
Polk	B 4	Dallas	701	7,858	9,923
Sherman	E 4	Moro	786	1,792	3,477
Tillamook	B 4	Tillamook	1,119	2,932	4,471
Umatilla	G 4	Pendleton	3,116	13,381	18,049
Union	G 4	Union	3,146	12,044	16,070
Wallowa	H 4	Enterprise	2,784	3,661	5,538
Wasco	D 4	The Dalles	2,962	9,183	13,199
Washington	B 4	Hillsboro	715	11,972	14,467
Wheeler	E 5	Fossil	1,746	......	2,443
Yamhill	B 4	McMinnville	711	10,692	13,420


BRITISH COLUMBIA
VANCOUVER ISLAND
Strait of Georgia
Strait of Juan de Fuca
PACIFIC
WASHINGTON
IDAHO
WHATCOM
OKANOGAN
FERRY
STEVENS
SKAGIT
SNOHOMISH
CLALLAM
JEFFERSON
CHELAN
DOUGLAS
LINCOLN
SPOKANE
MASON
KING
KITTITAS
ADAMS
WHITMAN
LEWIS
PIERCE
THURSTON
CHEHALIS
PACIFIC
WAHKIAKUM
COWLITZ
SKAMANIA
YAKIMA
FRANKLIN
COLUMBIA
GARFIELD
ASOTIN
WALLA WALLA
KLICKITAT
CLARKE
YAKIMA INDIAN RESERVATION
Great Plains of the Columbia
GRAND COULEE
Columbia River
Snake River
Yakima River
MT. BAKER
MT. RAINIER
MT. ST. HELENS
MT. ADAMS
MT. OLYMPUS
OLYMPIA
Seattle
Tacoma
Spokane
Walla Walla
North Yakima
Ellensburg
Port Townsend
Whatcom
Fairhaven
Everett
Vancouver
Portland
Astoria
Victoria
Cape Flattery
Cape Disappointment
Tillamook Head
Cape Lookout
Lake Pend d'Oreille
Rathdrum
Moscow
Lewiston
Pendleton
125
124
123
122
121
120
119
118
117
49
48
47
46
A
B
C
D
E
F
G
H
J
1
2
3
4



OREGON AND WASHINGTON

COPYRIGHT, 1891 AND 1903, BY DODD, MEAD & COMPANY.

AREA AND POPULATION OF WASHINGTON BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Adams	G 3	Ritzville	1,696	2,098	4,840
Asotin	H 3	Asotin	631	1,580	3,366
Chehalis	A 2	Montesano	1,968	9,249	15,124
Chelan.	E 2	Wenatchee.	3,070	....	3,931
Clallam	A 1	Port Angeles	1,807	2,771	5,603
Clarke.	C 4	Vancouver	646	11,709	13,419
Columbia	H 3	Dayton	876	6,709	7,128
Cowlitz	B 3	Kalama	1,145	5,917	7,877
Douglas	F 3	Waterville	4,768	3,161	4,926
Ferry	G 1	Republic	2,318	....	4,562
Franklin	G 3	Pasco	1,251	696	486
Garfield	H 3	Pomeroy	725	3,897	3,918
Island	C 1	Coupeville	238	1,787	1,870
Jefferson	A 2	Port Townsend	1,765	8,368	5,712
King	D 2	Seattle	2,051	63,989	110,053
Kitsap	C 2	Port Orchard.	407	4,624	6,767
Kittitas	E 2	Ellensburg	2,414	8.777	9,704
Klickitat	E 4	Goldendale	2,079	5.167	6,407
Lewis	B 3	Chehalis	2,836	11,499	15,157
Lincoln	G 2	Davenport	2,299	9,312	11,969
Mason	B 2	Shelton	993	2,826	3,810
Okanogan	E 1	Conconully	5,318	1,467	4,689
Pacific	B 3	Southbend	925	4,358	5,983
Pierce	C 2	Tacoma	1,554	50,940	55,515
San Juan	B 1	Friday Harbour	187	2,072	2,928
Skagit	C 1	Mount Vernon.	1,874	8,747	14,272
Skamania	C 1	Stevenson	1,743	774	1,688
Snohomish	C 1	Everett	1,651	8,514	23,950
Spokane	H 2	Spokane	1,777	37,487	57,542
Stevens	G 1	Colville	3,945	4,341	10,543
Thurston	B 3	Olympia	763	9,675	9,927
Wahkiakum	B 3	Cathlamet	273	2,526	2,819
Wallawalla	G	Wallawalla	1,277	12,224	18,680
Whatcom	D	New Whatcom	2,226	18,591	24,116
Whitman	H 2	Colfax	2,105	19,109	25,360
Yakima	D 3	North Yakima	5.784	4,429	13,462

the higher slopes in the north and southeast, it is insufficient to support agriculture without irrigation. In the south central part of the State the average is less than 10 inches. Another circumstance unfavorable to agriculture in the eastern section is the fact that throughout the State by far the greater amount of precipitation occurs during the winter months. Thus at Clearwater the normal precipitation for January is 20 inches, while in July it is only one inch. The snowfall is heavy on the western mountains, but in eastern Washington it is light, and the warm chinooks often evaporate it completely without wetting the ground. Blizzards and tornadoes are unknown, but thunderstorms occur at long intervals.

Soil and Vegetation. The soils are fertile in most parts of the State. The Puget Sound Basin is covered with a rich alluvium resting on a subsoil of glacial drift. On the southern mountain slopes and over the great plains of eastern Washington the soil is composed of decayed volcanic material, which possesses the elements of fertility in the highest degree, and, where it has accumulated to a sufficient depth, can be rendered highly productive by irrigation. Where not irrigated, however, the eastern lava plains are treeless and consist mainly of sage brush desert. The higher slopes of the north and east are covered with rich grasses, and on the eastern spurs and slopes of the Cascades there are open, park-like forests of pine. Western Washington, on the other hand, is covered with some of the most magnificent forests in the world. They consist mainly of gigantic coniferous trees such as the Douglas spruce, giant cedar, and Western hemlock, though the redwood and giant sequoia do not range as far north as this. The forests are rendered almost impenetrable by a profusion of undergrowth thriving in the rankest luxuriance in the moist atmosphere.

For **Fauna**, see the paragraph under **United States**.

Geology. The southern half of the Washington Cascades, and the whole of eastern Washington south of the Great Bend and the Spokane River, are covered by an immense sheet of basalt forming part of the great Oregon lava-flow, the most extensive volcanic outburst known on the globe. It is of geologically recent origin—Mount Rainier still gives evidences of volcanic activity—and over large areas it has been but little disturbed or eroded. The rivers, however, have cut deep cañons through it, which in the case of the Snake River penetrate into the underlying rocks, showing the lava field to be 1000 and 2000 feet in thickness. For about 100 miles around the confluence of the Snake and Columbia rivers the lava is overlaid by an irregular deposit of unconsolidated sand, clay, and volcanic dust dating from late Tertiary times and known as the John Day formation, having been laid down in the ancient Lake John Day. The northern half of the Cascades and the mountain country of northeastern Washington consist mainly of ancient crystalline rocks and Lower Paleozoic strata. In Western Washington Cretaceous and Tertiary deposits are the principal surface formations, though Carboniferous strata are upturned around the volcanic centre of Mount Olympus. The northern part of the State was covered by the Pleistocene ice-sheet, which left a heavy drift covering around Puget Sound, and is supposed to have formed the channels of the latter by its scouring action. It also dammed the Columbia River at the Great Bend, and forced it into a new and more southerly channel now indicated by the remarkable 'Grand Coulée.' When the ice retreated the river resumed its old channel.

Mining. Washington is the most important coal-mining State on the Pacific coast, and is the only one of those States which has coal of coking quality. The production of this mineral has increased steadily since 1894, the output in 1901 being 2,578,217 short tons. Almost the entire product was obtained from King, Kittitas, and Pierce counties. Gold and silver are mined in fluctuating quantities, the value of the output in 1900 being gold $580,500, and silver $206,640, commercial value. The gold is obtained almost wholly from quartz veins. Considerable quantities of limestone and some sandstone, granite, and marble are quarried.

Fisheries. As early as 1850 fish were shipped from Washington, and since that date the growth in the industry has been very rapid. The period between 1892 and 1902 showed an especially appreciable advancement, the value of the output in the former year being about $1,300,000, and in the latter about $6,700,000. The total amount invested in the industry in 1902 was $6,819,818, and there were between nine and ten thousand persons engaged in its pursuit. Salmon is the largest single product, the output in 1902 being valued at $3,889,185. The number of cases of salmon packed in 1866 was 4000, while in 1902 it was about 770,000. The canning and packing of fish ranks third among the industries of the State. Its growth during the period of 1890-1900 is indicated by the following table:

	Number of establishments	Number of wage-earners	Value of productions
1890......	7	316	$525,000
1900......	36	2,190	4,831,038

The establishment and rapid advance of this industry, bringing with it new methods of catching the fish, has greatly diminished the former plentiful supply. To remedy this condition, fish hatcheries have from time to time been established, until in 1900 there were fourteen in operation. The exportation of fish in comparison with its output is very small, being valued in the fiscal year of 1901 at $354,221, over two-thirds of which sum was represented by salmon.

Agriculture. In 1900, 8,499,297 acres, or 19.9 per cent. of the total area, were included in farms. The total acreage more than doubled in the decade 1890-1900 and the area of improved land, 3,465,960 acres, almost doubled in the same period. The recent enlargement of ranges by the incorporation of parts of the public domain has resulted in a continuous increase in the average size of farms since 1870, the average in 1900 being 256 acres. The agricultural area of Washington is greatly limited by the extensive mountainous and arid districts. In the western part the rainfall is very ample and the valley between the Cascade and Coast ranges is highly favored for cultivation. In central Washington the rainfall is insufficient for crops, but toward the eastern border it becomes heavier and extensive farming operations are carried on without the aid of irrigation. The depth of the channels of the large streams prevents the use of their abundant waters for irrigation. The principal region in which irrigation is possible is the Yakima River valley. The greater part of the irrigated area of the State is watered from the Yakima and its tributaries. The total crop area irrigated in 1900 was 117,798 acres. Alfalfa, clover, and other grasses and vegetables and fruit are the chief crops irrigated. Over half of the total crop area of the State is in wheat. Wheat production is greatest in eastern Washington, Walla Walla and Spokane being in the regions of heaviest production. The crop is grown almost wholly without irrigation. The soil is exceedingly fertile and a very high per acreage yield is obtained from wheat, as also from other crops. Barley and oats are the only other cereals of importance. The region is not adapted for corn. Hay and forage rank second in area and value. Potatoes are a favorite crop, and sugar-beet culture has developed in Spokane County. In Yakima, Pierce, and some other counties hops are a valuable crop. The most remarkable agricultural development between 1890 and 1900 was in fruit culture. The number of apple trees in 1900 (2,735,824) was nearly 9 times as great as in 1890 and the number of plum and prune trees (1,290,845) was more than 15 times as great. The southeastern counties lead in fruit-raising. The alluvium soil at the mouths of the tributary streams to the Walla Walla are peculiarly adapted to the cultivation of orchard fruits. The following table shows the acreage of the leading crops in the census years indicated:

CROPS	1900	1890
Wheat	1,088,102	372,658
Barley	122,298	51,551
Oats	126,841	65,089
Corn	10,483	9,583
Hay and forage	497,139	....
Hops	5,296	5,113
Potatoes	25,119	....
Sugar beets	1,863	....

STOCK-RAISING. Extensive areas too arid for cultivation afford pasturing facilities. All kinds of domestic animals are rapidly increasing in numbers. The number of sheep increased 110.4 per cent. between 1890 and 1900 and all other varieties increased over 50 per cent. The following table shows the number of domestic animals on farms and ranges:

ANIMALS	1900	1890
Dairy cows	107,232	70,721
Other cattle	287,691	184,413
Horses	243,985	153,770
Mules and asses	2,856	1,345
Sheep	558,022	265,267
Swine	181,535	90,274

FORESTS AND FOREST PRODUCTS. Forests of yellow pine, interspersed with tamarack and Western white pine, are common east of the Cascades and north of the Columbia River. Light forests of yellow pine also cover the eastern part of the State south of Spokane. East of the Cascades dense heavy forests of red fir prevail except near the coast, where its place is taken by the hemlock, cedar, and Sitka spruce. The total wooded area is estimated at 47,700 square miles, or 71 per cent. of the State's area. This includes large areas that have been burned or cut over, and 9500 square miles of forest reserved in the mountainous country and 324 square miles of the Mount Rainier National Park. The red fir constitutes over one-half of the stock of mercantile timber, estimated in feet. This and the cedar have been cut most extensively, the red fir being manufactured into lumber and the cedar into shingles. Puget Sound makes a large part of the timber land accessible to water transportation, in consequence of which the lumber industry has been much more extensive than in Oregon or California. The industry has developed almost wholly since 1880. (See table under *Manufactures.*) In 1900 the State ranked fifth among the lumber States. Wholesale methods of lumbering are followed. Donkey engines and wire cables are in common use in the lumber camps, and logging railways are often built for the transportation of logs.

MANUFACTURES. Manufacturing has developed almost wholly since 1885, in which year railroad connection was made with the older parts of the country. A new impetus was given to the industry through the discoveries of gold in Alaska in 1897. The rapidity of development is shown by the fact that while the value of manufactured products was only $3,250,134 in 1880, it was $86,795,051 in 1900. The number of people engaged in the industry increased meanwhile from 1147 to 38,806, the latter being 6.6 per cent. of the population for that year. By far the most important branch of industry is the sawing of lumber. (See above.) Next in importance is the manufacture of flour and grist mill products. An Oriental market is developing for the products of this industry. The canning and preserving of fish has developed almost wholly since 1890. (See FISHERIES.) The slaughtering and meat-packing industry is of equal importance with the foregoing. Seattle is the largest and most rapidly developing manufacturing centre, followed at a distance by Tacoma and Spokane. Statistics for the industries mentioned and for a number of less important ones are given in the table on page 527.

TRANSPORTATION AND COMMERCE. Washington possesses the best commercial facilities of any of the Pacific States. The principal outlet to the sea is Puget Sound, which, by reason of its position and the numerous bays and inlets with which its shores are indented, is especially well adapted to commercial purposes. The Puget Sound customs district, through its port of entry, Port Townsend (q.v.), controls the greater part of the trade with Alaska and the Orient. The total value of its foreign commerce in 1902 was $47,478,000, including exports to the amount of $34,726,000. Grays Harbor and Willapa Harbor are other important outlets. Water communication with the interior is afforded by the Columbia and Snake rivers and their branches. The Columbia, the most important stream, is navigable for large steamers as far as Vancouver, and for smaller vessels throughout the greater part of its course. In 1893 the total railway mileage was 2619, and in 1900, 2914. The principal lines are the Northern Pacific and the Great Northern. They both traverse the State from east to west as far as Seattle, where the

INDUSTRIES	Year	Number of establishments	Average number wage-earners	Value of products, including custom work and repairing
Total for selected industries for State	1900	1,391	23,080	$52,769,825
	1890	755	12,836	27,354,282
Increase, 1890 to 1900		636	10,244	$25,415,543
Per cent. of increase		84.2	79.8	92.9
Per cent. of total of all industries in State	1900	38.3	68.3	60.8
	1890	48.9	68.7	65.5
Cars and general shop construction and repairs by steam railroad companies	1900	16	956	$1,479,680
	1890	4	342	461,561
Cheese, butter, and condensed milk, factory product	1900	60	146	1,190,239
	1890	3	3	33,100
Fish, canning and preserving	1900	36	2,190	4,831,088
	1890	7	316	525,000
Flouring and grist mill products	1900	85	488	6,875,672
	1890	38	170	2,460,809
Foundry and machine shop products	1900	80	1,075	2,257,643
	1890	27	515	1,347,700
Liquors, malt	1900	25	211	1,230,525
	1890	13	209	1,178,306
Lumber and timber products	1900	778	15,696	30,286,280
	1890	462	9,491	17,450,301
Lumber, planing mill products, including sash, doors and blinds	1900	29	647	1,257,369
	1890	39	839	2,030,279
Printing and publishing—total	1900	246	930	1,855,730
	1890	145	780	1,678,541
Printing and publishing, book and job	1900	58	304	534,686
	1890	20	118	278,477
Printing and publishing, newspapers and periodicals	1900	188	626	1,321,044
	1890	125	662	1,400,064
Ship and boat building, wooden	1900	36	741	1,505,649
	1890	17	171	188,685

Northern Pacific turns south, extending to Portland, Oregon, and the Great Northern turns north to the Canadian border. The Canadian Pacific operates trains over the Seattle and International Railway, and thus brings the commercial centres of the State into touch with a third continental system.

Banks. As Washington was admitted to Statehood long after the national banking system was introduced, the national banks are the older and the stronger institutions. The banking provisions of the Constitution are very incomplete. Yearly reports to the State Auditor are required, but there is no punishment for failure to comply with the rule. The banks are sound and there were no failures even during the panic of 1893. The number of State banks is rapidly increasing; in 1899 there were 28 banks and in 1902 40.

The following table shows the financial condition of the various banks in 1902:

	National banks	State banks
Number	34	40
Capital	$3,430,000	$1,470,000
Surplus	947,000	29,000
Cash, etc	3,089,000	1,623,000
Deposits	30,967,000	13,232,000
Loans	18,802,000	7,170,000

Government. The first Constitution, adopted by a vote of the people in 1889, is still in operation. An amendment may be proposed in either branch of the Legislature and must receive the approval of two-thirds of the members elected to each House, followed by the approval of a majority of the electors voting at a popular election. In like manner a constitutional convention may be called, but the Constitution drawn up cannot be valid until adopted by the people. The rights of suffrage are limited to male citizens 21 or more years of age, who have resided in the State one year, the county 90 days, and the town, ward, or precinct 30 days, and who are of sane mind and have not been convicted of infamous crime. The Legislature may, however, give women the right to vote at school elections.

Executive. The Governor, Lieutenant-Governor, Secretary of State, Treasurer, Auditor, Attorney-General, Superintendent of Public Instruction, and a Commissioner of Public Lands are elected on the Tuesday after the first Monday in November every four years. The Governor may call extra sessions of the Legislature, and exercises, under regulation, the pardoning power. A two-thirds vote of the members present in each House may overcome the Governor's veto, whether of an entire bill or any part thereof.

Legislative. The minimum and maximum limits to the number of representatives are respectively 63 and 99, and the number of Senators cannot be more than one-half nor less than one-third of the number of Representatives. The former are elected for two years, the latter for four years. Regular sessions are held biennially and are limited in length to 60 days, the time of meeting being subject to the control of the Legislature. Any bill may originate in either House, but cannot contain more than one subject. Unless approved by a two-thirds vote of all the members elected to each House, a bill cannot be considered in either House unless the time of its introduction shall have been at least ten days before the final adjournment of the Legislature. Members receive $5 per day and mileage.

Judiciary. The Supreme Court consists of five judges, who are elected for six years. The number of judges, however, may be increased by the Legislature. In each organized county at least one Superior Court judge is elected for a term of four years.

Local Government. The Legislature maintains a uniform system of county government, in which no county officer is eligible to hold office more than two terms in succession. Municipal corporations can be treated only by general laws.

Washington has three representatives in the National House of Representatives. The capital is Olympia.

Finances. At the time of its admission to Statehood Washington assumed the Territorial debt, consisting of $153,669, which existed in the form of unpaid and interest-bearing warrants. This debt was bonded in 1900. The Constitution prohibits the creation of a funded debt over $400,000; but the insufficiency of taxable property made payments of money expenses impossible, and both the bonded and floating debt gradually grew. In 1900 the bonded debt amounted to $820,000, and there were outstanding debts to the amount of $721,000. Since then most of the latter has been converted into bonds. Most of the bonds are held by the permanent school fund, and, while the total nominal debt on September 30, 1902, amounted to $1,344,739, only $179,739 was due to private people. Against this debt the State had a balance in the treasury of $912,073, divided among 23 funds. The main sources of revenue are a general property tax and the sale of public lands. The total receipts for the two years ending September 30, 1902, were $7,149,381, and disbursements $6,663,308.

Militia. The population of the State of militia age in 1900 was 149,586. The organized militia in 1901 numbered 958 men.

Population. The following figures show the growth of the population by decades: 1860, 11,594; 1870, 23,955; 1880, 75,116; 1890, 349,390; 1900, 518,103. The State ranks 33d in the Union and second on the Pacific Coast. The males are largely in excess of the females, the former having numbered, in 1900, 304,178, and the latter 213,925. As in other Western States, there is a large foreign-born element, which in 1900 numbered 111,364, distributed among various nationalities, with English-speaking Canadians in the lead. The negroes in 1900 numbered 2514, Japanese 6617, Chinese 3629, and Indians 10,039. In 1900 there were 7.7 inhabitants to the square mile. The population is confined mainly to the Puget Sound region and the southeastern part of the State. There is a rather large urban population, the aggregate number of those in towns of over 4000 inhabitants in 1900 amounting to 36.4 per cent. of the total population. Seattle and Spokane almost doubled their population between 1890 and 1900, the former having in 1900 80,671 and the latter 36,848 inhabitants. In the same year the population of Tacoma was 37,714; Walla Walla, 10,049; Everett, 7838; New Whatcom, 6834.

Religion. The leading denominations in point of numbers are the Roman Catholics, Methodists, Disciples of Christ, Presbyterians, Baptists, and Congregationalists.

Education. The public school system is under the control of a State Superintendent of Public Instruction, elected for four years, and a Board of Education, appointed by the Governor with the consent of the Senate. All school districts of the State must maintain school for at least three months during the year, and all graded schools in incorporated cities and towns must be in session for at least six months. The public school system is supported financially by the common school fund (derived from State and individual appropriations and donations, the proceeds from public lands, etc.), and by a tax which must not exceed 5 mills on the dollar. In the census year 1900, out of a total of 158,245 children of school age, 100,731, or about 63 per cent., were in attendance. Of the population over ten years of age, 3.1 per cent. were classed as illiterate. The school statistics for 1902 gave the number of children of school age as 167,902, and the number in actual attendance as 136,645, or 81 per cent., which is a notable increase over the 1900 figures. The principal institutions of learning in the State are the University of Washington (see Washington, University of), at Seattle; Gonzaga College, at Spokane; Whitman College, at Walla Walla; and the Washington Agricultural College and School of Science, at Pullman. There are also State normal schools at Cheney and Ellensburg.

Charitable and Penal Institutions. The charitable and penal institutions are in charge of a bi-partisan board of control. Their authority includes the management, government, and purchasing of supplies for the institutions. There are two State hospitals for the insane, one at Fort Steilasoom and the other at Medical Lake, with 766 and 380 inmates respectively on September 30, 1902. On the same date the Soldiers' Home at Orting contained 168 persons, the school for defective youth at Vancouver 153, the Reform School at Chehalis 151, and the penitentiary at Walla Walla 581. The total expenditure for these institutions for the year ending on the date mentioned was $316,681. A parole law was introduced into the penal system in 1899.

History. The Territory of Washington was set off from Oregon March 2, 1853. The southern boundary was the Columbia River to the 46th parallel near Walla Walla, and thence east to the Rocky Mountains, thus including Idaho and a part of Montana. (For early history, see Oregon.) At its organization the population was only 3965, of whom 1682 were voters. With the discovery of gold in eastern Washington, a great influx of population followed and the alarmed Indians determined to exterminate the whites. This led to the Washington-Oregon Indian war of 1855-56. Again in 1857 there were serious Indian troubles concurrent with the rush of population to the gold fields of British Columbia, but the greatest rush was after the discovery of gold at Salmon River in 1860. At the time of the boundary treaty between Great Britain and the United States in 1846 (see Oregon), the 49th degree was accepted as the boundary to the channel between Vancouver Island and the mainland, thence down that channel to the sea. In 1859 a dispute arose as to which channel was meant, as on this hinged the possession of the Haro Archipelago, of which San Juan is the largest island. A collision between British and American soldiers was narrowly averted. (See

Pickett, George E.) The question was finally settled in favor of the United States by the decision of the German Emperor, October 21, 1872. In 1885-86 a violent agitation arose against the Chinese. Mobs burned their houses, forced them to leave the towns, and in some cases resorted to murder. Martial law was declared in Seattle in 1886 and the Governor called for the aid of Federal troops. An attempt was made to secure Statehood in 1876, and in 1878 a constitution was adopted, but to no purpose. In 1881-83 another bill was introduced into Congress, but again failed. In 1889 (February 22d) the Omnibus Statehood Bill, admitting the two Dakotas, Montana, and Washington, was signed by the President. A constitutional convention met July 4th, the Constitution formed was ratified October 1st, and State officers were elected at the same time. The State was admitted November 11th, and its progress since has been exceedingly rapid. The General Government has spent large sums for a navy yard and other governmental works at Port Orchard, near Seattle, and with the increasing importance of the interests of the United States in the Pacific, the State will gain because of its excellent harbors. In national politics the State voted for Republican electors in 1892, and for a fusion ticket of Democrats and Populists in 1896, but returned to the Republican column in 1900.

Governors of Washington

TERRITORIAL

Isaac I. Stevens		1853-57
C. H. Mason	Acting	1857
Fayette McMullen		1857-58
C. H. Mason	Acting	1858-59
Richard D. Gholson		1859-60
Henry M. McGill	Acting	1860-61
William H. Wallace		1861
L. J. S. Turner	Acting	1861-62
William Pickering		1862-66
George E. Cole		1866-67
E. L. Smith	Acting	1867
Marshall F. Moore		1867-69
Alvin Flanders		1869-70
Edward S. Salomon		1870-72
Elisha P. Ferry		1872-80
William A. Newell		1880-84
Watson C. Squire		1884-87
Eugene Semple		1887-89
Miles C. Moore		1889

STATE

Elisha P. Ferry	Republican	1889-93
John H. McGraw	"	1893-97
J. R. Rogers	Democrat-Populist	1897-1901
Henry G. McBride	Acting	1901—

Bibliography. Squire, *Resources and Development of the Territory of Washington* (Portland, 1889); Bancroft, *History of Washington, Idaho, and Montana* (San Francisco, 1890); Evans, *History of the Pacific Northwest* (Portland, 1889); Hawthorne, *History of Washington* (New York, 1893).

WASHINGTON. The capital city of the United States; conterminous with the District of Columbia (q.v.), a territory of 60 square miles (excluding 9.25 square miles of water), under the exclusive jurisdiction of Congress. It is situated on the northeastern shore of the Potomac River, about 100 miles from its mouth, and 40 miles by rail southwest of Baltimore, 228 miles from New York, 3118 from San Francisco, and 1110 from New Orleans; latitude (Capitol) 38° 53′ N., longitude 77° W. (Map: District of Columbia, C 7).

Description. The situation of the city is noted for its picturesque beauty. The Potomac stretches out nearly a mile in width along its border, having here finally reached tide-water and the head of navigation. Rock Creek and the Anacostia or Eastern Branch here enter the river, which is spanned by three bridges. Along the Potomac the land is low, but it gradually rises, reaching an elevation of 100 feet, and much more in the suburban portion of the city. A circle of hills forms the edge of a plateau which has in some parts an elevation of 300 to 400 feet. Formerly the section of the District bounded approximately by Rock Creek, the Potomac River, the Eastern Branch, and Florida Avenue was the city of Washington, but now there are no civil distinctions throughout the entire District. Georgetown, built partly on the heights of the Potomac River, west of Rock Creek, was a municipality before the site of the Federal City was selected, and is sometimes designated as West Washington. Anacostia, Brightwood, and other names given to the settlements in the District away from the main centre of population are still in use, but have no civil significance. The steam railroads enter the city from three different points and centre in two depots, one north and the other west of the Capitol building. In the year 1903 Congress authorized the building of a union station, which is to cost $4,000,000. Underground electricity is exclusively used as the motive power in all street railroads within the former municipal limits, and the overhead trolley outside those limits. The facilities of cheap and rapid transit communication with the outlying territory are abundant, some of the lines extending as far as twenty miles from the main portion of the city.

The plan of the city, which was made in 1791 by Pierre Charles L'Enfant, a French engineer who served in the Revolutionary War, was approved by General Washington, and is generally conceded to be the most complete as well as the most artistic city system ever carried out. As far as the topography of the country outside of the former urban limits and the existing improvements made it possible, this plan has been applied to the entire District. Within the old city limits the alphabetical streets run east and west and the numbered streets north and south, the whole being intersected by twenty-one avenues named from different States in the Union. The avenues converge at centres such as the Capitol and the President's house, so that these broad thoroughfares aid materially in giving that variety which is the unique feature of the city's plan.

The streets on the whole are the widest of any city in the world, as they range from 80 to 160 feet. They are paved with asphalt almost exclusively, and the sidewalks are commonly of cement. More than 84,000 trees line the streets. Massachusetts Avenue is adorned with a quadruple row its entire length of four miles and a half. The broad transverse avenues form at the intersections with the rectangular streets squares and circles and reservations which number 302 and comprise 407 acres. The most important of these reservations is the series beginning with the Capitol grounds, extending westward through the Mall (including the Botanical Gardens) to the Washington Monument grounds, and thence northward to the grounds of the President's house, including also Lafayette Park, opposite the President's house. The Mall, as the park extending from the Capitol to the Potomac is known, is adorned with fine trees. Numerous drives and walks furnish the opportunity of enjoying the unusual experience of rural surroundings in the heart of a great city, since Pennsylvania Avenue, the broad thoroughfare extending from the Capitol grounds to the vicinity of the President's house, lies a square or two north of this park of 230 acres.

The number and general distribution of the parks and the profusion of trees give to the city, when seen from an elevation, the appearance of a great park with buildings showing through the masses of foliage, or thrusting their tall forms of brick and stone above it. The tendency toward centralization in modern business has led to the erection of a number of lofty buildings for commercial purposes. The building regulations restrict buildings on residential streets to a maximum height of 80 feet, and in business sections to 110-130 feet, according to the width of the thoroughfare on which they front.

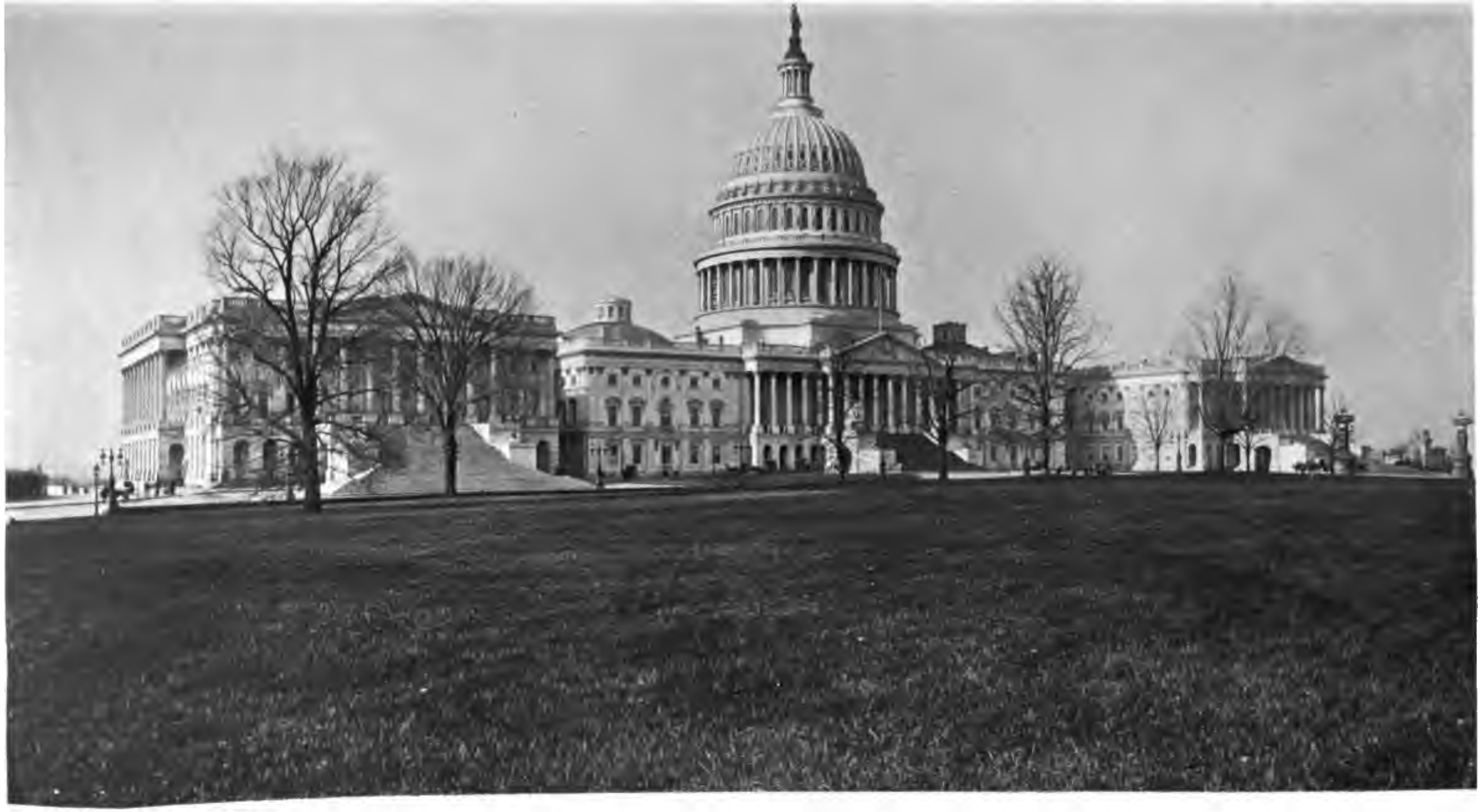
The principal business thoroughfares are F Street West, Seventh Street West, and Pennsylvania Avenue. There is a great diversity in the character of the domestic architecture, a circumstance which not only adds to the attractiveness of the city, but serves to give it individuality. Some of the fine residence streets are K Street North, Sixteenth Street West, Massachusetts Avenue, and Connecticut Avenue. The tendency in the growth of the city is toward the northwest.

BUILDINGS. A conspicuous object is the great dome of the Capitol, 288 feet high, the central feature of a structure which stretches along the brow of a hill for 751 feet. Its width is 350 feet. The main structure is of sandstone painted white, while the two wings occupied by the Senate and the House of Representatives are built of white marble. As a whole the building, with its porticoes and lobby dome (of iron), ranks as one of the most impressive and beautiful examples of architecture in the world. In general, the style is classic, with Corinthian details. Beneath the dome is the Rotunda, 96 feet in diameter and 180 feet high, adorned with historical paintings. What is now known as Statuary Hall was formerly the chamber of the House of Representatives, and the court room of the Supreme Court was once the Senate chamber. Since 1897, when the building for the Library of Congress, just east of the Capitol, was completed at a cost of over $6,000,000, the books of the great national collection have been housed in the new structure, instead of in the inadequate quarters in the west front of the middle section of the Capitol building. The Library building is an elaborate specimen of Italian Renaissance, and its ornamentation both inside and outside is more profuse than in any other structure which has been erected at public expense. A tunnel connects the Library and Capitol buildings. See LIBRARY OF CONGRESS, with Plate.

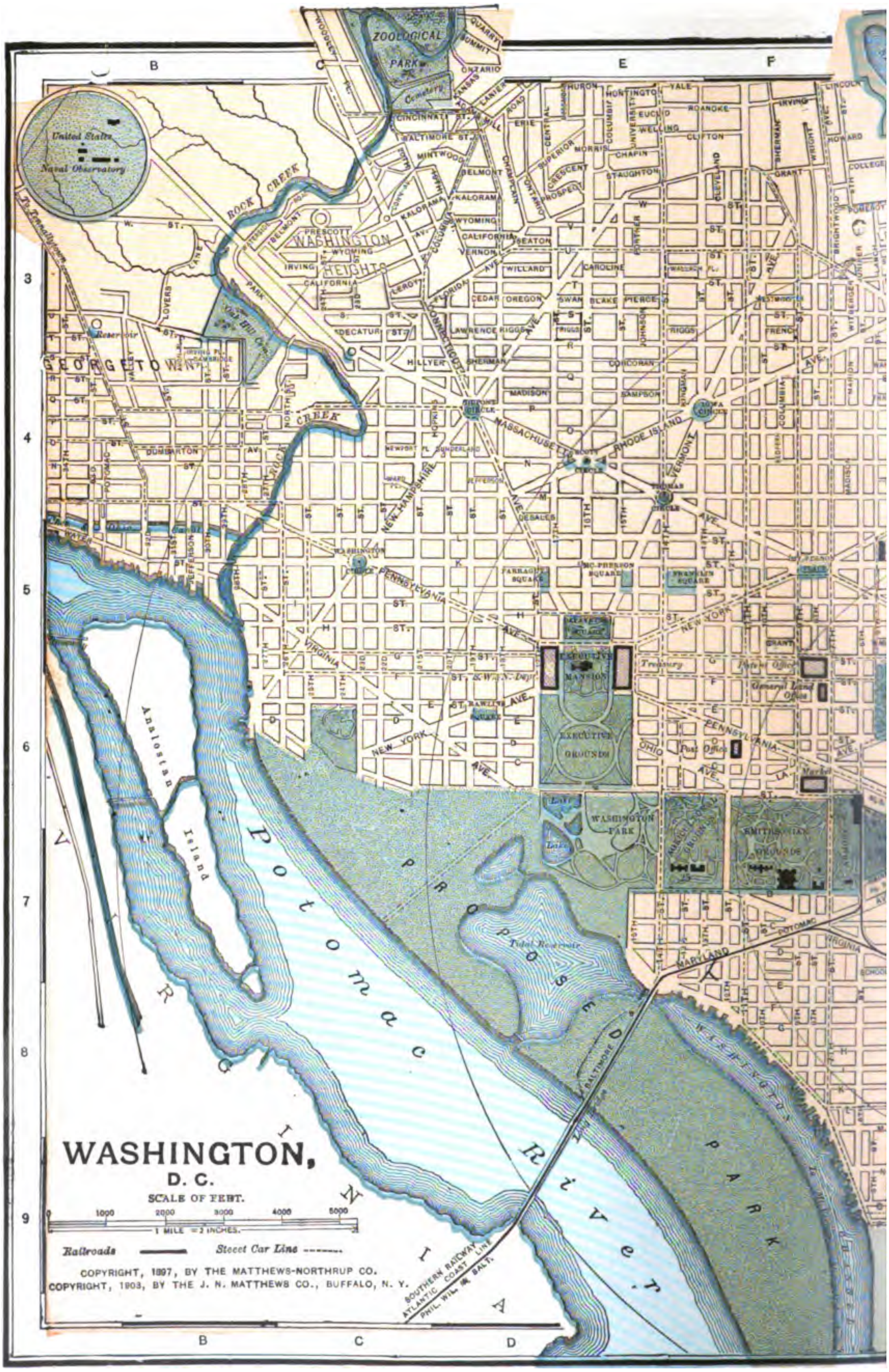
About a mile and a half northwest of the Capitol is the President's house, or White House (q.v.). Owing to the unfortunate location of the granite structure occupied by the Treasury Department, the view from the Capitol down the broad expanse of Pennsylvania Avenue is interrupted by the southern portico of the Treasury building, instead of ending with the White House and its garden. Flanking the White House on the east is the Treasury Department building, with its vast colonnade, and on the left, the massive granite structure occupied by the State, War, and Navy departments. About midway between the White House and the Capitol are two marble buildings situated on opposite sides of F Street. One of these, an imposing specimen of the Doric, is the home of the Interior Department. The Patent Office is here, and in the building across the street are the Indian and Land offices. Still farther to the east along F street is a great structure of brick, where the clerks of the Pension Office do their work. The building consists of a tier of offices, three stories high, surrounding a court protected by a roof of glass and iron. A feature of the exterior is the terra cotta frieze, depicting scenes from army life during the Civil War.

The only type of modern 'skyscraper' building for office purposes erected by the Government, in Washington is the nine-story granite structure occupying an entire square on Pennsylvania Avenue, between Eleventh and Twelfth streets. It is the home of the Post Office Department, with offices on the first floor for the city post office. Directly north of the Capitol is another lofty structure which forms a part of the plant of the Government Printing Office, the largest concern of its kind in the world. Another great workshop of the Government is the ordnance factory, which occupies the old Navy Yard site to the southeast of the Capitol. The great guns are forged elsewhere, but in this shop, which employs hundreds of men, they are finished. Another workshop of interest is that in which the paper money and the postage stamps of the Government are made. This is known as the Bureau of Engraving and Printing, and is situated in a large brick structure on the south side of the Mall and at the west end of the line of structures occupied by Government institutions. Its neighbor on the east is the building of the Agricultural Department. Plans were being prepared in 1903 for a building of marble to cost $3,500,000, to take the place of the present structure, which is of brick. Farther to the east rise the Norman towers of the Smithsonian Institution, and near by is the low-lying but extensive building occupied by the National Museum. Even with the large floor space provided, there is not sufficient room, and Congress has authorized the expenditure of more than $3,000,000 in the construction of a building on the south side of the Smithsonian grounds west of Seventh Street. Not far from the National Museum is the Army Medical Museum of the Surgeon-General's Office, U. S. A., which has come to have a wide reputation as the home of the largest medical library in the world. Still farther to the east is the home of the United States Fish Commission.

As the dome of the Capitol building closes in the vista of the Mall to the east, so at the extreme west rises the impressive marble obelisk erected to the memory of the first President of the United States. It was begun in 1848 and completed in 1884. (See WASHINGTON MONU-



WASHINGTON
THE CAPITOL



WASHINGTON, D. C.

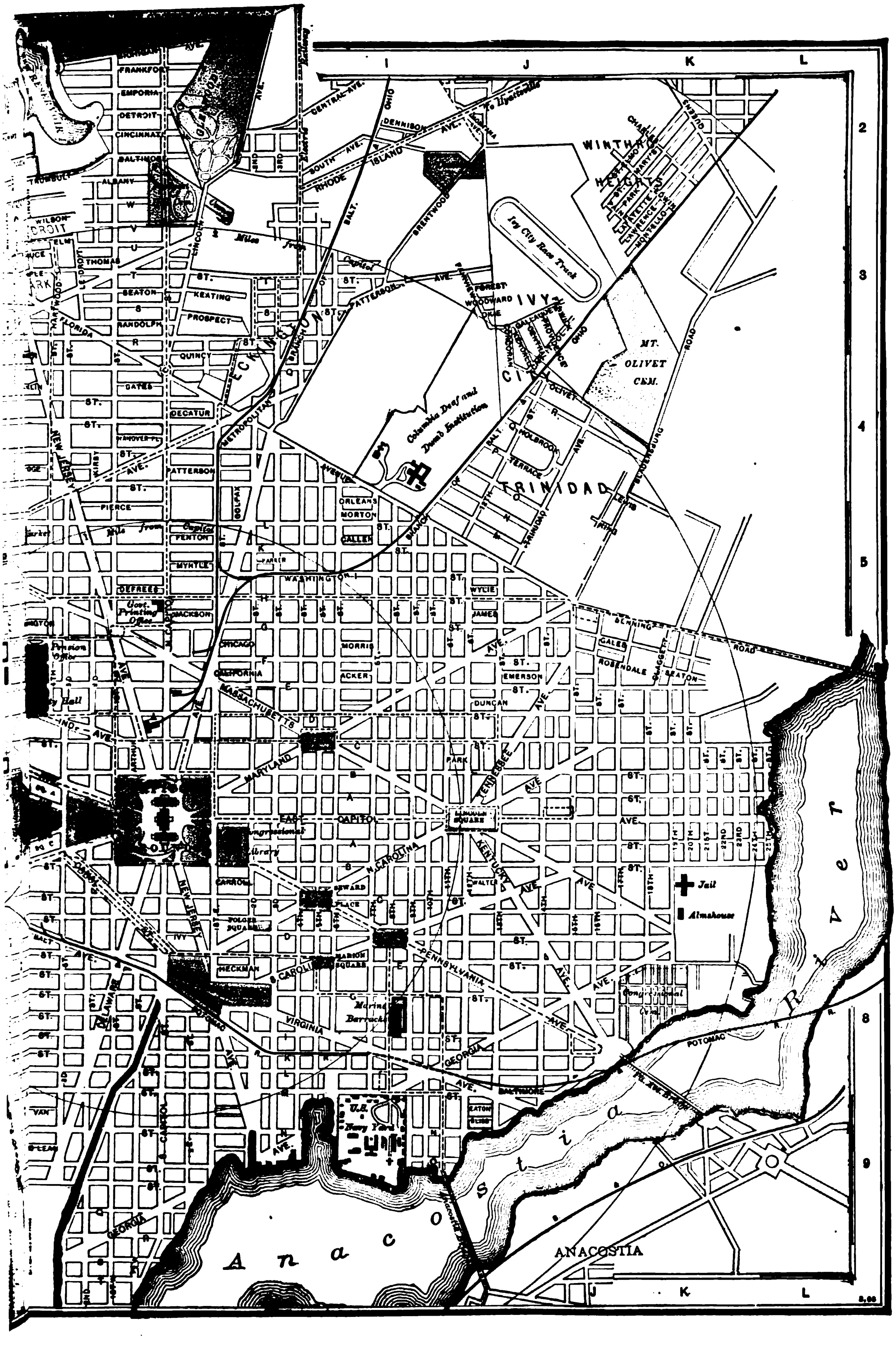
SCALE OF FEET.

0 1000 2000 3000 4000 5000

1 MILE = 2 INCHES.

Railroads ——— *Street Car Line* -------

COPYRIGHT, 1897, BY THE MATTHEWS-NORTHRUP CO.
COPYRIGHT, 1903, BY THE J. N. MATTHEWS CO., BUFFALO, N. Y.


I
J
K
L
2
3
4
5
8
9
Ivy City Race Track
WINTHROP HEIGHTS
IVY CITY
MT. OLIVET CEM.
Columbia Deaf and Dumb Institution
TRINIDAD
ECKINGTON
Govt. Printing Office
Pension Office
City Hall
Congressional Library
LINCOLN SQUARE
FOLGER SQUARE
MARION SQUARE
Marine Barracks
U.S. Navy Yard
Jail
Almshouse
Congressional Cem.
ANACOSTIA
Anacostia
River
3 Miles from Capitol
2 Miles from Capitol
RHODE ISLAND AVE.
FLORIDA AVE.
NEW JERSEY AVE.
NEW YORK AVE.
MASSACHUSETTS AVE.
MARYLAND AVE.
EAST CAPITOL
N. CAROLINA AVE.
S. CAROLINA AVE.
PENNSYLVANIA AVE.
VIRGINIA AVE.
GEORGIA AVE.
KENTUCKY AVE.
TENNESSEE AVE.
DELAWARE AVE.
BENNING ROAD
BLADENSBURG ROAD
To Hyattsville
POTOMAC R. R.
BALTIMORE
Pa. Ave. Bridge
FRANKFORT
EMPORIA
DETROIT
CINCINNATI
BALTIMORE
ALBANY
THOMAS
SEATON
KEATING
PROSPECT
RANDOLPH
QUINCY
GATES
DECATUR
PATTERSON
PIERCE
FENTON
MYRTLE
DEFREES
JACKSON
CHICAGO
CALIFORNIA
ORLEANS
MORTON
GALLEN
WASHINGTON
WYLIE
JAMES
MORRIS
ACKER
EMERSON
DUNCAN
GALES
ROSENDALE
SEATON
CARROLL
SEWARD PLACE
WALTER
HECKMAN
IVY
DENNISON
SOUTH AVE.
CENTRAL AVE.
BRENTWOOD
WOODWARD
FOREST
HOLBROOK
TERRACE
OLIVET
METROPOLITAN
ANACOSTIA BRIDGE
3,00

MENT.) On the heights north of Georgetown and near the line of Massachusetts Avenue is an extended group of white marble buildings where the work of the Naval Observatory is carried on. Still to the north and east is the site selected for the buildings that are being erected for the use of the Bureau of Standards. To the east is the United States Soldiers' Home in a beautiful park of 502 acres. On the opposite side of the Potomac, on the Virginia shore, is Arlington (q.v.), with a famous national cemetery. Adjoining these ample grounds is the reservation of Fort Myer, a cavalry post of the United States Army. Overlooking the city from the north side of the Anacostia are the towers of the Government Hospital for the Insane. On the point of land separating the Anacostia and the Potomac rivers are the Washington Barracks, now an artillery post and designated as the site of the War College. Near the old Navy Yard are the barracks of the Marine Guard, where is also the home of the famous Marine Band.

PARKS. With the exception of the Mall, the plan of the city made no provision for extensive park space. There are, however, many open places scattered throughout the city, some of which are of sufficient size to warrant their being placed in the category of small parks. Their combined area is 617 acres. While this system of little parks is to remain a feature of the urban plan as applied to the territory beyond the original city limits, yet large areas have been and are to be reserved. The latest addition is Potomac Park, a domain of 739 acres, which has been reclaimed from the Potomac River. It is practically a continuation of the Mall and will afford water drives and other attractive features. The ponds used by the Fish Commission border this new reserve, and the water attractions are increased by a large tidal reservoir basin connected with the main channel of the Potomac. Another fine public reservation is the stretch of territory comprising the Zoölogical and Rock Creek parks, and containing 1775 acres. The land lies on either side of Rock Creek from Connecticut Avenue north to the District bounds, and is broken and picturesque. When the reclamation of the Anacostia Flats is completed another large addition will be made to the park area.

The statues throughout the city are numerous and, on the whole, meritorious. Many are effigies in bronze of distinguished soldiers and sailors. The latest addition is the statue of Rochambeau in Lafayette Park, which flanks the one erected on the east side of the same park in memory of Lafayette and his compatriots in the Revolutionary War. Abraham Lincoln is commemorated by a bronze group erected in Lincoln Park by the colored people. There are also memorials to those who have won distinction along paths other than military, as, for example, statues of Joseph Henry, Daniel Webster, Benjamin Franklin, Samuel D. Gross, Martin Luther, Samuel Hahnemann, John Marshall, and James A. Garfield.

EDUCATIONAL INSTITUTIONS. The public school system has the patronage of all classes of the community, and a smaller percentage of children attend private institutions than in the average city. The system includes all the approved modern features, from the technical high school to kindergarten, night schools, and vacation schools. In 1902 there were 48,432 pupils enrolled, and the number of teachers was 1323. The school buildings numbered 124. The higher educational institutions are the Columbian University (q.v.), the Catholic University of America (q.v.), Georgetown University (q.v.), Howard University (q.v.), the Carnegie Institution (q.v.), and the Columbian Institution for the Deaf and Dumb. Law, medical, and dental schools are maintained in connection with the Columbian, Georgetown, National, and Howard universities. There are also a law school under the auspices of the Catholic University, and the Washington College of Law, primarily for women. In addition to the National College of Pharmacy, there is a pharmaceutical school in connection with Howard University. There is also a college of veterinary surgery. The American University, established by the Methodists, has extensive grounds near the city and one building has been erected, but the university has not yet been opened. Near the Catholic University are several affiliated colleges established by various orders for the education of their members. These include Saint Thomas College (Congregation of Saint Paul), the Marist College, Holy Cross College, College of the Holy Land (Franciscans), Saint Austin's College (Society of Saint Sulpice), Trinity College for girls, and colleges conducted by the Dominicans and the Paulists. Housed in a splendid building on Seventeenth Street are the treasures of the Corcoran Gallery of Arts. An art school carried on in connection with the gallery has large classes in attendance.

LIBRARIES. Washington contains a greater number of collections of books than any other city of its size in the world. There are no less than thirty-four libraries owned by the Government, besides the Public Library and those in educational institutions and in private hands. The aggregate number of books and pamphlets in these libraries is estimated to be more than 2,000,000. The Library of Congress, with 1,100,000 books and pamphlets, is one of the great general collections of the world. The various scientific bureaus of the Government have valuable special collections. Among these may be mentioned the great medical library of the Surgeon-General's Office, and the collections belonging to the Geological Survey, the Patent Office, the Smithsonian Institution, the Agricultural Department, the Bureau of Labor, the Weather Bureau, the Bureau of Education, the Naval Observatory, and the War, State, and Navy Departments. The Public Library is a free circulating library. It occupies a spacious marble structure on Mount Vernon Square, given by Andrew Carnegie. The library is controlled by a board of trustees, appointed by the District Commissioners. The Bar Association has a valuable library in the Court House, and there are also collections of books in the various educational institutions.

CHARITABLE INSTITUTIONS. The city is well supplied with hospitals, some of the leading ones being: Garfield, Providence, Freedman, Homeopathic, Emergency, Columbia Hospital for Women, Government Hospital for the Insane, Children's Hospital, and Columbian University Hospital. There are many dispensaries, asylums, homes, reformation and relief societies. Social settlement methods are not lacking. Organized charitable work on an extensive scale is carried on by the Associated Charities, which is supplied in large part with funds raised by the Citizens' Relief Committee. An incorporated company is engaged in erecting sanitary homes for the poor.

THEATRES, CLUBS, AND HOTELS. Some of the leading theatres are the Columbia, the National, and the Lafayette. The principal clubs are the Metropolitan, Cosmos, and Army and Navy, which are all in commodious homes. There is perhaps no city in the world where the flood of visitors is so continuous as at the national capital. It is probably true that more conventions and annual gatherings are held in Washington than in any other place. The facilities for the comfort and care of the stranger are extensive and thoroughly modern. Among the prominent hotels are the New Willard, Arlington, Shoreham, Raleigh, Metropolitan, Ebbitt, Riggs, Gordon, Cochran, Hamilton, and Grafton.

MANUFACTURES. Washington is not a manufacturing city, but still a large sum of money is invested in manufacturing enterprises, and the value of the yearly output is considerable. The product is made up principally of articles for home consumption. In the census year 1900 the District had 2754 manufacturing establishments, with a total capital of $41,981,245. They employed 24,693 hands and paid in wages $14,643,714. The raw materials used were valued at $19,369,571. The product was valued at $47,667,622. Twenty per cent. of the total value of the manufacturing and mechanical industry of the District was the product of Government establishments.

GOVERNMENT. Since 1874 the government has been under the control of three commissioners appointed by the President and approved by the Senate. The citizens have no direct voice in the appointments to office within the District, having no vote in District or national affairs.

Estimates of the money needed for municipal purposes are sent to Congress by the District Commissioners and an appropriation bill is framed, based on these estimates. In the year 1903 the total amount carried in the District bill was $9,354,287. The principal items were as follows: schools, $1,378,909; interest on debt and sinking fund provision, $925,408; improvements and repairs of streets, $791,000; sewers, $897,000; police, $800,325; fire department, $372,180. Half of the amount appropriated is paid by the United States and the other half is raised by taxation from the citizens of the District. This division of the municipal burden is based upon the large ownership by the United States of property in the District, which, of course, is untaxed and which is estimated, counting the streets, to be one-half of the entire area. All the expenditures of money thus appropriated, made under the direction of the Commissioners, must pass the scrutiny of the auditing officers of the Treasury Department, just as in the case of all Federal expenditures. With these safeguards about municipal disbursements and the practical elimination of local politics, the affairs of the District are managed with a degree of economy and efficiency that is believed to be without a parallel in the history of municipal government. The tax rate on both real and personal property is $1.50 per hundred. In the case of real estate it is upon the assessed valuation, which is not less than two-thirds the actual value. The funded debt of the District in 1902 was $14,198,330. The assessed value of real estate in 1903 was $208,519,436, and of personal property $22,249,935.

The water supply is brought from the Great Falls of the Potomac by means of an aqueduct 12 miles long. The water-works are owned by the Government. The fund from the water tax is kept separate from the general fund. A sand filtration plant is a new feature that is to be added to the system.

POPULATION. In 1900 the population of the District was 278,718, of whom 191,532 were white and 86,702 were colored.

HISTORY. For a number of years after the Revolutionary War the country had no permanent capital, and there was great rivalry among the principal cities to secure the seat of government. At last, in 1790, partly as the result of a compromise and partly in deference to Washington's judgment, the Potomac country was chosen and Virginia and Maryland each offered to cede a tract to the General Government. By act of March 30, 1791, Washington was authorized to select the site and mark the boundaries, and this he did early in the year, the cornerstone of the Federal territory being laid on April 15th. On the spot chosen an Englishman named Francis Pope had settled in 1663 and had called the place Rome. Major Pierre Charles L'Enfant, a French engineer who had served in the Continental Army, was chosen to lay out the town, and, though dismissed in March, 1792, he drew up a plan which was adopted by the commissioners in charge and in accordance with which Andrew Ellicott laid out the city. In September, 1791, the name Columbia was adopted for the District and the name Washington for the city. The District was originally ten miles square, but in 1846 the Virginia portion was retroceded, leaving a land area of 60 square miles. The land within the area of Washington laid out in lots was divided by agreement equally between the United States and the proprietors, except certain portions which were purchased by the Government. By the sale of land thus obtained a part of the money used in the erection of the public buildings was secured. In order to facilitate this division, the land-owners deeded their entire holdings to the Government, receiving from the latter title deeds. For this reason the land records within the original urban limits start from the Government's title to the whole acquired in 1791. During the first few years the large scale on which the plans were drawn was in such striking contrast to the actual size of the place that by travelers and others Washington was derisively called 'The City of Magnificent Distances,' 'The City of Streets Without Houses,' 'The Wilderness City,' and 'The Capital of Miserable Huts.' In 1800 the north section of the Capitol, the cornerstone of which had been laid in 1793, was finished, and Congress held its first session there in November, the archives having been transferred from Philadelphia somewhat earlier. A letter-writer in this year said: "The Capitol is on an eminence near the centre of the immense country called here the city. There is one good tavern and several other houses are finished or being built." The city is now regarded as coextensive with the District, though there are some differences in taxation between the 'urban' and the 'rural' parts.

On August 24, 1814, an English force of about 5000 men under General Ross and Admiral Cockburn defeated an American militia force of about 7000 at Bladensburg (q.v.), and, advancing to Washington, set fire to the Capitol, the President's house, and other public buildings, all of which, however, were replaced within the next few years.

During the Civil War Washington was repeatedly threatened by Confederate armies, notably in July, 1864, when General Early, after defeating Gen. Lew Wallace at Monocacy, only thirty miles away, advanced to within a few miles of the city. Early in 1861 work was begun on a system of fortifications which when finished consisted of "68 inclosed forts and batteries, having an aggregate perimeter of about 14 miles and emplacements of about 1120 guns; of 93 unarmed batteries, having 401 emplacements; and of 20 miles of infantry trenches." These works have been since unoccupied with the exception of Fort Myer (q.v.) on Arlington Heights. Throughout the war Washington was a vast depot of military supplies; long trains of army wagons were almost constantly passing through its streets; immense hospitals for the sick and wounded were erected, and many churches, public institutions, and the Capitol itself, were at times given up to this service. During the period 1861-65, however, much work was done on the public buildings. On May 23 and 24, 1865, Washington was the scene of the greatest military display ever witnessed in America, when the Federal veterans of the war were reviewed by President Andrew Johnson.

With the year 1871 began what has been called the Renaissance of Washington. Under the lead of Alexander R. Shepherd, Governor of the District, vast improvements were effected throughout the city: pavements were constructed, a sewage system devised, shade trees set out, grades equalized, parks beautified, and a new system of water supply provided. In consequence of the expense entailed by this reconstruction of the city, which was carried on with great waste, arising in a great measure from corruption, the territorial debt increased from $3,000,000 in 1871 to $20,000,000 in 1875; and largely on this account Congress (1874) changed the government. Georgetown, which had been settled as early as 1695, had been laid out as a town in 1751, and had been incorporated in 1789, was annexed to Washington in 1878, its charter having been withdrawn in 1871.

Bibliography. Todd, *The Story of Washington* (New York, 1889); Varnum, *The Seat of Government of the United States; A Review of the Discussions on the Site and Plans of the Federal City* (Washington, 1854); Porter, *The City of Washington* (Baltimore, 1885); Crew, *Centennial History of the City of Washington* (Washington, 1892); *Records of the Columbian Historical Society* (ib., 1897); Mackall, *Early Days of Washington* (ib., 1897-1903); Bryan, *Bibliography of the District of Columbia* (ib., 1900); Wilson, *Washington, the Capital City* (Philadelphia, 1902); Cox, *Celebration of the One Hundredth Anniversary of Washington, 1800-1900* (Washington, 1901).

WASHINGTON. The county-seat of Wilkes County, Ga., 75 miles northwest of Augusta, on the Central of Georgia Railroad (Map: Georgia, D 2). It has Saint Joseph's Academy and the Mary Willis Library. The village is the commercial centre of a district producing cotton, grain, and lumber, and has cotton mills, carriage factories, foundries and machine shops, and manufactories of fertilizers, cottonseed oil, engines, furniture, etc. The water-works and the electric light plant are owned by the municipality. Population, in 1890, 2631; in 1900, 3300.

WASHINGTON. The county-seat of Daviess County, Ind., 85 miles southwest of Indianapolis, on the Evansville and Terre Haute and the Baltimore and Ohio Southwestern railroads (Map: Indiana, B 4). It is the commercial centre of a farming and stock-raising region, especially noted for its deposits of coal, kaolin, and fire clay, and manufactures lumber, flour, brick, tiling, underwear, and veneering. The Baltimore and Ohio Southwestern Railroad also maintains repair and construction shops here. There is a public library. The city owns the electric light plant. Population, in 1890, 6064; in 1900, 8551.

WASHINGTON. The county-seat of Washington County, Ia., 66 miles southwest of Davenport, on the Chicago, Rock Island and Pacific, the Chicago, Burlington and Quincy, and the Chicago, Milwaukee and Saint Paul railroads (Map: Iowa, F 3). It is in a fertile farming section, which also has important horse-breeding and stock-raising interests, and manufactures flour, carriages, mittens, and gloves. There is a public library with more than 5200 volumes. The water-works and electric light plant are owned by the municipality. Population, in 1890, 3235; in 1900, 4255.

WASHINGTON. The county-seat of Beaufort County, N. C., 127 miles east by south of Raleigh, on the Pamlico River, and on the Atlantic Coast Line Railroad (Map: North Carolina, E 2). It is favorably situated for commerce, and carries on a considerable trade in cotton, corn, rice, farm produce, lumber, and naval stores. Oyster-fishing and ship-building are important industries; and there are also steam gins, planing mills, etc. Population, in 1890, 3545; in 1900, 4842.

WASHINGTON. The county-seat of Washington County, Pa., 25 miles southwest of Pittsburg, on the Pittsburg, Cincinnati, Chicago and Saint Louis, the Baltimore and Ohio, and other railroads (Map: Pennsylvania, A 3). It is the seat of Washington and Jefferson College (q.v.), and of Washington Female Seminary and Trinity Hall. The Citizens' Library has 6000 volumes. There are also the Washington County Law Library and that of the Young Men's Christian Association. Washington is of considerable commercial and industrial importance, being situated in a section known for its oil wells and deposits of coal and limestone. The leading manufactures are flour, carriages, tin, brick, steel, car springs, foundry and machine-shop products, and glass. Originally called Bassettown, Washington received its present name in 1784. It was incorporated as a township in 1810, and was chartered as a borough in 1852. Population, in 1890, 7063; in 1900, 7670.

WASHINGTON, Fort. See Fort Washington.

WASHINGTON, Mount. The highest peak of the White Mountains in New Hampshire, and, with the exception of a number of peaks in North Carolina and Tennessee, the highest point in the United States east of the Rocky Mountains (Map: New Hampshire, J 4). It rises from the Presidential Range near the centre of the White Mountain group, east of the Crawford Notch, and has an altitude of 6293 feet. It is composed chiefly of granite; its western slope is steep, and on the north and east it is broken by deep gorges. The lower slopes are covered with forest, but the summit is bare and rocky. A carriage-road and a rack-and-pinion railroad, the latter completed in 1869, ascend to the summit, which commands a magnificent view, and on which a hotel and a United States meteorological station are situated.

WASHINGTON, Treaty of. A treaty concluded in 1871 between the United States and Great Britain for settling various differences between the two governments, but chiefly those with regard to the Alabama claims (q.v.). In the beginning of 1871 the British Government sent Sir John Rose to the United States to ascertain whether negotiations looking toward the settlement of the question in dispute would be acceptable to the President. The United States Government received his advances with cordiality and on the 26th of January Sir Edward Thornton, the British Minister at Washington, formally proposed the appointment of a joint high commission to meet at Washington for the purpose of devising means for settling the matters at issue. The United States readily consented to the proposal, provided the differences growing out of the Civil War should be included among the subjects to be considered. The British Government promptly accepted the American proviso and the President appointed as Commissioners Hamilton Fish, E. R. Hoar, Justice Samuel Nelson, Robert C. Schenck, and George H. Williams. The British Government selected as its Commissioners Earl de Gray and Ripon, Sir John Macdonald, Sir Stafford Northcote, Sir Edward Thornton, and Montague Bernard. The joint commission entered at once upon its task and on the 8th of May concluded a treaty which received the prompt approval of the two governments, and which is known as the Treaty of Washington. Aside from the settlement of the dispute growing out of the so-called *Alabama* claims (for a treatment of which see that title), provision was made for the adjustment of the differences with regard to the Northeastern fisheries by the appointment of a mixed commission to meet at Halifax and pass upon the relative value of certain reciprocal privileges granted each of the contracting parties. Finally provision was made for submitting to the arbitration of the Emperor of Germany the dispute concerning the Northwest boundary. See San Juan Boundary Dispute.

The so-called rules of Washington agreed upon by the contracting parties for the guidance of the tribunal in the interpretaion of certain terms used in the treaty, and of certain principles of international law governing the obligations of neutrals, are: (1) That due diligence "ought to be exercised by neutral governments in exact proportion to the risks to which either of the belligerents may be exposed, from a failure to fulfill the obligations of neutrality on their part." (2) "The effects of a violation of neutrality committed by means of the construction, equipment, and armament of a vessel are not done away with by any commission which the Government of the belligerent power benefited by the violation of neutrality may afterwards have granted to that vessel; and the ultimate step by which the offense is completed cannot be admissible as a ground for the absolution of the offender, nor can the consummation of his fraud become the means of establishing his innocence." (3) "The principle of exterritoriality has been admitted into the laws of nations, not as an absolute right, but solely as a proceeding founded on the principle of courtesy and mutual deference between different nations, and therefore can never be appealed to for the protection of acts done in violation of neutrality." The agreement on the part of Great Britain to these rules was qualified by the declaration that "her Majesty's Government cannot assent to the foregoing rules as a statement of principles of international law which were in force at the time when the claims mentioned arose, but, in order to evince its desire of strengthening the friendly relations between the two countries and of making satisfactory provision for the future, agrees that the arbitrators should assume that the British Government had undertaken to act on the principles set forth in the rules."

Consult: Cushing, *Treaty of Washington* (New York, 1873); Davis, *Mr. Fish and the Alabama Claims* (Boston, 1893); Adams, *The Treaty of Washington;* Moore, *International Arbitrations* (Washington, 1898).

WASHINGTON, University of. A coeducational State institution at Seattle, Wash., founded in 1861. For several years the work of the university did not rank greatly above that of an academy. The first class was graduated in 1876. In 1903 the university had an attendance of 631 in the College of Liberal Arts, College of Engineering, the Schools of Mines, Pharmacy, and Law, and the Graduate School. Of these 363 were pursuing the course in liberal arts. In the same year it had a faculty of 37, a library of 16,000 volumes and 12,000 pamphlets, property estimated at $2,000,000, grounds and buildings valued at $300,000, and an income of $275,000. The university grounds cover 355 acres within the city limits.

WASHINGTON, Booker Taliaferro (the child of a mulatto slave and of a white man) (c.1858—). An American negro educator, born near Hale's Ford, Franklin County, Va. He was a plantation slave, after the Civil War removed to Malden, W. Va., was there employed in a salt furnace, and later in a coal mine, and obtained his first instruction chiefly in a local night school. After much difficulty and hardship he made his way to the Hampton (Va.) Normal and Agricultural Institute, where he defrayed the cost of his board by acting as janitor, and studied for three years (1872-75). He then taught school for two years at Malden, studied further for eight months (1878-79) in the Wayland Seminary of Washington, D. C., and in 1879 was appointed an instructor in the Hampton Institute. There he was successful in directing the work of about 75 Indians of whose education General Armstrong was then making trial, and introduced and took charge of the night school, which soon became an important feature. In 1881 he was appointed to establish a colored normal school at Tuskegee, Ala., the State Legislature having granted an annual appropriation of $2000 to be used for the salaries of instructors. He opened the school in a dilapidated shanty and a church, with 30 scholars, and himself as the only teacher. Subsequently he transferred the school to its present site on a plantation bought for $500, about one mile from Tuskegee. His efforts to better the condition of this institution led to his appearance at many important public assemblages, both religious and secular, and his addresses on these occasions soon made him known as a remarkably fluent and effective speaker with a faculty for telling a homely story to illustrate his point. He became known, moreover, not only as a man who was tremendously in earnest, but as a far-sighted and practical reformer. His most notable address was that given at the opening of the Atlanta (Ga.) Cotton States and International Exposition in 1895. In 1900 he organized the National Negro Business League at Boston, Mass. His publications include: *The Future of the American Negro* (1899); a remarkable autobiography, *Up from Slavery* (1901, originally published in *The Outlook* in 1900-01); and *Character-Building* (1902), a collection of addresses to Tuskegee students. Consult also, Thrasher, *Tuskegee; Its Story and Its Work* (Boston, 1900), with an introduction by Washington. See TUSKEGEE NORMAL AND INDUSTRIAL INSTITUTE.

WASHINGTON, BUSHROD (1762-1829). An American jurist, born in Westmoreland County, Va. He was the son of John Augustine Washington, younger brother of General Washington. He graduated at William and Mary College in 1778; studied law in Philadelphia; practiced for a time in his native county; and from 1780 until the surrender of Cornwallis at Yorktown served as a volunteer in Col. J. F. Mercer's troop of horse. In 1787 he became a member of the House of Delegates, and in the following year was a member of the Virginia convention that ratified the Federal Constitution. In 1798 he became an associate justice of the United States Supreme Court. Four years later, upon the death of Martha Washington, he inherited the mansion of Mount Vernon and part of the estate. Among his published works are: *Reports of Cases Argued and Determined in the Court of Appeals of Virginia* (1798-99); and *Reports of Cases Determined in the Circuit Court of the United States, for the Third Circuit, from 1803 till 1827*, edited by Richard Peters (1826-29). His *Life* was written by Horace Binney (privately printed, Philadelphia, 1858).

WASHINGTON, GEORGE (1732-99). Commander-in-chief of the Continental forces in the War of the American Revolution, and first President of the United States. He was born in Westmoreland County, Va., near the confluence of Bridges' Creek and the Potomac River, February 22, 1732, and was the oldest son of Augustine Washington by his second wife, Mary Ball. His great-grandfather was John Washington, who emigrated from England about 1657 with his brother Lawrence. John became a landed proprietor and planter in Virginia, in the 'Northern Neck,' a district between the Potomac and the Rappahannock rivers, and left two sons, Lawrence and John, the former being the father of Augustine. The little recorded concerning Augustine Washington represents him as a man of high character. By his first wife he had three sons and a daughter; by Mary Ball, who was endowed with great intelligence and beauty, four sons and two daughters. Soon after George's birth his father removed to a farm on the Rappahannock River, opposite Fredericksburg, where he died in 1743. This estate was bequeathed to George; the other children were handsomely provided for, Lawrence receiving the estate afterwards called Mount Vernon. But while the family had a competency and were large landed proprietors, the facilities for education in the colonies—particularly in the South—were at this time so meagre that the younger children were forced to depend on the poor common schools of the neighborhood, where they acquired only the rudimentary branches. Yet, though naturally diffident, George saw something of planter society, and at the age of thirteen he wrote out for his own use 110 maxims of civility and good behavior.

He was athletic in form, much given to exercising, a graceful and expert rider, and fond of the wild life of the woods and encampments. He had the customary boyish proclivity toward imitation of military service, possibly in a marked degree, and appears to have been generally chosen as a leader by the companions of his youth, and to have been deferred to by them in the settlement of disputes which arose. As a growing lad, he was not remarkable as a scholar; was rather reserved and sedate in his demeanor; and was of a more serious turn of mind than is usual among boys. In 1740-42 his half-brother, Lawrence Washington, served, as a captain of Virginia troops, under Admiral Vernon in the expedition against Cartagena, and later named his residence on the Potomac Mount Vernon, in honor of his commander. This connection led to the offer of a midshipman's commission to George, which, but for the opposition of his mother, he would have accepted. Such education as the boy received was completed by the time he was sixteen years of age, his last two years of schooling having been devoted mainly to the study of engineering, geometry, trigonometry, and surveying, probably from his having a mathematical turn of mind, and also because the profession promised advantages, in view of the wild state of the country and the increasing demand for accurate surveys.

In 1748 Washington received a commission as public surveyor, and the summer months of the next three years were occupied by him in the duties of his profession, more particularly in the region of the Alleghanies, and especially on the immense tracts of land owned by Lord Fairfax, the first surveys of which he made in March and April, 1748. Surveyors were scarce, and the remuneration was ample, and as the young Virginian was economical, he saved money, and acquired property by purchase long before he reached his majority. This fact and the qualities of character which he displayed gained him a solid reputation; and he was thus early regarded with esteem and confidence by the leading men in the colony.

The year 1751 found the frontiers threatened by the French and Indians, and frequent attacks and depredations occurred, necessitating some provision for the public safety. The colony was accordingly divided into military districts, to each of which an adjutant-general was appointed, with the rank of major, and a salary of £150 per annum. George Washington received one of these appointments, and entered with zeal on the study of military tactics and strategy, chiefly under Adjutant Muse, a Virginian, and Jacob Van Braem, a Dutch soldier of fortune. These studies were interrupted in 1751-52 by an excursion to Barbadoes with Lawrence, who was sent thither by his physicians. During this visit George had an attack of smallpox, recovering after a month's illness. On his death, in July, 1752, Lawrence bequeathed to George the estate of Mount Vernon, which had been left to him by his father. The care of this property and his military duties occupied George until 1753, when he was sent as a commissioner by Governor Dinwiddie to gain information concerning the intentions of the French, who had sent an expedition to the headwaters of the Ohio, and to warn them against trespassing upon territory claimed by Virginia. Washington acquitted himself of this mission very creditably, displaying great judgment, coolness, and address. He set out from Williamsburg in October, 1753, with no escort, and performed his journey through nearly 600 miles of wilderness in a most intrepid manner in spite of treachery and accidents, which are recorded in his modest account. In the spring of 1754 he was made second in command of the regiment which formed the military establishment of the colony, and, with half the regiment, was sent forward to occupy the outposts on the Ohio. His superior officer, Col. Joshua Fry, suddenly died, and he was soon left in sole command. This was his first campaign, and he at once distinguished himself by defeating a detachment of the French under Jumonville. The skirmish of Great Meadows (July 3, 1754), which followed, resulted in the capitulation of the provincial forces on terms honorable to Washington. On a reorganization of the Virginia troops, which meant an inferior military grade for him, he resigned his commission and retired to Mount Vernon, refusing in a dignified way offers from Governor Sharpe of Maryland of a renewal of his commission under conditions he deemed incompatible with self-respect.

In 1755, however, he accepted a position as aide on General Braddock's staff and passed through the ill-fated compaign of that year with great éclat. His personal bravery under fire was conspicuously shown in the disastrous battle of the Monongahela, July 9th, in which he displayed the greatest gallantry, and it was recognized that Braddock's defeat was largely due to neglect of Washington's wise counsel. The duty now fell to Washington to reorganize the provincial troops, and he retained the command of them until the close of the campaign of 1758, when he resigned his commission and retired to private life. But he did not resign before he had made a brief visit to Governor Shirley at Boston (February, 1756) to settle unpleasant questions of precedence between provincial and crown military officers—a trip that enlarged his knowledge of men and of his native country—or before he had seen Fort Duquesne occupied (November 25, 1758). See PITTSBURG.

On January 6, 1759, Washington married Mrs. Martha Custis, a young widow with two children, John and Martha Parke Custis, and wealthy in her own right. The management of her large estate, combined with that of his own, now occupied most of his time, at least until about 1763. Having been elected to the House of Burgesses of Virginia shortly before his marriage, he now began to appear prominently in public affairs, attending regularly every meeting of the Assembly, and, though seldom speaking, taking care to be thoroughly informed upon every prominent public question. He moved much in society; was also an enthusiastic hunter; practiced a generous hospitality at Mount Vernon; associated constantly with the leading men of the colony; and soon, and imperceptibly, gained a recognized position as a man of great ability and marked personal influence. At this time he was frequently made the depositary of important trusts, and was very often chosen to act as arbitrator in disputes arising among the colonists. His devotion to business and affairs was untiring, his industry extraordinary. He personally took charge of all his numerous accounts and business records, conducted his large and increasing correspondence, and drafted all his own contracts and deeds. At the outbreak of the Revolution he was recognized as the leading man in the Colony of Virginia, and was certainly one of the wealthiest in the colonies.

When the disputes between the colonies and England began, Washington held that arms should be the last resort. His respect for lawful authority made him dread any rupture; nevertheless, he drew up in 1769 a non-importation agreement, which was signed by the House of Burgesses, and at the provincial convention at Williamsburg, August 1, 1774, he was among the foremost in asserting the right of the colonies to self-government. It was at this time that he made one of the few impulsive speeches recorded of him. Touched by the sufferings of Boston, resulting from the enforcement of the Boston Port Bill (q.v.), he exclaimed: "I will raise a thousand men, subsist them at my own expense, and march with them, at their head, for the relief of Boston." He was one of the six Virginia delegates appointed to the first Continental Congress, which met in September, 1774; and on June 15, 1775, was chosen by that body commander-in-chief of the Continental Army, his nomination having been formally made by Thomas Johnson of Maryland and warmly seconded by John Adams. He accepted with great modesty, refused any pay for his services, and asked only that his expenses be refunded to him after the war. For this important position his previous education had singularly adapted him. Not only was he competent in military affairs and skilled by precept and experience in the art of war; but his extensive knowledge of the geographical character of the country, and his familiarity with the characteristics and qualifications of the royal army, made him certainly the most dangerous

GEORGE WASHINGTON
FROM AN ETCHING BY T. JOHNSON

antagonist, as a commanding officer, with whom that army could have to cope in the colonies.

Washington left Philadelphia on June 21st, joined the army at Cambridge, and assumed command on July 3, 1775. This army numbered about 16,000 men, all told, including the sick. It was in want of everything that could make it an effective fighting force—arms, ammunition, accoutrements, and, worse than all, *esprit de corps*. The course pursued by Congress in making its appointments had occasioned much discontent among the general officers; the organization was defective; a commissary and adjutant-general were more needed than a brave warrior or a skillful tactician. In Washington, fortunately for the country, were combined all three. He proceeded at once to complete an effective organization of his army, by forming it into six brigades of six regiments each, keeping together the troops from each colony, as far as practicable, and placing them under a commander from their colony. He maintained a constant correspondence with Congress, pressing his views earnestly upon that body, and, though slowly, with marked success. All the officers were commissioned anew by Congress, and gradually a Continental army was formed. Washington corresponded with the heads of the different colonial governments, and afterwards with the Governors of the several States, and succeeded at length, not only in creating the American Army, but in becoming the sole channel of communication between it and the numerous and complicated depositories of authority in the United States. But all this was accomplished amid embarrassments innumerable. The army itself became diminished by the expiration of terms of enlistment; there were cabals among the officers, and disagreements with the civil authorities; yet, despite all opposing influences, the British were closely besieged in Boston during the winter of 1775-76, and until a new army could be collected, and arms and ammunition supplied. On March 4, 1776, the Americans took possession of Dorchester Heights, and on the 17th the British evacuated Boston, and their fleet put to sea; whereupon Washington at once proceeded to New York, with the design of preventing a landing. In this he was foiled, partly through the insufficiency of the forces at his disposal, partly on account of the royalist strength in New York. The landing was effected; the Americans were defeated in the battle of Long Island (q.v.), August 27, 1776; and Washington was forced to abandon New York to its fate and retreated northward. After opposing the British in the northern part of Manhattan Island and north of the Harlem River, notably at White Plains (q.v.), October 28th, he crossed the Hudson early in November with only about 6000 men under his immediate command. He was hotly pursued through New Jersey by the British, and when he crossed the Delaware into Pennsylvania had less than 3000 weary, half-starved, dispirited soldiers under his command. Three weeks later (December 26th) he captured more than 1000 Hessians at Trenton (q.v.), and stole away from the superior forces of Cornwallis, defeating his reserve at Princeton (q.v.), and then went into winter quarters at Morristown, N. J. By March 1, 1777, not a British or Hessian soldier was to be found in New Jersey, save a small detachment at New Brunswick and Perth Amboy. By his brilliant movements between December 25, 1776, and January 4, 1777, Washington had not only saved his small army, but had inspired the almost despairing colonists with renewed confidence and hope. In the mean time Congress had seen the necessity of enlisting a regular army of men for a longer period than a year, which had been its previous practice; and it now conferred for a period of six months almost dictatorial powers on Washington. The campaign of 1777 in this theatre of the war opened about the middle of June, and was disastrous to the Americans from the beginning. They were defeated in the battle of the Brandywine (September 11th), and the British entered Philadelphia two weeks later. On October 4th the patriots were again defeated at Germantown, and about the middle of December Washington and his half-clothed and worn-out command went into winter quarters at Valley Forge (q.v.) in a fortified encampment. During the winter Washington and his troops were subjected to the severest privations. To add to his embarrassment, a conspiracy among some of his own general officers nearly resulted in deposing him from his command in favor of General Gates, whose victory over Burgoyne at Saratoga had been, as Thomas Paine soon showed, rendered possible by Washington's admirably conceived and executed manœuvres; but it was fortunately frustrated, and only added to Washington's influence. (See CONWAY CABAL.) Meanwhile, the men suffered for lack of food and proper clothing; the quartermaster's and commissariat departments were deranged and inadequate; and the patriot cause was at the lowest ebb of its fortunes. But Congress took up the question of properly recruiting and providing the army; a treaty with France was ratified, May 4, 1777, with great rejoicing on the part of the Americans; and the British, although only 20 miles distant from the American camp, permitted the winter and spring to pass without any offensive movement. All these circumstances combined enabled Washington to open the campaign of 1778 in somewhat better condition, and with an army in good spirits and rendered more efficient through the energetic drilling of Steuben. Sir Henry Clinton, who had replaced Howe as commander-in-chief of the British forces in America on May 18th, evacuated Philadelphia on June 18th, and Washington crossed the Delaware with his whole army, attacking the enemy at Monmouth (q.v.) on June 28th, when they retreated, after a sharp engagement, which, but for the insubordination of General Charles Lee (q.v.), would probably have resulted in a victory for the Americans. Washington continued his march to the Hudson, which he crossed, and encamped, July 20th, near White Plains. He now distributed his troops in a line of cantonments around New York and in New Jersey, extending from Long Island Sound to the Delaware; arranged for the defense of New England; and in December went into winter quarters. During the whole of 1779 Washington retained his position in the Highlands of the Hudson, and remained on the defensive. In 1780 the French Government sent out Count Rochambeau, who arrived at Newport, R. I., July 10th, with an expedition; and combined operations were concerted, but not carried out, on account of the naval superiority of the

British. The features of importance of this year were the discovery of the treason of Benedict Arnold, followed by the execution of Major André, and the success of the British in the South, where, however, in the next year they were foiled by General Greene, Washington's most reliable subordinate. The year 1781 found Washington hampered by a vacillating and unreliable Congress, doubtful of its own powers, and, although he had now every hope that he would be strongly supported by the French auxiliary fleet, he was unable to. utilize this advantage to the necessary extent. In August and September Washington, greatly strengthened by a French reinforcement under Rochambeau (q.v.), transferred his troops to the South and invested Lord Cornwallis at Yorktown, Va., a French fleet under De Grasse (q.v.) shutting off any assistance which might have come to the British by sea and preventing Cornwallis's escape. On October 17th the British commander proposed a cessation of hostilities, and two days later he capitulated with his whole army. (See YORKTOWN.) This practically concluded the active operations of the war. Washington now exerted himself in endeavoring to obtain from Congress a settlement of the claims of his officers. It is probable that, had Washington so desired, he could at this time have founded a monarchy, sustained by his army. He took the course, on the contrary, of quelling this disposition on the part of his soldiers whenever it showed itself. On June 8, 1783, he issued his splendid letter to the Governors of the States with regard to the necessity of establishing a firm and dignified Federal Government. On November 25, 1783, the British evacuated New York; on December 4th Washington delivered his farewell address to the army; and on December 23d, at Annapolis, he resigned his commission to Congress and retired to private life. For further details concerning his services during the Revolution, see the article UNITED STATES, and the articles on the various battles.

During the five years following the close of Washington's military career, he found sufficient occupation in attending to the affairs of his homestead and property, and in fostering the progress of his native State. Mount Vernon was now constantly the scene of a profuse hospitality over which Washington presided with the courtly dignity natural to him. He maintained his keen interest in public affairs, greatly regretting the general chaos and such disgraceful outbreaks as Shays's Rebellion, and helped by his correspondence to bring the leading men of the country to a determination to form a more perfect Union. He was president of the Philadelphia convention of 1787, which framed the Constitution of the United States. Washington was unanimously chosen the first President of the United States, and on April 30, 1789, took the oath of office in New York, where Congress was then sitting.

Washington's administration of the civil government was marked by the methodical precision which had characterized his conduct through life. His conscientious habit of undertaking no duty until he comprehended its entire scope and bearing was also especially apparent in his new position. He thoroughly informed himself concerning all affairs of state, and every political act of importance which had been performed by the Government and its agents since his retirement. He personally directed the organization of the different departments of the Government under the new system, and in accordance with the Constitution, and no act of his was more significant than his appointment as heads of departments of such distinguished and able men as Jefferson, Hamilton, Knox, and Edmund Randolph. Meanwhile, before the work of Congress began, Washington found time to make a tour through the Eastern States, better to acquaint himself with the views of the men who were presently to lay the foundations of the commercial and industrial greatness of the United States. Before Congress, in his first message, he laid an eminently judicious series of suggestions of laws and provisions, which were at once made the basis of legislation. He refrained sedulously from allying himself with either of the two parties, Federalist and Democratic Republican, forming under Hamilton and Jefferson; and, on the contrary, strove to reconcile the differences between the leaders which he foresaw must inevitably in the future bring about wider differences among the people. The success of his first administration, and the universal sense of a security under his leadership, which did not appear in the least to be certain under that of any other, produced a general anxiety, as his term of office drew to a close, that Washington should accept the Presidency for a second term. Jefferson and Hamilton—wide apart as the poles in their political opinions, and personally at enmity with each other—agreed in this; and each wrote a letter to Washington urging his compliance with what was now a great popular demand. To their solicitation and that of others he acceded; he was reëlected unanimously, and on March 4, 1793, took the oath of office for the second time as President of the United States.

The very beginning of Washington's second administration saw the United States drawn into the vortex of European politics. The French Revolution was culminating in a Reign of Terror. Great Britain and France were at war, and gratitude seemed to demand that the Western Republic should sustain her sister State and former ally in the existing struggle. But Washington was especially opposed to foreign complications, and while he recognized the French Republic, and received its representative, he steadfastly adhered to his resolution to avoid interference in European turmoils, and issued a proclamation of neutrality on April 22, 1793. Factions now arose in the United States, the one side seeking to enforce practical adherence to the cause of France and the other sustaining Washington in the face of bitter accusations of bias in favor of the recent enemy of America, Great Britain. Between Republicans and Federalists the line was now drawn strictly on this basis. Dissensions and resignations occurred in the Cabinet. Among the people Jacobin clubs were formed, which were as virulent in the expression of their animosities as were their prototypes in France. In the midst of all the excitement consequent upon such a state of affairs, which was greatly increased by the injudicious, not to say insulting, defiance of the proclamation of neutrality by Genet, the French representative to the United States, Washington sent John Jay as envoy extraordinary to England. Jay negotiated a commercial treaty which, though by no means satisfactory, was better than nothing, and this was signed by Washington on August 18, 1795. The publication of the terms of this treaty aroused the most violent discussion in and out of Congress. That body called upon the President for the correspondence and instructions involved in the negotiations, and these Washington declined to furnish. Acrimonious debate followed, but the President held firm to his position, and the matter died out. (See JAY'S TREATY.) Thus, by his wisdom and determination, did Washington prevent his country—just emerging from the trials and vicissitudes of the War of Independence—from engaging in 'entangling alliances' which would certainly have precipitated renewed warfare and perhaps have rendered impossible the growth of the magnificent superstructure of which the solid foundation had been laid.

Among the important events of Washington's administration were the admission of Vermont, Kentucky, and Tennessee into the Union, the assumption of the war debts of the States by the Federal Government, the chartering of the Bank of the United States, the establishment of the national mint, the Whisky Insurrection (q.v.) of 1794 in western Pennsylvania (which was speedily put down without bloodshed), the unsuccessful expedition of General Harmar against the Northwestern Indians in 1790, the disastrous defeat of General St. Clair by them in 1791, and the victory gained by General Wayne over them at Fallen Timbers, August 20, 1794. The retirement of Jefferson from the Cabinet, and the more decided ascendency of Hamilton in the councils of the Administration, also should be mentioned, as well as the scurrilous attacks upon Washington by the radical adherents of the former. While Washington leaned to the Federalist side, he was far from being the mere instrument of the brilliant Hamilton.

On September 19, 1796, Washington, declining to serve again, issued his Farewell Address to the country he had been so largely instrumental in forming almost out of chaos. He delivered his last Presidential message, turned over his office to his successor, John Adams, and retired to his home at Mount Vernon, followed by the love and veneration of his people. For further details concerning his two administrations as President, see the article UNITED STATES.

At Mount Vernon he devoted himself to agriculture. In 1798 the prospect of a war with France led to his appointment as commander-in-chief of the National Army. On December 12, 1799, he was exposed in the saddle, for several hours, to cold and snow, and attacked with acute laryngitis, for which he was repeatedly and largely bled. He sank rapidly, and died on December 14th. His last words were characteristic. He said: "I die hard; but I am not afraid to go. I believed from my first attack that I should not survive it. My breath cannot last long." A little later he said: "I feel myself going. I thank you for your attentions; but I pray you to take no more trouble about me. Let me go off quietly. I cannot last long." After some instructions to his secretary about his burial he became easier, felt his own pulse, and died without a struggle, partly, it would seem, a victim to the malpractice of that day.

When news of his death reached Europe, the mourning became almost as widespread as it had been in America. The armies of Bonaparte and the Channel fleet of Great Britain did homage to his memory. It was admitted on all hands that a cosmopolitan statesman of the highest rank, and a noble friend of mankind, was lost to the world. The eulogy of 'Light-Horse Harry' Lee that he was "First in war, first in peace, and first in the hearts of his countrymen," thus had a wider meaning than its author intended perhaps to give it—a meaning which the lapse of years has extended rather than diminished.

Washington was six feet two inches in height, with brown hair, blue eyes, large head and hands, and strong arms. The portraits painted in his early life are perhaps the most truthful, as the artificial teeth worn in his later years altered decidedly the expression of his face. The statue by Houdon, at Richmond, has been accepted as the typical likeness, but the forehead is probably too retreating. The earliest known portrait, by Charles Wilson Peale, was painted in 1772. That by Joseph Wright, painted in 1782, was highly approved by Washington himself. Those by Trumbull and Sharpless are considered faithful in most respects. Those by Stuart are somewhat idealized. No one picture can be accepted as entirely satisfactory. Washington was a forcible, but not a fluent, speaker. He was attentive to his personal appearance and somewhat fond of display. To a natural diffidence was doubtless due the cold and reserved manner that distinguished him when in public life. Toward young people, and especially toward his nieces and nephews—his adopted children, for he had none of his own—he was gracious and gentle. He was fond of fox-hunting, visited the theatre occasionally, and was a moderate wine-drinker, but was opposed to the use of tobacco, although he raised it on his plantations. He was, like nearly all Americans of property at that period, a slaveholder, but he was a considerate master. He possessed at his death 124 slaves, whom he directed, in his will, to be emancipated at the death of his wife, so that the negroes of the two estates who had intermarried might not be separated. As early as 1786 he expressed himself in favor of abolition by legislative authority. He was not a scholar, and the 1200 or more volumes that composed his library were chiefly on agricultural and military topics. He was a member of the Protestant Episcopal Church, but the exact nature of his religious opinions is a subject of controversy.

The early biographers of Washington erred in representing him as an ideal being of almost superhuman excellence. The criticism of later times deems it but honest to portray the man as he was. There are writers who, forgetting that balance of genius is rarer and more commendable often than brilliance, are inclined to rate him below Hamilton or Jefferson in political wisdom; but even these echo the tributes paid by the world to his unselfish devotion to duty, especially to the cause of independence, to his courage, his sublime hopefulness under defeat, his strong will, his marvelous insight into character, his abiding faith in God, and his absolute integrity and purity of motives. When these virtues are considered, few, if any, heroes of history can be placed beside him.

Washington's wife, who was of nearly the same age with him, is described as having been amiable in character and lovely in person. She was the daughter of Colonel John Dandridge, of New Kent County, and was born in May, 1732. Her first husband, to whom she was married in June, 1749, was Daniel Parke Custis, a wealthy planter. By the courtesy of the period she was called Lady Washington, and whether in her own home or at the 'federal court,' she presided with great dignity and grace. She died at Mount Vernon, May 22, 1802.

Consult: Sparks, *Life and Writings of Washington* (12 vols., Boston, 1834-37); *Life of Washington*, by Chief Justice Marshall (5 vols., Philadelphia, 1804); *Life of Washington*, by Washington Irving (5 vols., New York, 1855-59), and the abridged edition, John Fiske (New York, 1888); *The Writings of Washington*, collected and edited by W. C. Ford (14 vols., New York, 1889); lives by Hale (1887), Lodge ("American Statesmen," 2 vols., 1889), B. T. Johnston (1894), P. L. Ford and Woodrow Wilson (1896). See also the many publications of Lossing and Baker, and histories of the Revolution, such as those by Fiske and by Trevellyan. For the history of Washington's administrations, see Schouler's and McMaster's histories of the United States.

WASHINGTON, WILLIAM AUGUSTINE (1752-1810). An American soldier, a kinsman of George Washington, born in Stafford County, Va. He was educated for the ministry, but on the outbreak of the Revolutionary War entered the patriot army as a captain under Colonel Hugh Mercer. He was wounded in the battles of Long Island and Trenton; fought at Princeton; and later became a major in Colonel Baylor's corps of cavalry. In 1779 he joined General Lincoln's army in the South; became a lieutenant-colonel in March, 1780; and in many conflicts greatly distinguished himself as a leader of light cavalry. At the battle of Cowpens he made a charge upon Tarleton's troops that decided the day, and in the pursuit he had a personal encounter with the British leader. He assisted in covering the rear of Greene's army in the famous retreat before Cornwallis, and fought with great distinction at Guilford Court House and Hobkirk's Hill. At Eutaw Springs his horse was shot under him; he received a bayonet wound, was taken prisoner, and was not released until the close of the war. He then married a Charleston lady, settled in that city, and became a member of the South Carolina Legislature. When war with France became imminent in 1798, he was, upon the recommendation of General Washington, made a brigadier-general.

WASHINGTON AGRICULTURAL COLLEGE AND SCHOOL OF SCIENCE. A coeducational State institution at Pullman, Wash., established in 1890 on the national land grant act. It offers partially elective courses in the departments of mathematics and civil engineering, chemistry, botany and zoölogy, agriculture, horticulture, English, economic science and history, mechanical engineering, modern languages, mining engineering, and military science and tactics, with supplementary courses in physics, geology, and mineralogy, Latin, and education. In addition, special instruction is provided in the schools of agriculture, dairying, pharmacy, veterinary science, and business, the school for artisans, and the preparatory school. Provision is also made for graduate instruction. The endowment consists of 190,000 acres of land, none of which has as yet been converted into funds, $25,000 annually from the Morrill Fund, $15,000 from the Hatch Fund, and State appropriations amounting for 1903-04 to $158,000. It had in 1903 a total attendance of 761, when its faculty numbered 59, and its library contained 5000 books and 2000 documents. The buildings and grounds were valued at $260,500 and the college property at $340,000. The gross income for 1902 was $115,000.

WASHINGTON AND JEFFERSON COLLEGE. An institution of higher education at Washington, Pa., founded in 1787 as Washington Academy and chartered as Washington College in 1806. In 1865, to secure a conditional gift of $50,000, Washington College and the neighboring Jefferson College, founded in 1802, were united under the present name, and in 1869 the location of the consolidated institution was fixed at Washington. The college is Presbyterian in affinity, but is not under ecclesiastical control. It admits students on certificate as well as by examination. Three courses of study leading to degrees are offered—classical, Latin scientific, and French scientific. A summer school and a preparatory department with courses corresponding to those in the college are maintained. In 1903 the attendance was 360, of whom 250 were collegiate students; the instructors numbered 25; and the library contained 16,000 volumes. The endowment was $250,000, the income $40,000, and the value of the college property $1,100,000. The centennial of the college was celebrated in 1902, when gifts to the amount of $425,000 were secured, of which $50,000 was for a library building and $375,000 for endowment.

WASHINGTON AND LEE UNIVERSITY. An undenominational institution of learning at Lexington, Va., established as the Augusta Academy in 1749 and chartered in 1782. The first considerable amount of money received by the school was that given by George Washington, which still yields an annual income of $3000 to the university. The name was in consequence changed to Washington Academy. In 1802 the Cincinnati Society, on dissolving the organization, appropriated the residue of their funds to the institution. Gen. Robert E. Lee was made president of the college in 1865, and during an administration of five years wielded great power for good with the students. After his death the corporate name of the institution was changed in 1871 to its present title, and in the same year Gen. G. W. Custis Lee succeeded his father as president, resigning in 1897. His successor was William Lyne Wilson, former Postmaster-General of the United States, who died in 1900. The following year George Hutcheson Denny, LL.D., was elected to the vacant position. The university is divided into three schools, of Arts, Engineering, and Law, with courses leading to the degrees of B.A., B.S., and LL.B. It accepts the certificates of accredited schools in lieu of the entrance examination and offers a number of free scholarships and a university fellowship. In 1903 it had a faculty of 22; 302 students; an endowment of $750,000, with an income of $50,000; and property valued at $400,000, including buildings and grounds worth $250,000. The library numbered 40,000 volumes.

WASHINGTON BARRACKS (D. C.). A United States military post, established in 1797 as Washington Arsenal. The reservation, which includes 69 acres, is situated on Greenleaf's Point in the city of Washington, which is the post-office and telegraph station. It was changed from an arsenal to an artillery post in 1881, and quarters for 25 officers and 400 men and stables for 150 horses were provided. It has been the headquarters of the War College, of the School of Submarine Mining, and of Engineers since 1900.

WASHINGTON COURT HOUSE. The county-seat of Fayette County, Ohio, 40 miles southwest of Columbus, on Paint Creek, and on the Cincinnati, Hamilton and Dayton, the Baltimore and Ohio, the Ohio Southern, and the Cincinnati and Muskingum Valley railroads (Map: Ohio, C 6). It is in a productive farming country, and manufactures boots and shoes, flour, soap, woolen goods, lumber, etc. Poultry-packing is also an important industry. Population, in 1890, 5742; in 1900, 5751.

WASHINGTON ELM. A venerable elm near the northwest angle of the common in Cambridge, Mass., under which Washington is said to have assumed command of the American Army on July 3, 1775. The tree, though carefully protected, is in an advanced state of decay and retains only a part of its former proportions.

WASHINGTON MONUMENT. A huge obelisk erected in the city of Washington, having a total height of 555 feet 5⅛ inches. It is the highest masonry structure in the world. The cornerstone was laid in 1848 and work on the monument continued slowly until 1877, when it ceased, but was resumed in 1878, and finished in 1884. The Washington National Monument Society originated the plan and controlled the work of construction until 1877, when its property was conveyed to the United States. Maryland marble is the material out of which the monument was constructed. The foundation covers an area of 16,000 feet, and weighs 36,912 gross tons. The shaft is 55 feet 1.5 inches square at the bottom, 34 feet 5.5 inches square at the top, weighs 43,633 gross tons, and is 500 feet 5⅛ inches high; the apex, weighing 300 tons, is 55 feet high, its summit being nearly 600 feet above the tidewater of the Potomac. The apex is capped by an aluminum point. It has 262 marble pieces, of seven-inch thickness. Toward the cost of erection the Monument Society had expended $300,000; the total cost has been $1,187,710.31. Lieutenant-Colonel T. L. Casey, of the United States Engineers, had charge of the work of construction after its passing under the control of the United States. The original designs were by Robert Mills. An elevator and an iron stairway of 900 steps within the monument afford access to the base of the apex.

WASHINGTON UNIVERSITY. An unsectarian institution at Saint Louis, Mo., chartered in 1853 as Eliot Seminary, in honor of Rev. William G. Eliot, of Saint Louis, in deference to whose wishes, however, the name was changed to Washington Institute. Its first educational work under the charter was the opening of an evening school for boys, the O'Fallon Polytechnic Institute. In 1857 the title of Washington University was assumed, and the first college degrees were granted in 1862. A Law School was organized in 1867, the School of Engineering and Architecture in 1870, the School of Fine Arts in 1879, and the School of Botany in 1885. The Saint Louis Medical College, founded in 1842, became a department of the university in 1891, the Missouri Dental College in 1892, and the Missouri Medical College in 1899. The university now consists of these departments, with the addition of Smith Academy, a preparatory school for boys; Mary Institute, a school for girls, organized in 1859; and the Manual Training School, organized in 1879. Students are admitted to the undergraduate department on examination or certificate from an accredited school. The college confers the degree of bachelor of arts and the School of Engineering that of bachelor of science. The professional degrees of civil, mechanical, electrical, and chemical engineer, and architect are given only after three or more years of successful practice. The master's degree in art and science and the degree of doctor of philosophy are also conferred. In 1894 a tract of land just outside the city limits was purchased as a new site for the university, and gifts made by citizens of Saint Louis made it possible to begin building at once. Ten buildings had been erected by 1902 and it was expected that the new site would be occupied in September of that year, but the leasing of the grounds and buildings to the Louisiana Purchase Exposition postponed the removal of the university until after the close of the Exposition. In 1903 the faculty numbered 196 and the student enrollment 2219; of these 241 were in the undergraduate department, 521 in the professional schools, 338 in the school of fine arts, and 1120 in the preparatory schools. The library contained 23,000 volumes. The value of the grounds and buildings was estimated in 1903 at $2,250.000, and the total value of the college property at $7,401,451. The endowment was $4,730,485, and the income $223,365.

WASHITA, wŏsh'ĭ-tȧ, or **OUACHITA.** A river which rises in the highlands of western Arkansas and flows southeast and southward through that State and Louisiana, emptying into the Red River near the latter's confluence with the Mississippi (Map: Arkansas, C 4). Its length is about 550 miles. In its lower course, where it is generally called the Black River, it is connected with the Mississippi by a large network of bayous, the most important of which is the Tensas. The river flows through a rich corn and cotton region, is navigable for large river steamers 300 miles to Camden, Ark., and for smaller steamers to Arkadelphia, 70 miles farther.

WASH'O. A small tribe constituting a distinct linguistic stock, occupying the eastern slopes and valleys of the Sierra Nevada, west of Reno and Carson City, Nev. They appear to be entirely distinct from any other tribe, and are probably the remnant of a more numerous people destroyed by disease or exterminating wars. The Piute (q.v.) hold them as vassals, and as a mark of their subjection forbid them the use of horses. Nothing is known of their tribal traditions or customs beyond the fact that their women are noted for their beautiful basketry. They have no recognized territory and no relations with the Government, but get their subsistence from seeds, piñons, small game, and by labor for the whites. They number about 250.

WASIELEWSKI, vä'syȧ-lĕf'skė, JOSEPH WILHELM VON (1822-96). A German violinist and writer on music, born at Gross-Leesen, near Danzig. He studied at Leipzig under David, Hauptmann, and Mendelssohn, became a member of the Gewandhaus Orchestra, and was concertmeister at Düsseldorf under Schumann from 1850 to 1852. Later he conducted the new Choral Society at Bonn. In 1855 he settled at Dresden and devoted himself to literary work. From 1869 to 1884 he was city music director at Bonn, and in 1884 he retired to Sondershausen. Among his works are: *Robert Schumann. Eine Biographie* (3d ed. 1880); with important supplementary matter in *Schumanniana* (1884); *Die Violine und ihre Meister* (3d ed. 1880); *Geschichte der Instrumentalmusik im 16. Jahrhundert* (1878); *Beethoven* (1888); *Das Violoncell und seine Geschichte* (1889); *Carl Reinecke, sein Leben, Wirken und Schaffen* (1892). Among his compositions are: *Herbstblumen,* a set of nine violin pieces; a *Nocturne* for violin with the pianoforte; the *Kaiserlied im Volkston;* and other patriotic songs.

WASMES, väm. The capital of an arrondissement in the Province of Hainault, Belgium, 6 miles southwest of Mons. It is in the Borinage, a region noted for its extensive coal-mining interests. Population, in 1900, 14,660.

WASP (AS. *wæsp, wæps,* OHG. *wefsa,* MHG. *wefse, wespe,* Ger. *Wespe,* wasp; connected with Lat. *vespa,* OBret. *gnohi,* OChurch Slav. *vosa,* wasp, Lith. *vapsà,* gadfly). Any insect of the hymenopterous superfamilies Vespoidea and Sphecoidea, most of the former being known as 'social' wasps, and of the latter as 'solitary' wasps. All of the social wasps belong to the Vespoidea, and according to the present classification there have been added to the group, from structural peculiarities, the wasps of the families Pompilidæ, Eumenidæ, Sapygidæ, Scoliidæ, Myzinidæ, Tiphiidæ, and Thynnidæ, all of which lead solitary lives. The superfamilies also contain the so-called solitary velvet ants (q.v.) and the cuckoo-flies, 'gold wasps' (family Chrysididæ), as well as two families of parasitic wasps, the Bethylidæ, formerly placed in the Proctotrypoidea, and the Trigonalidæ, formerly placed with the ichneumon-flies. All wasps belong to the old group Aculeata, which includes the so-called stinging Hymenoptera. The social wasps have the sting always issuing from the tip of the abdomen, the pronotum not extending back to the tegulæ, the tarsi slender and not dilated or thickened as with the bees. The solitary wasps (superfamily Sphecoidea) are separated from the social wasps by the pronotum, which extends back to the tegulæ when these are present; the trochanters are one-jointed. These wasps are distinguished from the ants by the fact that the first segment of the abdomen is simple and does not contain swellings.

With the exception of the mainly tropical honey wasps (genus Nectarina), all the young wasps are fed for the most part upon other insects or insect remains. The true social wasps of the United States (see heading *Social Insects* in article INSECTS) belong to the genera Vespa and Polistes, the former including the species which make the paper nests with an outer covering, and usually composed of several layers of combs; the latter containing the common, long-bodied black wasps with folded wings which build nests of a single comb without any papery envelope. (See Figure 5, Colored Plate of INSECTS.) These wasps often build their nests in barns and outhouses, but sometimes also in bushes or upon the lower surfaces of stones slightly raised from the ground. The cells of one of these wasps' nests are hexagonal, in a single layer instead of two, as with the higher bees, and usually vertical instead of horizontal. With some species the nest consists of but a single comb, as with Polistes, and with others of a series of combs in tiers, and the whole inclosed in a spherical case made of many thicknesses of paper, as with many of the Vespas. The nests are enlarged by adding cells to the edges of the comb, space being gained by removing the inner layers of the envelope. These removed portions are masticated and added to the outside. An egg is laid in each cell, and the young larva when hatching hangs with its head downward, suspended by a gummy excretion from the anus. They are constantly fed by the workers and females with the juices of fruits, flowers, and the masticated remains of insects. When full grown they spin silken cocoons, the lower end of which serves as a cap to the cell. After the adult wasp has emerged the cell is cleaned out and a new egg laid in it. With the larger nest-builders, a month or less elapses from the laying of the egg to the emergence of the adult. Several generations may be reared in the same cell.

The largest of the American social wasps is the so-called white-faced hornet (*Vespa maculata*). The European hornet (*Vespa crabro*) has been accidentally introduced into the United States and has established itself near New York City. (See HORNET.) The smaller species of Vespa, which are generally marked with yellow and are often known as 'yellowjackets,' frequently nest beneath stumps or stones, although their nests are often also found hanging from rafters and the branches of trees. The nests of *Vespa germanica,* a small yellowjacket, are commonly found near the ground, and often exceed a foot in diameter. Access to the nest is gained by one or two circular or oval openings about three-quarters of an inch in diameter, which lead directly to the centre of the nest. The loose outer papery covering is by no means as tough and firm as with the hornets. The combs are built in eight or more horizontal layers attached to each other by strong supports. As a rule the males and queens of true social wasps are not developed until toward autumn, at which time larger cells, always to be found in the lower combs of a nest, are made for their reception.

The tropical social wasps of the genus Polybia and its allies build enormous nests. A species which occurs in Ceylon has nests which frequently reach a length of six feet. The nest of the Brazilian *Polybia scutelaris* is a solid closed structure covered externally with rough knobs or angular projections. The nests of another

South American species are so regularly shaped and so compact and solid as to look like a stone. *Vespa orientalis* mixes a considerable quantity of earth with the paper which it uses in its nest, and there is a nest in the British museum from Bahia supposed to be that of a social wasp, the outer wall of which is apparently formed entirely of earth and is one-quarter or one-half of an inch thick. The comb inside appears also to be formed of clay, and the whole seems an elaborate construction in pottery. Sharp suggests that it may possibly be the production of a eumenid wasp which has taken on social habits.

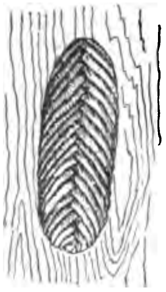
The sting of most of the social wasps is very severe, but the wasps themselves are not dangerous except when disturbed. When they are flying about they are perfectly harmless unless attacked or irritated. A person may stand close to a wasp nest without risk if he stands motionless. In fact, a wasp may settle upon a person with no danger of stinging unless some movement is made.

The solitary wasps belonging to the Vespoidea resemble greatly in habits the solitary wasps of the superfamily Sphecoidea, although they differ in important structural characters. The family Pompilidæ is an extensive one, more than a hundred species being found in the United States. They may well be known as the 'spider wasps,' since they all, so far as known, store spiders in their burrows. As a rule they dig burrows in the ground or utilize excavations made by other insects. Some dig their burrows before they catch their spiders and others reverse the process. One species has been seen carefully to hang its spider on the branch of a plant until the burrow was completed. The tarantula-killer (q.v.) of the Southern United States is a member of this family. The so-called 'potter-wasps' of the family Eumenidæ belong to this group, and construct globular cells of clay or sand attached to a twig by a narrow petiole. These little wasps store up caterpillars, sawfly larvæ, and beetle grubs for their young. Each cell is completely filled and contains a single egg of the wasp. The wasps of the parasitic families Sapygidæ, Scoliidæ, Myzinidæ, and Tiphiidæ, as a rule, lay their eggs upon the bodies of the larvæ of other insects, especially beetle larvæ.

The true solitary wasps of the superfamily Sphecoidea have been divided into 12 families, and comprise many of the most interesting of insects. They usually construct cells in subterranean burrows, each cell provided with paralyzed insects for their larvæ. In their habits the sand wasps or 'digger wasps' are rather typical of the group, e.g. the great digger wasp *Sphecius speciosus* stores the large cicadas or harvest flies in deep burrows made usually in clay soils. A burrow consisting of a sloping entrance six inches long, turning at right angles and extending for several inches farther and ending in a globular cell an inch and a half in diameter, is previously prepared by the mother wasp. Sometimes the main burrow has several branches, each terminating in a similar cell. After a burrow is prepared, a cicada is captured and paralyzed by its captor's sting. The cicada is then carried with great difficulty up a trunk of the tree for some distance in order that the wasp may fly obliquely downward to her nest, the weight of the cicada being so great that she cannot fly with it horizontally or upward. The terminal cell being reached, an egg is laid under the middle of the victim's body, upon which the footless larva of the wasp begins to feed as soon as hatched. In the course of a week the larva spins a white cocoon mixed with earth, and remains through the autumn and winter, transforming to pupa the following spring. Shortly afterwards the adult gnaws through the cocoon and works its way up to the surface of the ground.

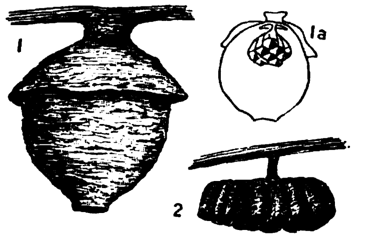
The solitary wasps of the family Crabronidæ are rather small insects which burrow in soil and sometimes in decaying wood. A great variety of insects is stored in these cells, each species, however, seeming to have a distinct preference. The industry of some of the members of this family is extraordinary. The Peckhams have observed *Crabro stirpicola* working night and day for a period of forty-two consecutive hours. The 'mud-daubers,' or mud-wasps, of the genus Sceliphron (formerly Pelopæus) build cells of mud, frequently in great numbers, in sheltered places, often entering houses and barns for the purpose. Spiders are stored in these cells, as a rule, and a single egg is laid upon the last spider which has been pushed in, and the larva works rapidly, as do other wasps' larvæ of this group. The female wasp completes and provisions one cell before beginning another. The sand-wasps of the family Oxybelidæ burrow in the sand and provision their nests with flies.

A close study of the habits of the solitary wasps by several acute observers has brought out many interesting points bearing upon different theories of instinct, and important contributions to our knowledge of the psychology of insects have been made from observations upon this group. For example, in the genus Ammophila the wasps carefully cover their burrows when they are completed and stored, taking the greatest care to conceal the entrance, the mother wasp frequently returning from time to time to see that nothing has been disturbed, and adding sand or other disguising substances to the covering of the burrow. The most interesting feature of the habits of these insects, however, is the undoubted use of a tool by the mother insect. In filling in the mouth of the burrow, Williston has seen the mother wasp take a stone in her jaws and use it as a tamping iron to pack the earth down more tightly. Fabre's extended studies led to the conclusion that these solitary wasps are inspired by automatically perfect instincts which can never have varied to any great extent from the beginning of time. In his opinion deviation from regular rule would mean extinction. G. W. and E. G. Peckham, however, after equally close study, found that variability in the habits of different individuals of the same species exists in every particular—shape of nest, manner of digging it, manner of stinging the prey and of crushing it, manner of carrying the victim, way of closing the nest, and even in either closing the nest or leaving it open. In the study of the Ammophilas it was especially noticed that there is a very dis-



CELL OF A MUD-WASP.

tinct personality among the females. One seemed in haste and spent no time on smaller details; another worked with great attention to detail, spending a long time on the closing of her burrow, arranging the surface with scrupulous care, and sweeping every particle of dust to a distance; another was very careless, carrying the caterpillar in a slipshod way, and making a very poor nest.



NESTS OF PAPER-MAKING WASPS.
1 and 2. Nest of hornets; 1a, section showing interior.

Among the English-speaking people of German descent the word *wasp* is frequently used for other groups of hymenopterous insects. Thus an ichneumon-fly is called a parasite wasp, and a chalcis-fly the same.

Consult: Saussure, *Monographie des guépes sociales* (Geneva, 1853-58); Ashmead, "Classification of the Entomophagous Wasps," in *The Canadian Entomologist* (Ottawa, 1899): "Classification of the Fossorial, Predaceous, and Parasitic Wasps" (ib., 1900); Fabre, *Insect Life* (London, 1901); Peckham, *On the Instincts and Habits of the Solitary Wasps* (Milwaukee, 1898); Howard, *The Insect Book* (New York, 1902): Lubbock, *Ants, Bees, and Wasps* (New York, 1882); Sharp, *Cambridge Natural History,* vol. vi. (London, 1901).

WASPS, THE (Lat. *Vespæ*, Gk. Σφῆκες, *Sphēkes*). A comedy by Aristophanes, produced in B.C. 422 at Athens. Its satire is aimed against the proneness of the citizens to go to law. In it Philocleon, an exaggerated sufferer from this mania, is cured by his son, Bdelucleon, by being persuaded to hold court at home. He passes favorable judgment on his own dog, charged with having stolen a Sicilian cheese. In the second half of the play Philocleon is shown as becoming gradually interested in art, and is thereupon congratulated by the chorus on his change of sentiment.

WASTE (OF. *wast, guast, gast, vast,* waste, devastation, from Lat. *vastus*, waste, desolate, vast; connected with OIr. *fas*, AS. *wēste*, OHG. *wuosti*, Ger. *wüst*, waste, desolate, desert). In the law of real property, any material injury caused or permitted to be done by a tenant of a particular estate to the property, and lessening the value of the estate of the reversioner or remainder-man. It is called *voluntary* where the damage is the result of some positive and willful act on the part of the tenant, and *permissive* where the tenant is unreasonably negligent in omitting to take proper measures to prevent the injury. Even though the tenant holds 'without impeachment of waste,' wanton acts of destruction may be restrained by a court of equity. A tenant may cut such timber as may be reasonably necessary for his own use, or to reclaim land suitable for agricultural purposes, but the destruction of timber to the detriment of the estate is waste. The destruction of ornamental trees will be restrained as waste by a court of equity. The removal of deposits of sand, gravel, clay, etc., and the opening of mines and quarries are waste, unless the premises are let for such purposes. If open mines, quarries, etc., exist on leased premises, it will be presumed that it was intended that the tenant should work them. The remedy for waste is an action at law for damages, or an application to a court of equity for an injunction. Consult the authorities referred to under REAL PROPERTY.

WASTE LANDS. A popular term for uncultivated and unprofitable tracts in populous and cultivated countries. They are very variable in character and include marsh or swamp lands (both fresh and salt), moors, peat bogs, steep and rocky lands, sand, arid lands (see IRRIGATION), 'galled' and gullied soils, and chalk downs. Their improvement is largely a question of expense. It is often more profitable to improve lands already cultivated, and to bring them into a higher state of cultivation and productiveness, than to reclaim waste lands. The means of reclamation are also very various and include drainage, manuring, mulching, irrigation on arid soils, growth of sand-binding plants on sandy soils, etc. The process of reclamation must as a rule be gradual, especially when the soil is naturally poor, and must include improvement of the physical condition of the soil by proper cultivation, cropping, etc., as well as increase of plant food by the use of manures and fertilizers, since the addition of even large amounts of the latter to very poor soils will not alone render them fertile.

WATAU'GA ASSOCIATION. In American history, the name given to the first compact of government west of the Alleghanies, signed by the settlers of what is now East Tennessee in 1772 and 1775. (See TENNESSEE.) Though the articles are lost, the general scheme is known. A legislative council of thirteen was chosen by the signers. This council elected five of their number to exercise judicial and executive functions, and the five chose a chairman. A sheriff and an attorney were appointed and courts were held regularly. Jurisdiction was assumed, however, over none but the signers, and in consequence outlaws from Virginia and North Carolina flocked in. In 1775 or 1776 the name Washington District was given to the territory, and in 1776, at their request, their representatives were given seats in the North Carolina Assembly. Consult: Ramsey, *Annals of Tennessee* (Charleston, 1853); and Caldwell, *Studies of the Constitutional History of Tennessee* (Cincinnati, 1895).

WATCH (AS. *wæcce*, from *wæccan, wacian, wacan,* to watch, wake; connected with Goth. *wakan*, OHG. *wahhēn*, Ger. *wachen*, to watch, Lat. *vigil*, watchful, wakeful, *vigere*, to be lively, Skt. *vājay*, to rouse). A small, portable machine for measuring time. The parent of the watch, as of the other modern timekeepers, was the ancient tower clock, the earliest example of which, known as De Wyck's clock, is described under CLOCKS. The invention of the spring to take the place of the weight to drive the wheel-train made the construction of a portable time-keeper possible. The first watches were made very early in the sixteenth century, Peter Hele, a clock-maker of Nuremberg, being usually credited with the invention. At first a straight spring was used, but this was soon replaced by a coiled spring. The first balance used in watches, termed a *foliot*, corresponded in its action to the suspended weights on a horizontal lever of an early clock. It consisted of a metallic rod terminating at each end in a heavy mass, the whole formed out of a single piece of metal. This was afterwards replaced by a wheel, in which the weight, accumulated mainly on the rim, took the place of the weights suspended on the ends of a bar. The first great improvement made in watch construction was the application of the coiled hair-spring to the balance-wheel. This invention was probably made by Hooke about 1658.

The earliest watches had little physical resemblance to their modern successors. One of the first was a cylindrical box of metal, chased and gilded, the lid pierced with an opening over each hour mark through which the hand could be seen. Others were made in many grotesque shapes and in all sizes from the diameter of a saucer to that of an ordinary lead pencil. Curious mechanism was as much prized as quaint form in these early timekeepers, and both seem to have been considered of more importance than the accurate measurement of time. Alarm watches, and repeaters, or striking watches, were great favorites. The earliest watches usually had but one hand. Enamel dials were first used in 1650. Jewels were first used as pivot bearings for watches about 1700.

The *fusee*, which was invented early in the sixteenth century, continued to be used in English watches until toward the close of the nineteenth century, although it had been discarded in the American machine-made watch many years before. The fusee is a spirally grooved cone, connected with the barrel which contains the main-spring by a chain, one end of which is fixed to the broadest part of the cone and the other end to the barrel. From the fusee the motion was communicated to the train, and the theory of its use was that in its unwinding it corrected the variations in the force of the main-spring and so equalized the power exerted upon the train. The equalizing effect is due to the fact that, when the spring is all coiled up and its force upon the barrel is greatest, the chain is acting upon the small end of the fusee and its leverage upon the fusee is least; but as the force of the spring diminishes, the chain having reached a broader part of the fusee, the leverage is increased, and the two are so adjusted to each other that the action of the spring modified by the leverage of the chain produces a uniform stress in the fusee. In most modern watches the great wheel forms part of the barrel and the diminishing power of the main-spring, as it uncoils, is neutralized by the escapement, with which the balance-wheel is connected. The later models of watch movements made by the American Waltham Watch Company are constructed with what may be properly designated as a 'detached barrel'—a method which gives greater strength to the barrel (of steel, instead of brass) and constitutes a safeguard against the breakage of the mainspring.

Almost immediately after the invention of the hair-spring attempts began to be made to introduce into watches an escapement which would produce greater accuracy than the vertical escapement at first used. The detached lever escapement described farther on is now commonly used in watches. Early in the history of both clock and watch construction it was noticed that variations in the temperature produced variations in the rate of going, the increase or diminution of the temperature affecting to some extent the moment of inertia of the balance-wheel and to a great extent the elastic force of the balance-spring. A rise in the temperature makes the balance expand, and therefore augments its moment of inertia; it adds to the length of the spring, and thereby diminishes its elasticity, the elastic force of a spring varying inversely as its length; and the time of vibration of the balance, which depends upon the moment of inertia directly and upon the elastic force of the spring inversely, is increased—that is, the watch goes more slowly—in consequence both of the increase of inertia and of the diminution of the elastic force of the spring. A fall in temperature is attended by opposite results, the watch going more rapidly. The importance of discovering some means for correcting these temperature variations was most evident in connection with marine chronometers, upon which navigators depend for reckoning their longitude at sea. Early in the eighteenth century John Harrison, who invented the gridiron pendulum for clocks and several other improvements in their mechanism, made the compensating balance, which was soon applied not only to chronometers, but to all high-grade watches. In the compensating balance, the balance-wheel is made of two metals—brass and steel—which are affected at unequal rates by temperature. The outer rim is of brass and the inner rim and cross arms of steel, the two metals being firmly united by fusion. To allow for an expansion, the wheel is made in two equal parts, joined by means of a cross arm as shown in Fig. 1. The increased expansive and contractile power of brass over steel is so utilized by proportioning in this combination of the two metals that the changing size of the balance-wheel automatically adjusts itself to the varying conditions of the hair-spring. It will be noticed (Fig. 1) that the balance-wheel is ballasted with tiny screws. Their object is twofold, to adjust the balance-wheel to the exact weight required to make the desired number of vibrations—18,000 per hour—and, by changing the positions of the screws, to adjust the effective weight of the balance-wheel on the diameter to meet changing conditions of temperature. Recent improvements in watch mechanism have been directed toward constructing a movement that shall not be affected by electrical disturbances. In order to accomplish this, the balance, roller, hair-spring, pallet, and fork are made of non-magnetic materials.

Briefly summarizing the steps by which the mechanism of the modern watch has been developed from De Wyck's model, we find: (1) The use of the spring as motive force; (2) substitution of balance-wheel, with hair-spring, for weights; (3) successive improvements in escapement; (4) introduction of enamel dials; (5) introduction of jewels as pivot bearings; (6) invention of compensating balance; (7) dis-carding of fusee; (8) introduction of automatic machinery for the construction of the parts.

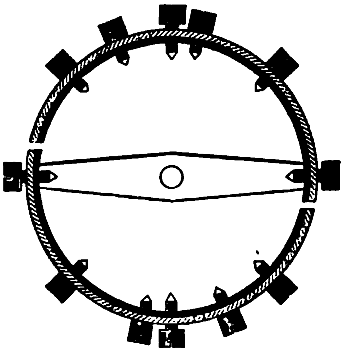


FIG. 1. BALANCE WHEEL.

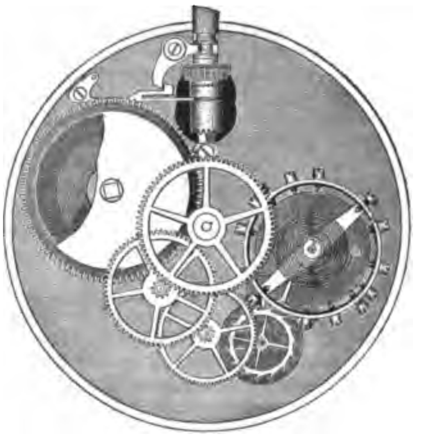


FIG. 2.

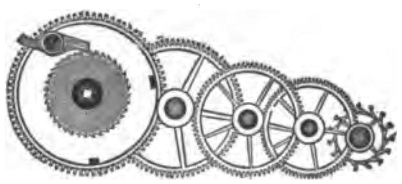


FIG. 3.

The mechanism or 'movement' of a modern American watch consists of a series of wheels called the *train*, the first of which, named the *barrel*, contains the main-spring, in which the power secured when the watch is wound up is stored. The train transmits to the desired points the motion stored up in the spring. At the end of the train is the *escapement*—a delicate and complex mechanism which so regulates the motive force stored up in the main-spring that it is expanded with uniformity and at the desired rate. The train of wheels is placed in a circular position as shown in Fig. 2 so as to accommodate the shape of the watch, but the order is best understood by arranging them in a straight line, as in Fig. 3. It has been seen that the first wheel of the train, the barrel, contains the main-spring and is therefore connected with the stem-winding attachment. A little click or pawl, working in the teeth of a ratchet fastened to the main-spring arbor, keeps the latter from running backward. The second wheel of the train, called the *centre wheel*, is always placed in the centre of the watch, because connected with it on the same staff are the wheels which drive the minute and hour hands. The centre wheel meshes into the *third pinion*, upon which the *third wheel* is firmly fixed. This turns the *fourth pinion*, which carries a wheel gearing into the *escape pinion*, upon which the *escape wheel* is carried. The second or centre pinion is attached to a centre staff, which projects through the main plate of the watch. Upon this projecting portion is mounted another pinion, which from its shape is called the *cannon pinion*. The minute hand is fitted upon the hub of this pinion and its teeth drive a little wheel which is commonly known as the minute wheel. Attached to this wheel is still another pinion geared to drive the hour wheel, which is mounted on the long hub of the cannon pinion. Upon the hub of the hour wheel the hour hand is placed. The number of teeth on each of these wheels and pinions (which are generally called the *dial wheels*) is so arranged that while the cannon pinion, carrying the minute hand, makes a complete revolution in one hour, the hour wheel, carrying the hour hand, revolves once in twelve hours. The stem attachment for setting the watch is connected with one or other of these dial wheels.

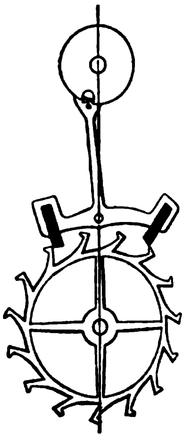


FIG. 4.

Returning now to the wheel train, we find that the fourth pinion has a pivot which projects through the frame plate and upon this pivot the second hand is mounted. Hence it is necessary that the fourth pinion and wheel should make a revolution once a minute, or 60 times as fast as the centre staff. This is accomplished by means of the proportioning of the centre wheel, third pinion and wheel, and fourth pinion to each other. Considering, now, the last wheel of the train and its various attachments, which are grouped together under the general name of *escapement*, we find that the group consists of seven members: The *escape wheel*, the *pallet*, the *fork*, the *roller* and *roller pin*, the *balance-wheel*, and the *hair-spring*. The use of each part is explained farther on. The combined object of the whole group is to stop and then set in motion again, at regular intervals, every wheel in the train—an action which causes the familiar tick of the watch. The teeth of the escape wheel, instead of being cut on the epicycloidal curve like the other teeth of the train, so as to convey motion with as little loss of power as possible, are constructed with an entirely different object and in an entirely different form. They form a series of fifteen hooks. An anchor-shaped piece, called the pallet, is so hung that first one and then the other of its horns is locked into the tooth of the escape wheel as it revolves. These locking horns are usually made of some precious stone. The unlocking is accomplished by a lever called the fork, which is attached to the pallet. The action of the fork is controlled by the balance-wheel by means of a little disk under the balance-wheel called the roller. On the outer edge of this disk is the roller pin, which alternately engages and releases the fork. It has already been shown that the action of the hair-spring on the balance makes its vibrations isochronous; by means of the fork disengaging at regular intervals the teeth of the escape wheel from the pallet and so freeing the whole train, this isochronous motion is conveyed to the entire watch train. Fig. 4 of the accompanying cuts shows the action of the fork, roller, roller pin, pallet, and escape wheel, while Fig. 5 shows the hair-spring connected with the balance, with the roller and roller pin underneath.

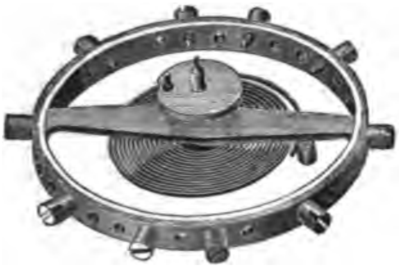


FIG. 5.

WATCH MANUFACTURE. In England and Switzerland watch-making was early developed as a household industry. Among the Swiss, in particular, it gave employment to thousands of men, women, and children in their homes, the industry being so far subdivided as to consist of over a hundred distinct branches; and the Swiss finally became the watch-makers for the world. Various attempts, beginning as early as 1809, were made in the United States to make watches by hand after the Swiss plan; but the price of labor was too high and the laborers too inexperienced, so that each attempt ended in failure. The idea of manufacturing watches by using machinery to make uniform and practically interchangeable pieces, first occurred to Aaron Dennison, a Boston watch-maker, about 1848, who was familiar with the methods and machinery employed for the manufacture of army muskets, at the United States Armory at Springfield, Mass. His original plan was to gather under one roof several labor-saving machines already in use in Switzerland for some of their watch-making processes; to supplement these by new contrivances; and to run them all by one power. He formed a small company, which built its first factory at Roxbury, Mass. But the Swiss authorities passed a law prohibiting the exportation of machines, models, or drawings, so that the pioneer company was obliged to construct its own machines. Its first machine-made watch was turned out in 1853. Subsequently the works were removed to Waltham, Mass., where the company was reorganized under the name of the American Watch Company.

It has been claimed for the watch-making industry that it has caused the invention of a greater number of mechanical appliances than any other, with the possible exception of electricity. Not only ingenuity, but the greatest accuracy and delicacy, is required of the machinery used in watch-making. For instance, the finest screws used in a small-sized watch have a thread of 260 to the inch and weight 1/30,000 pound. The wire of a hair-spring, though a foot long, weighs 1/15,000 of a pound. The jewel work is extremely minute. A pallet jewel weighs 1/150,000 of a pound and a roller jewel much less. The advantages of producing all these minute parts by automatic machinery, besides cheapness and rapidity of production, are the greater accuracy of the parts and the possibility of replacing a broken part with an exact duplicate.

The following is an outline of some of the principal processes: The plates which support the mechanism of the watch are turned on lathes and perforated for screws, arbors, and the like, by drills. The arbors, staffs, and pinions on which the wheels and other moving parts work are also turned on lathes. The teeth in the wheels and pinions are formed by cutters or by saws. The screws, big and little, are made by machines which cut the threads and finish the heads both for appearance and accuracy. The metal of the balances has to be compressed with great care to secure uniform density, by means of hammers or rollers. It must then be faced and recessed by lathes, tapped by drills, finished, and glossed. The springs are drawn, flattened, finished, and coiled by special machinery.

Recently a branch of the watch-making industry has been developed devoted exclusively to the production of low-priced watches. The pioneer among the low-priced watches was the Waterbury, which was patented by D. A. Bucke in 1878. Its cheap production was largely due to improvements in the old duplex escapement, which made it possible to stamp out its parts with an ordinary die. Within recent years some of the clock companies have begun making low-priced watches as a by-product connected with clock manufacture. These cheap watches are made exactly like small spring clocks. The parts are stamped out, no jewels are used, and very little time is devoted to testing and adjustment. For watches of this type, of which the extreme of cheapness is the 'dollar watch,' which is probably sold at wholesale for not more than 60 cents, an enormous demand has arisen. Most of these establishments are located in Connecticut and New York, and a single one of them had, in 1900, a daily output of 2000 watches.

The manufacture of watch cases is now conducted by all better-grade manufacturers as a separate industry. The movements are made to standard sizes and qualities and then sold at wholesale to jobbers, and also to watch-case manufacturers. The watch-case industry had a rapid development toward the close of the nineteenth century and is now one of great importance. Most of the work is performed by automatic machinery. Gold, silver, nickel, and gun metal are used, besides various alloys known under the trade names of silveroid, nickel silver, etc. The popular gold-filled case was patented in 1859 by James Boss, of Philadelphia. Open-face watches have become very popular, thick beveled-edge glass rendering the case as reliable a protection as the extra gold cover of the 'hunting' watch and more nearly dust-proof.

STATISTICS. The following statistics, as published in the section on "Watches and Watch

Cases" in the Department of Manufactures of the Twelfth United States Census, indicate the growth of the industry in the United States. This report shows that in 1900 43 establishments in the United States were reported to be engaged in the manufacture of watches and watch cases. The capital invested is stated to be $22,754,483 and the value of the product for the year $14,606,571. Of these establishments only 13, with a combined capital of $14,235,191, were engaged in the manufacture of watch movements. The tendency of industry to concentrate in large establishments is shown in the growth of this industry: in 1870 there were 37 watch-movement factories in the country, or 24 more than in 1900; but their combined capital was reported as only $2,666,133, and the annual value of their product at $2,819,080.

Bibliography. Although there are many foreign books devoted to the history of watches and to foreign practice, very little has been written regarding American history and methods. For the former phase of the subject, consult bibliography under Clocks; Manufactures, vol. x., part iv. of the Twelfth United States Census, contains valuable historical and statistical matter. *The Journal of the Franklin Institute* contains a lecture by E. A. Marsh, December 14, 1894, on "The History of Watch Making." He is also the author of *Evolution of Automatic Machinery in America* (Chicago, 1896), and of a chapter on the "American Watch Company," in the *History of Middlesex County, Mass.*, published by J. Lewis & Co. *Appleton's Journal* for July 2 and 7, 1870, contains an article on "Watchmaking in America," which includes a good account of the early history of timekeepers.

WATCH (AS. *wæcce*, from *wacian*, *wæccan*, Goth. *wakan*, OHG. *wahhēn*, Ger. *wachen*, to wake, watch; connected with Lat. *vigil*, wakeful, watchful). A term used to designate the part of a ship's company that is employed in working her at one time. The deck force is divided into starboard and port watches, and the fire-room and engine-room forces usually into three watches. The starboard and port watches are commonly subdivided into first and second parts called quarter watches, though when only a 'quarter watch' is on deck for duty it constitutes 'the watch' for the time being. In cases of emergency, or when the ship is getting under way, coming to anchor, or performing some other evolution requiring all available men, both watches ('all hands') are called. In port all hands are at work during 'working hours,' but only an *anchor watch* (q.v.) is on deck at night except in unusual circumstances. The term watch is also used to designate the period of time during which a watch of men are on deck. This time is two or four hours. The watches are named as follows: mid-watch (midnight to 4 A.M.), morning watch (4 to 8 A.M.), forenoon watch (8 A.M. to noon), afternoon watch (noon to 4 P.M.), first dog-watch (4 to 6 P.M.), second dog-watch (6 to 8 P.M.), first watch (8 P.M. to midnight). The dog-watches are designed to shift the order of the watch so that the same men will not have the same watch every night.

WATCH AND WARD. In the old English law a phrase employed to describe the supervision and care of police officials. See Blackstone's Commentaries.

WATCH HILL. A summer resort in the town of Westerly, R. I. See Westerly.

WATCH OFFICER. Officers who have transatlantic steamers there are usually two officers. The number of such officers depends upon the character of the vessel. In many large transatlantic steamers there are usually two officers on watch at a time. In large naval vessels midshipmen act as junior officers of the watch under the regular watch officers, who are lieutenants or ensigns. The watch officer actually on duty is called the officer of the deck (q.v.) or officer of the watch.

WATER, H_2O. A chemical compound of hydrogen and oxygen, formed by the union of two volumes of the former with one of the latter, or, what is the same, containing 11.136 per cent. by weight of hydrogen and 88.864 per cent. of oxygen. (See Chemistry, especially historical section.) It is formed by the direct explosive union of its elements at a somewhat elevated temperature. This, however, need not be maintained, during the reaction, by the introduction of heat from outside sources; for the heat developed by the reaction itself (67,500 gram-calories for every 18 grams of water formed) is not only sufficient to maintain the temperature necessary for combination, but, in the absence of indifferent gases or of an excess of one of the reacting gases, raises the temperature to 2844° C. (5151° F.). At this temperature about one-third of the reacting gases combine, the other two-thirds combining gradually during the subsequent cooling. The reaction may be started by platinum sponge or platinum black (forms of finely divided platinum), or other catalytic agents (see Catalytic Action), such as charcoal, pumice stone, porcelain, rock crystal, glass, etc.; with some of these substances, however, it is necessary besides to apply heat, although the initial temperature need not be quite so high as in their absence.

Liquid Water. Water is well known in the three states of aggregation—liquid, solid, and gaseous. Under normal atmospheric pressure, water is liquid between 0° C. (32° F.), its freezing point, and 100° C. (212° F.), its boiling point. Its greatest density is at about 4° C. (39.2° F.), at which temperature one cubic centimeter weighs, *in vacuo*, one gram. Its specific heat exceeds that of any other substance except hydrogen, the amount of heat required to raise the temperature of one gram from 18° to 19° C. being the most generally adopted unit of heat—the so-called gram-calorie. Water is practically incompressible, one million volumes becoming less by only fifty volumes when the atmospheric pressure is doubled. When viewed through layers of considerable height, pure water is seen to possess a bluish tinge. Soft potable waters have a brownish color. Water containing traces of calcium carbonate in suspension appears opaque if viewed through a sufficiently high column; but the opacity is gradually destroyed if carbonic acid gas is passed into the water, the color of the latter meanwhile changing gradually through brown, yellow, and green, to blue. On the strength of this observation, it has been suggested that the colors of natural waters may be due in part to the varying amounts of carbonic acid contained by them, although the nature of the bottom and the color of the sky largely determine the color of waters, beyond doubt. Liquid water is a poor conductor of heat, and when perfectly pure is one of the poorest known conductors of electricity. The purification of water for scientific purposes is best effected by distillation. An efficient method consists in dissolving a small amount of potassium permanganate in a quantity of ordinary water, allowing to stand for a day, then adding a further amount of potassium permanganate and some caustic potash and distilling, preferably in an apparatus provided with a platinum condenser (the metal of the apparatus must be free from lead); the first portions of the distillate should be rejected, and the distillation should be interrupted after about four-fifths has passed over; the intermediate portion may be further purified by dissolving in it a small amount of acid potassium sulphate and redistilling. Natural waters may be classified according to their origin. *Rain water*, which forms by the condensation of the aqueous vapor more or less abundant in the air, is the purest of all natural water, although it takes up foreign substances in its passage from the clouds to the earth, and always contains ammoniacal salts, sodium chloride, and other inorganic salts, as well as traces of organic matter of various kinds. Rain water collected in places where much coal is burned invariably contains traces of sulphuric acid derived from the oxidation of the sulphur from the pyrite present in most coals. *Surface water*, which includes the water from rivers, is of course less apt to be pure than rain water, its character being determined largely by the nature of the soil over which it passes, and by the vegetation on the surface. The mineral ingredients are usually carbonates, chlorides, and sulphates of the alkalies and alkaline earths, with small quantities of iron and manganese, while the organic matter is of vegetable origin. *Well water* is that derived from wells or bore-holes made in the surface of the earth, and includes the water from shallow wells and that from deep wells. The shallow wells serve chiefly as the source of domestic supply, especially in country districts, and their water is liable to contamination from sewage and other refuse animal matter, owing to the fact that they are invariably sunk in the immediate vicinity of human dwellings. It is to such sources that epidemics of typhoid fever and similar diseases are often traced. Nitrates, nitrites, and ammonia are the constituents commonly found in such waters, and their presence indicates contamination of a dangerous character. Wells more than 100 feet in depth, and especially *artesian* wells, are used as sources of water, chiefly in cities, for manufacturing plants, which contains only mineral ingredients. *Mineral waters* possess more or less marked medicinal properties, in consequence of the considerable amounts in them of substances capable of exercising various physiological effects. Such waters are classed according to their temperature into cold, tepid, warm, or hot, and according to their ingredients into alkaline, alkaline-saline, saline, and acid waters. The alkaline waters are those that contain the alkaline carbonates, and, owing to the presence of free carbon dioxide, are sometimes designated as 'carbonated waters.' The alkaline-saline waters include those in which there is a mixture of carbonates with sulphates or chlorides, and are subdivided according to the predominance of the acid constituent into sulphated, muriated, and borated. The saline waters are those which contain a predominance of sulphates or chlorides, and are similarly subdivided into sulphated, muriated, and borated; while the acid waters are those that contain free sulphuric, hydrochloric, or silicic acid. Sometimes these four classes are further subdivided according to their predominant basic solid constituents; thus when the sodium or lithium salts predominate, the water is known as *sodic* or *lithic*, etc. *Sea water* is the water which forms the ocean; and as it is constantly receiving the waters more or less impure from rivers, and at the same time losing pure water in the form of vapor by means of evaporation, the impurities remain behind, and have given to this water its well-known saline character. An analysis of sea water shows traces of nearly every known element, and its salinity varies in different parts of the world. When it freezes the resulting ice is nearly, though not quite, free from salt. Waters are distinguished as *hard* and *soft* according as they contain large or small quantities of calcium or magnesium salts in solution, and this fact may be determined by an examination with a soap solution, the addition of which causes the formation of lather when the quantity added is sufficient to have rendered the water soft.

ICE OR SOLID WATER. The passage of water from the liquid to the solid state is accompanied by an expansion equal to about one-eleventh of its volume; hence water freezing in pipes may easily cause them to burst. The normal freezing-point of water varies but slightly with the external pressure; considerable pressures, however, cause a marked depression of the freezing-point (q.v.). Besides, if carefully kept out of contact with the air, water may be readily under-cooled to temperatures far below its freezing-point; it is then, however, in an exceedingly unstable state, and mere contact with a sharp-edged body, or especially exposure to the air, causes the entire mass to freeze very rapidly, the temperature simultaneously rising to the normal freezing-point. The heat developed during the freezing of one gram of water is 79.06 calories. Natural ice is transparent and highly coherent. Ice of similar properties is obtained artificially when the cooling medium employed is only about one degree below the freezing-point; the ice formed at lower temperatures occludes minute globules of air, and these render it whitish and more or less opaque.

WATER VAPOR, OR GASEOUS WATER. This is a normal constituent of the atmosphere (q.v.). The passage of one gram of liquid water into steam at 100° C. (212° F.) involves the absorption of as much as 536 calories of heat. At every temperature water-vapor can only exist below a certain maximum of pressure, viz. the vapor tension of water at that temperature. Under that pressure the vapor is said to be 'saturated.' Stronger pressure causes liquefaction, unless the temperature is above the critical point, which, according to Nadejdin, is about 258° C. (about 496.5° F.). (See CRITICAL POINT.) Water vapor is colorless and perfectly transparent, unless it is allowed, in the saturated state, to escape into the cold air, when condensation causes the formation of minute bubbles that produce the characteristic appearance of steam.

BIBLIOGRAPHY. Déhérain, *Etudes pour servir à l'histoire de la chimie. La découverte de la composition de l'eau* (Paris, 1860); Nichols, *Water Supply* (New York, 1882); Davis, *A Treatise on Steam-Boiler Incrustation, and Methods for Preventing Corrosion and the Formation of Scale; also a Complete List of all American Patents issued by the Government of the United States from 1790 to July 1, 1884, for Compounds and Mechanical Devices for Purifying Water, and for Preventing the Incrustation of Steam Boilers* (Philadelphia, 1884); Davis, *An Elementary Handbook on Potable Water* (Boston, 1891); Wanklyn and Chapman, *Water Analysis* (London, 1891); Greenwell and Curry, *Rural Water Supply* (London, 1895); Mason, *Water Supply* (New York, 1896); Thresh, *Water and Water Supplies* (London, 1896); Fuertes, *Water and Public Health* (New York, 1897); Rideal, *Water and Its Purification* (London, 1897); Crook, *The Mineral Waters of the United States* (New York, 1899); Leffmann, *Examination of Water for Sanitary and Technical Purposes* (4th ed., Philadelphia, 1899). See WATER PURIFICATION; WATER SUPPLY; WATER-WORKS; WELL-SINKING, etc.; together with the accompanying bibliographies.

WATER BABIES, THE. A fanciful tale by Charles Kingsley (1863).

WATER BED. A rubber bed-tick, designed to be filled with water and to take the place of an ordinary mattress on a sick-bed. Its use decreases the probability of the formation of bedsores (q.v.). Objections to it are its great weight when filled, necessitating a very strong bedstead, and its liability to become cold, thus chilling the patient, and the difficulty of drawing off the contents and replacing them with warmer water. The air bed, constructed on the same principle, meets all the indications and is free from all the objections. It is provided with a valve-stem through which it may be inflated with a bicycle air-pump.

WATER-BEECH. See HORNBEAM.

WATER-BEETLE. Any beetle which lives in or upon the water; more specifically, one of the true water-beetles or 'water-tigers' of the family Dytiscidæ. They live in the water both as larvæ and as adults, although they are probably modified terrestrial insects resembling the ground-beetles of the family Carabidæ. The pupa is terrestrial. They are elliptical convex insects with the hind legs formed for swimming. The wing-cases fit perfectly to the body except at the tip, so as to form an air-tight space above the body proper. This space is the air-chamber, and the beetle rises to the surface of the water, exposing the tip of its body and drawing in a supply of air which will last it for some time, when it goes below the surface again. The larvæ of the true water-beetles are very rapacious, and suck the juices of small, soft aquatic insects. The mandibles are hollow, with a hole near the tip and another at the base, thus being fitted for suction. The water-beetles are more numerous in temperate and boreal than in tropical regions. About 1800 species are known, of which nearly three hundred inhabit the United States.

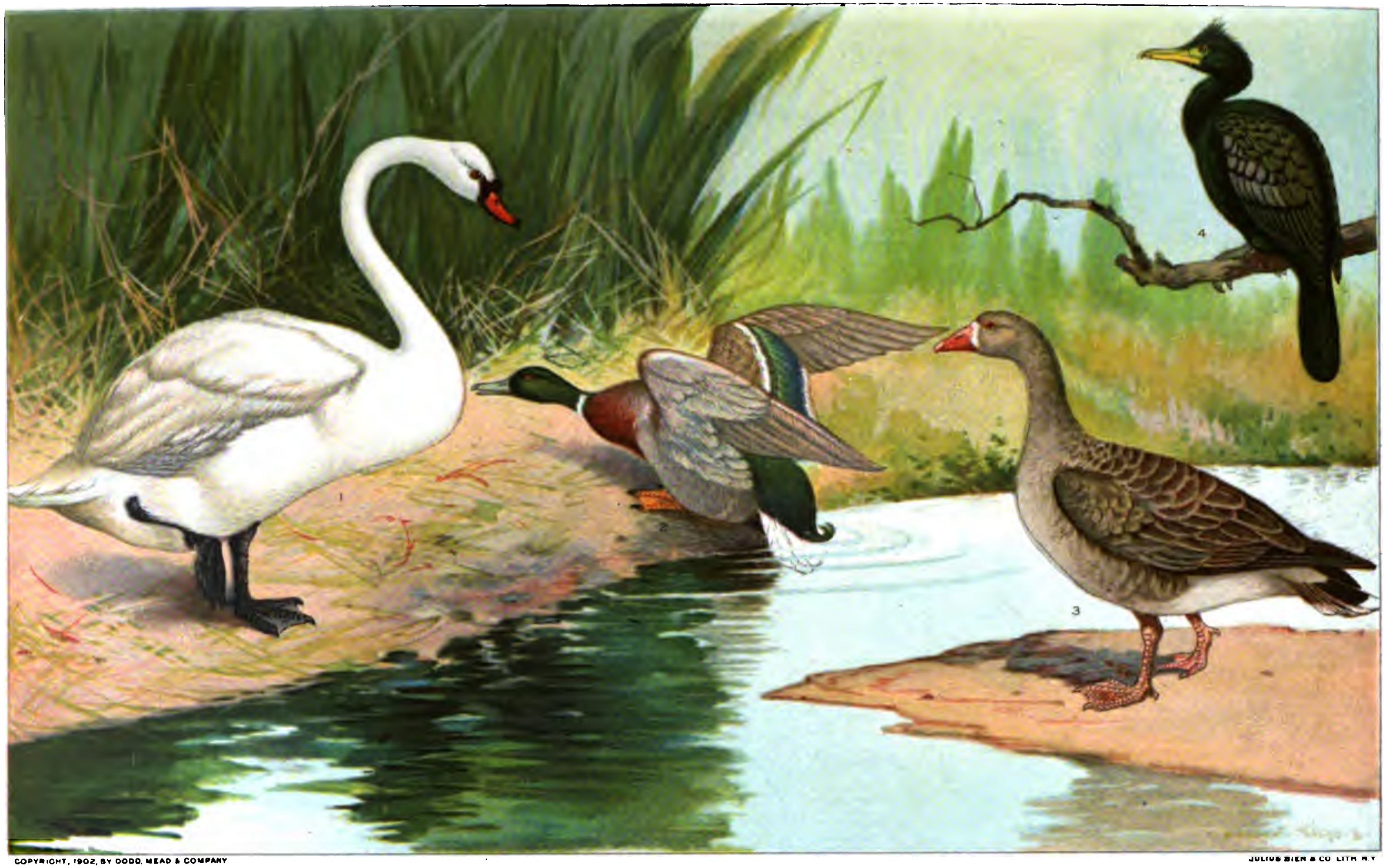
Whirligig beetles of the family Gyrinidæ are small oval forms which swim about on the surface of the water, usually darting in curious curves, from which habit the popular name is derived. They can dive, carrying with them a small supply of air, but their proper life is on the surface. The two hind pairs of legs are so modified as to form paddles. The larvæ are aquatic and are elongate with sharp mandibles. They are carnivorous in the larval stage as well as in the adult. About 300 species are known, of which nearly forty occur in the United States.

The water-beetles of the family Hydrophilidæ are sometimes called 'water scavenger-beetles.' The larvæ are predaceous and carnivorous, but the adult beetles are, as a rule, vegetable feeders, though they will prey upon small aquatic animals. They are usually dark-colored, of elliptical shape, and do not swim as readily as do the other water-beetles, nor is the supply of air which may be carried as extensive as with the others. Many species construct egg-cocoons, which are sometimes attached to the body of the beetle and sometimes to aquatic plants; and frequently unattached, floating on the surface of the water. From 20 to 100 eggs are laid in each cocoon. About 1000 species are known, and of these 150 are found in the United States, and about 90 in England. Other beetles, such as the Amphizoidæ and Pelobiidæ, live in the water in their early stages. The strangely modified parasitic beetle, *Platypsyllus castoris*, found commonly upon the beaver, might also with justice be called a water-beetle. Consult Miall, *The Natural History of Aquatic Insects* (London, 1895).

WATER-BIRDS. A group of birds alike in their adaptations to an aquatic life. Such are the sea-birds, or Steganopodes, well represented by the cormorant; the auk tribe, gull tribe, and other marine groups; and the great tribe of fresh-water aquatic birds represented by the swans, geese, and ducks. All water-birds are swimmers and divers, and are more or less completely web-footed, furnishing them both with paddles and with broad supports in walking upon muddy shores. All get their food mainly from the water—fish, amphibians, reptiles, shell-fish, and small aquatic animals; or else aquatic vegetation. Their plumage is dense, oily, and, except in the ducks, usually of plain black, white, and brown colors; they nest on the ground, as a rule, laying unspotted eggs, except auks, gulls, etc.; and the fresh-water section affords many birds most esteemed for food and sport, and several domesticated species of great value. See Colored Plate of WATER-BIRDS.

WATER-BOATMAN. An aquatic bug of the family Corixidæ, in which the head is free, capable of great rotation, and attached to the thorax only by a narrow area. The water-boatmen, as a rule, are mottled bugs of oval shape, found commonly swimming on the surface of ponds and streams. They are quite at home beneath the water as well as on the surface, and remain there for a long time, since the fine hairs which cover the body retain a film of air. They hibernate in the mud at the bottom of ponds or streams. The eggs are laid under water, and are attached to the stems of aquatic plants.

WATER BIRDS



COPYRIGHT, 1902, BY DODD, MEAD & COMPANY

JULIUS BIEN & CO LITH N.Y.

1 MUTE SWAN - CYGNUS OLOR 1/10 NATURAL SIZE
2 MALLARD DUCK - ANAS BOSCHAS 1/10 „ „
3 GRAYLAG GOOSE - ANSER CINEREUS 1/10 NATURAL SIZE
4 AFRICAN CORMORANT - PHALACROCORAX AFRICANUS 1/10 „ „

When their pools dry up they fly to other water, and are sometimes attracted to lights at night. About forty species occur in the United States, all belonging to the genus Corixa. The eggs of *Corixa mercenaria* and *Corixa femorata* are laid in enormous numbers in the lakes near the City of Mexico, and are made into cakes with meal by the natives and half-breeds. The adults are also eaten in Mexico and in Egypt.

WATERBRASH. See PYROSIS.

WATER-BUCK, or KOB. One of the large marsh-loving African antelopes of the genus Cobus, several species of which go by other names, as 'singsing' (q.v.). The water-buck proper (*Cobus ellipsiprymnus*) is more than four feet tall, and remarkable for its long, shaggy, reddish coat. It is numerous all over Southern and Eastern Africa, roving in small bands about stony hills near the marshy rivers, to which it runs for refuge when alarmed. Its flesh is very poor for eating. See Plate of ANTELOPES.

WATER-BUFFALO. See BUFFALO.

WATER-BUG. In general terms, any aquatic insect of the order Hemiptera, including all of the members of the six families composing the group Cryptocerata or Hydrocorisæ, as well as the Hebridæ and Hydrobatidæ. (See WATER-STRIDER.) The families Corixidæ (see WATER-BOATMAN), Nepidæ (see WATER-SCORPION), Galgulidæ (see TOAD-BUG), and Belostomidæ (see FISHKILLER) belong to this group.

The back-swimmers of the family Notonectidæ are predaceous water-bugs resembling the water-boatmen, but the dorsum is very convex and they always swim with the ventral surface upward, a habit which distinguishes them from all other water-bugs. The female pierces holes in the stems of water-plants for her eggs. The adults hibernate in the mud at the bottom of streams and ponds. About a dozen species are known to inhabit the United States.

The creeping water-bugs of the family Nauconidæ are small, flat-bodied, oval water-bugs found in ponds containing plenty of vegetation, on which the creepers crawl, or about which they swim, feeding upon land-insects which have accidentally fallen into the water.

The marsh-treaders of the family Hydrometridæ resemble the water-striders, but are more slender and delicate. The adults of our commonest species (*Hydrometra lineata*) hibernate under rubbish along the banks of slow streams and ponds, and lay their eggs singly, on the stems of aquatic plants. The larvæ fall into the water and remain near the bank, feeding upon the bodies of insects which fall into the stream. The only other true bugs which are in any way aquatic belong to the family Hebridæ, which contains very small species of semi-aquatic habits, being found in very wet moss and damp littoral vegetation. The common cosmopolitan German cockroach or croton bug (*Ectobia germanica*) is often called 'the water-bug' in the United States, since it frequents the vicinity of water-pipes in houses. See COCKROACH.

WATERBURY, wa̤'tĕr-bĕr-ĭ. A city in New Haven County, Conn., 33 miles southwest of Hartford, on the Naugatuck River, and on the New York, New Haven and Hartford Railroad (Map; Connecticut, C 3). It is attractively situated. There are three parks: the Green, Hamilton Forest, and South. Riverside Cemetery has great natural beauty. Among the educational institutions are Saint Margaret's Diocesan School for Girls, the Convent of Notre Dame, and Gerard School. The Bronson Library contains 57,500 volumes. Other noteworthy features include the Southmayd Home for Old Ladies, Waterbury Hospital, the city hall, Masonic Temple, Odd Fellows' Block, and the Soldiers' Monument. Waterbury has long been known for its large industrial interests. It is the leading centre of the United States for the manufacture of brassware (including castings and finishings). The famous Waterbury watches also are made here. There are also foundries and machine shops, knitting mills, and manufactories of buttons, stamped ware, lamps and reflectors, clocks, needles and pins, plated and Britannia ware, hosiery, automatic machinery, etc. The capital invested in all industries in the census year 1900 was $23,421,640, and the value of the output was $33,778,905. The government is vested in a mayor, chosen biennially, and a unicameral council. Of the subordinate officials, the majority are appointed by the mayor, subject to the confirmation of the council. The Board of Education, however, is chosen by popular vote. The water-works are the property of the municipality. They were constructed in 1866, and represent an expenditure of $1,470,908. For maintenance and operation, the city spends annually about $423-000, the main items being: schools, $180,000; interest on debt, $61,000; police department, $41,-000; fire department, $34,000; streets, $25,000; and municipal lighting, $22,000. Population, in 1890, 28,646; in 1900, 51,139.

Settled in 1677, Waterbury was part of Farmington until 1686, when it was incorporated as a town and its present name adopted in place of the old Indian name, Mattatuck. In 1691 it suffered greatly from a flood, and in 1712 an epidemic, called the 'Great Sickness,' carried away one-tenth of its inhabitants. It was incorporated as a city in 1853. In 1900 the town and city of Waterbury were united into one municipality. Consult Anderson (editor), *The Town and City of Waterbury* (3 vols., New Haven, 1896).

WATER-CALTROPS. Aquatic plants. See TRAPA.

WATER-CHESTNUT. The edible seeds of the Trapa natans, called by the French *marron d'eau*. In China the fruit of Trapa bispinosa, known as *ling ko*, is common, it having been included among the five food grains of China. The seeds do not keep well, and those offered in bazaars are often decayed. The fresh nuts resemble chestnuts in taste. The name water-chestnut is also given to the edible tubers of the *Eleocharis tuberosus*, a plant of the natural order Cyperaceæ, which is cultivated by the Chinese in tanks very abundantly supplied with manure. It is destitute of leaves, except a slender short sheath or two at the base of each culm. The tubers are produced on stolons. They are in high estimation among the Chinese for food, and are eaten either raw or boiled. They are called *pi-tsi* or *maat-ai*.

WATER-CHINQUAPIN. See LOTUS.

WATER-CLOCK. See CLEPSYDRA.

WATER-CLOSET. See PLUMBING.

WATER-COLOR PAINTING (AQUARELLE). The process of painting by means of colors mixed with water and some adhesive, as gum or size, instead of oil. The term is now generally used for such painting upon paper which shows through as a ground. It differs from gouache painting, in which the color is applied in successive layers, as in oil. The processes of painting in vogue before the introduction of oil colors were, for the most part, varieties of water-color, as, for example, fresco-painting (q.v.), in which water-colors are applied to the wet line of the plaster, and tempera (q.v.). For the technique of painting among the Egyptians, Greeks, and other ancient peoples, whose works, although they made use of water-colors, are not aquarelles in the modern sense, see PAINTING, EGYPTIAN ART, etc.

In early Christian miniatures and book illustrations water-color was the medium usually employed. They were designed with the silver point, drawn with the pen, and then colored with light tints. During the Byzantine and Romanesque periods the more elaborate gouache technique was preferred, but the Gothic age saw a revival of the aquarelle. From the treatise of Cennini, a disciple of Giotto, we know that these illuminators had greatly advanced upon their predecessors; they had an elementary knowledge of light and shadow and used about the same variety of colors as contemporary panel painters. In the later fifteenth century water-colors were extensively used in the coloring of prints from wood engravings, and to some extent of those from line engravings, a practice which lingered until the seventeenth century. They were also extensively used during this period in drawings and in colored sketches by many of the principal masters.

Such, indeed, was the origin of modern water-color. It was the custom of Dürer, and certain of the German, Dutch, and Flemish artists, to outline drawings with a reed pen and fill in those outlines with an auxiliary flat wash. Gradually the hard lines were replaced by touches with the brush, and the result was a monochrome in browns, and grays, bistre, or Indian ink. These again came to be tinted, and so suggested the full use of colors. Rembrandt often drew in brown, and added dashes of strong color; and Rubens produced something very like modern water-color drawings. The modern art became emancipated from the old traditions by "gradual disuse of the old shadow tint, and imitation of the local color, not alone of the objects themselves, but of every modification resulting from light, dark, half-tint, or distance, a method which at once led to far greater truth and richness than could ever have been attained by merely passing color over the universal shadow tint." The stained drawing gradually gave way to the more perfect tinted drawing. But the tinted style predominated till 1790; and it may be said that the water-colors of the eighteenth century were tinted monochromes. Artists who used the stained and tinted manner were Malton (1726-1801), Paul Sandy (1725-1809), often called, though without justification, 'the father of water-color art;' also (all in the last half of the eighteenth century) Grimm, Webber, Clevely, Pars, and Rooker. Wheatley, Westall, and Gilpin used water-colors as well as oil. Rowlandson, Cristall, Hills, Wright, Mortimer, Gresse, Hearne, J. R. Cozens, and Dayes greatly promoted the growing art. Nicholas Pocock (1749-1831) displayed a new richness and force. John Smith first advanced beyond the weakness of mere tinting. Thomas Girton (1773-1802) attained great richness of tone and breadth; his compositions were grand but simple; he massed light and shade in broad and sometimes abrupt forms. J. M. W. Turner (1775-1851) soon distanced all his predecessors and contemporaries, and in his hands water-color painting became a new art. He wholly abandoned preliminary tinting; minute details are imitated in local color; and his work is marked by breadth, fullness, and warmth, as well as grace. Other important names are those of Varley, Samuel Prout, Peter de Wint, Cotman, David Cox, Copley Fielding, Hunt, Cattermole, Lewis, Birket, Foster, Herkomer, Burne-Jones, Walter Crane, etc.

The impetus toward water-color in France first came in the early twenties from the Englishman Bonington and from Géricault. It was soon practiced by all important artists, among whom Delacroix, Isabey, and especially Decamps achieved most remarkable results. Among celebrated French aquarellists of a later date were Leloir, Meissonier, Regnault, Detaille, and Vibert, among figure painters; and Jaquemart, Harpignies, Français, and others among landscapists. The very popular fan painting upon silk and satin is done with water-colors, which have lately been applied, with high success, to paintings upon canvas and other materials as well. In Germany water-colors were used by Schwind with great effect in the portrayal of his dream-like fables, but the first important German aquarellist was Hildebrandt, a pupil of Isabey. Other important representatives are Menzel in Berlin, Karl Werner, and Fielder (Triest). Both in Holland (Israels) and Belgium are flourishing schools, and in Spain and Italy the example of Fortuny gave rise to a particularly brilliant development.

In the exhibitions of water-color paintings yearly held in the United States, particularly in New York, great variety in technique and subject is seen, but no distinctive American 'school' has as yet been developed. Among the artists prominent in figure painting are Winslow Homer, William M. Chase, C. Y. Turner, Robert Blum, Irving R. Wiles, Thure de Thulstrup, and Mrs. Rhoda Holmes Nichols; in landscape may be mentioned Alexander Wyant, J. Francis Murphy, Samuel Coleman, R. Swain Gifford, Henry Farrar, and Childe Hassam; in marine painting, William T. Richards and Charles A. Platt; and in architecture, Harry Fenn and Hughson Hawley.

At present water-color paintings may be divided into three kinds: (1) those in which the coloring is mainly transparent; (2) where it is usually opaque; (3) where transparent, semi-transparent, and opaque colors are freely used in combination. The quick drying of water-color pigments is favorable to rapid execution, and greater clearness of color is attained than is practicable in oils. They are especially adapted to sketches of all kinds, and the rendering of fugitive impressions, and retain color far better than oil paintings. The progress of the art has been greatly promoted by modern chemical developments in the preparation of the colors—great variety of really permanent colors being now procurable. These are various pigments ground with gum or other mucilage, and may be kept in cakes, the usual vehicle for moistening and applying them being gum arabic and water. But for artists they are now usually prepared so as to be kept moist in small earthenware pans or metallic tubes.

The earliest organized society for the promotion of the art was the British Society of Painters in Water-Colors, founded in London in 1804, and known since 1882 as the Royal Society, which has held exhibitions since 1805. Societies exist in other countries where the art is practiced. The Société des Aquarellistes Français in Paris was founded in 1879, before which aquarelles were exhibited in the Salon. The American Society has held yearly exhibits in New York since 1867. The South Kensington Museum possesses what is probably the finest collection of water-colors in existence.

BIBLIOGRAPHY. For the technical side, consult Barnard, *Landscape Painting in Water-Colors* (London, 1870); Hamerton, *Graphic Arts* (ib., 1882); Cassagne, *Traité d'aquarelles* (Paris, 1886); Ciceri, *Cours d'aquarelles* (ib., 1879); and Schmidt, *Technik der Aquarelle* (Leipzig, 1890). For the English school, see Monkhouse, *The Early English Water-Color Painters* (London, 1889); Roget, *History of the Old Water-Color Society* (ib., 1891); and Redgrave, *Water-Color Painting in England* (ib., 1892).

WATER-COLORS. Pigments mixed with water, with the addition of some adhesive material such as gum or size. Those prepared for artists' use are made with great care and are generally formed in dry cakes with gum, while those that are used for sign-painting or coloring walls are simply mixed up with common glue or size. The latter are sometimes called 'distemper colors,' their application being only of a temporary character.

WATERCOURSE. In law, a living stream of water usually flowing in a well-defined bed or channel into some other body of water. It does not lose its character as a watercourse if it becomes dry in times of unusual drought, but it must have such a permanent and substantial source of supply as not to depend upon mere surface drainage in case of rain. The source may be living springs or from natural percolation, but must be sufficient to supply water during the greater part of the year. For a discussion of the rights of owners of land along watercourses, see RIPARIAN RIGHTS; WATER RIGHTS. Consult Augell, *On Watercourses* (7th ed., Boston, 1877).

WATER-CRAKE or WATER-OUZEL. See OUZEL.

WATERCRESS. See CRESS and Plate of SALAD PLANTS.

WATER CURE. See HYDROTHERAPY.

WATER-DEER. See CHEVROTAIN.

WATER-DOG or WATER-SPANIEL. See SPANIEL.

WATER-DROPWORT (*Œnanthe*). A genus of large perennial plants of the natural order Umbelliferæ, with compound or decompound disagreeable smelling leaves. The common water-dropwort (*Œnanthe crocata*) is common in wet places throughout Europe. The roots of the latter have some resemblance to small parsnips, but are popularly reputed harmful. The fine-leaved water-dropwort, called water-fennel by the Germans (*Œnanthe Phellandrium*), is also common in similar situations in Europe. It has a jointed rootstalk (rhizome), with tufted whorled rootlets and a strong zigzag stem dilated at the base. It was at one time erroneously regarded as a specific against pulmonary consumption. Neither of these plants occurs in the United States unless as a rare introduction.

WATEREE, wa̤'tĕr-ē; called in its upper course the CATAWBA. A river which rises in the Blue Ridge in North Carolina and flows southeast into South Carolina, where it unites with the Congaree to form the Santee (Map: South Carolina, D 2). Its length is about 300 miles, and it is navigable to the Fall Line a few miles above Camden, S. C.

WATER ENGINE. See HYDRAULIC PRESSURE ENGINE.

WATERFALL. The sudden passage of a stream of water from an upper level to a lower one. The steady erosive action of a current of water soon cuts a valley down through yielding rocks, while the more resistant rocks effectually resist erosion, and under others the fall rapidly breaks down and becomes a series of rapids. A remarkable series of waterfalls exists in the neighborhood of the cities that lie between Trenton, N. J., and Augusta, Ga. Along this line the more resistant rocks of the older strata come to the surface; the weaker rocks lie to the east of this region, which is often called the Fall Line. On the other hand, in the case of mountain torrents, where the rocks are very hard, the quantity of water small, and the erosive action quite weak, beautiful and artistic waterfalls and cascades are numerous. The highest waterfalls are mountain cataracts; thus the waters of the Yosemite, California, fall 2660 feet in three leaps. The Oroco Falls of Monte Rosa are 2400 feet high; the Grand Falls of Labrador 2000 feet; the Gavarnie, in the Pyrennes, 1400 feet; and the Staubbach, Switzerland, 1000 feet. The falls that are famous for the immense quantity of water passing over, rather than the extreme height, are the Falls of Niagara, from 150 to 164 feet, and the Victoria Falls of the Zambezi, 400 feet.

WATER-FLEA (so called because skipping like a flea through the water). A phyllopod crustacean, especially of the genus Daphne, whose minute species are common in fresh water. See PHYLLOPODA.

WATERFORD, wa̤'tĕr-fĕrd. A maritime county of the Province of Munster, Ireland, bounded by Saint George's Channel and the counties of Wexford, Kilkenny, Tipperary, and Cork (Map: Ireland, D 4). Area, 717 square miles. The surface is generally mountainous, and there are large marshy districts. About one-half of the area is pasture land, and but a small area is under tillage. Population, in 1901, 87,187. County town, Waterford. Historically Waterford has been one of the chief strongholds of the English in Ireland.

WATERFORD. The capital of Waterford County, Ireland, on the Suir, 12 miles from the sea, and 97 miles south-southwest of Dublin (Map: Ireland, D 4). The city, with the exception of its Ferrybank suburb, with which it is connected by a bridge of 39 arches, 852 feet long, lies on the right bank of the river, along which a handsome and spacious quay extends for nearly a mile, and from which the city ascends gradually in well-built streets. The chief public buildings are the Protestant and Roman Catholic cathedrals, the Protestant episcopal palace, the Catholic College of Saint John, and the national school. Ring or Reginald's Tower, an important archæological monument, erected in 1002, was rebuilt in 1819. In addition to the union workhouse, there are an infirmary, a dispensary, a fever hospital, a district lunatic asylum, and a penitentiary. Vessels of 2000 tons are able to discharge their cargoes at the quay, and there is anchorage for larger ships six miles lower down the river, at Passage. The chief trade is with England. The exports comprise butter, pork, bacon, oats, eggs, and live stock. The imports include maize, wheat, flour, petroleum, sugar, and timber. There is a ship-building yard, with patent slip, graving-bank, and dock, on the Kilkenny bank of the river, and other industrial establishments include distilleries, breweries, foundries, and flour mills. Originally of Danish foundation, Waterford was taken by Strongbow, by whom it was enlarged. It received a charter from John, which was forfeited under James I., but restored by Charles I. in 1626. Population, in 1891, 26,203; in 1901, 26,743.

WATER-GAS. See Gas, Illuminating.

WATER-GLASS, or Soluble Glass. A term applied to alkaline silicates containing an excess of alkali and soluble in water. Three varieties of water-glass are in use, viz.: (1) *Potash water-glass*, or potassium silicate, prepared by fusing together three parts of silica (sand) and two parts of potassium carbonate, with a small quantity of charcoal, in an ordinary reverbatory furnace, the product being soluble in four or five parts of boiling water. (2) *Soda water-glass*, or sodium silicate, prepared by melting together fifteen parts of silica (powdered quartz), eight parts of sodium carbonate, and one part of powdered charcoal, heating for five or six hours, then cooling, powdering, and extracting with five or six times its weight of boiling water. Thus is obtained the original water-glass invented by Fuchs of Munich, who first described it in 1825. The so-called 'double water-glass' consists of a mixture of both of the foregoing. It may be made by fusing together 100 parts of silica, 28 parts of potassium carbonate, 22 parts of sodium carbonate, and 6 parts of powdered charcoal. These substances find extensive practical application. When used in the form of varnish or paint they produce a fireproof and waterproof surface. When applied as a coating to a surface containing lime, they combine with the latter, forming an infusible silicate or artificial stone. This process has been taken advantage of for the preservation of frescoes, and is known as 'stereochromy.' It has also been utilized for the manufacture of artificial stone, and of a cement for consolidating siliceous sand into a hard, durable artificial sandstone, capable, before it is fired, of being molded into any desired form. Owing to its cleansing properties, water-glass is sometimes used as an ingredient of certain soaps. It is also employed in the manufacture of earthenware, and as a substitute for dung in the dyeing and printing of fabrics. Consult Feuchtwanger, *A Practical Treatise on Soluble or Water Glass* (New York, 1870).

WATER-HEMLOCK. See Hemlock and Plate of Poisonous Plants.

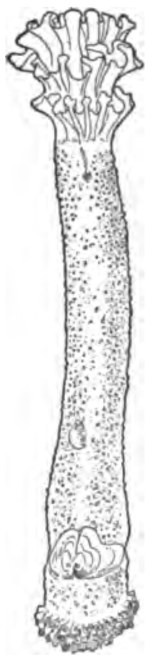
WATER-HEN. Any one of several rails and gallinules (qq.v.).

WATERHOUSE, wạ'tẽr-hous, Alfred (1830—). An English architect, born at Liverpool. He studied with Richard Lane at Manchester, and afterwards in France and Italy. His first work of importance was the Court of Assize at Manchester. His next works were the new buildings of Balliol College, Oxford, and of Caius College, Cambridge. Other important buildings are the Manchester City Hall; Pembroke College, Cambridge; Owen's College, Manchester; the South Kensington Natural History Museum, London; Eaton Hall, Cheshire; and Iwerne Minster, Dorsetshire. His works are generally in the Gothic style.

WATERHOUSE, John William (1849—). An English figure painter, born in Rome, Italy. He studied a short time at the Royal Academy schools, but was mostly self-taught. He belongs to the classic school of Leighton and Tadema, and excels in the poetic rendering of ideal subjects, which are remarkably rich in color. His later paintings tend to the symbolical and suggest the influence of the Pre-Raphaelites. They include "The Oracle" (1884); "The Magic Circle" (South Kensington Museum); "The Lady of Shalott" (Leeds Gallery); "Hylas and the Nymphs" (1897); and "La Belle Dame sans Merci."

WATER-HYACINTH. See Aquatic Plants.

WATERING-POT SHELL, or Aspergillum. The shell and tube of a strange little bivalve (*Brechites* or *Aspergillum vaginiferum*, of the Red Sea), related to the date-shells and ship-worm (Teredo), which only as an embryo presents the appearance of a normal bivalve. Born from a floating egg, it ceases at an early age of its existence to live free, and while yet no more than an eighth of an inch long sinks into the sand, or adheres to some fixed object, and begins to form a very long upward-growing calcareous tube. The little valves appear to be discarded and become soldered into the wall of the 'sheath,' which enlarges upward in pace with the growth of the mantle and siphons, and for their protection; it is usually about the size of a pipe stem. Downward, the animal closes in the sheath by a disk perforated by many tubes, each secreted by a tentacle-like filament of the mantle. A dozen or more species


WATERING-POT SHELL.

are recognized, all Oriental, and many strangely distorted. The frills around the upper edge of the shell stick out of the sand in which the remainder is buried and exhibit stages of growth. Other species are borers in rock, coral, or timber; and another prominent genus is Gastrochæna, in which the valves are not included in the wall of the sheath.

WATER-LEMON. See GRANADILLA.

WATER-LILY, POND-LILY. Popular names for species of the genus Nymphæa, of the natural order Nymphæaceæ. The species, of which there are about thirty, are natives of temperate and tropical climates and are all perennial, aquatic herbs. They have rootstocks or tubers, which are imbedded in the mud at the bottoms of ponds and shallow, sluggish streams; floating, usually round leaves, and usually showy flowers of many tints, ranging from white to red, yellow and blue. On account of their beauty and the fragrance of some species, they have long been favorite plants in water gardens, and a large number of hybrids and varieties have been produced. The starchy seeds and rootstocks are used for food in many parts of Africa, Asia, Australia, and tropical America. The essentials of water-lily culture are rich alluvial mud at the bottom of a shallow pond, plenty of light, and selection of kinds that are hardy in the climate. Some may be allowed to freeze, but as a rule the pond should be deep enough to prevent freezing solid, at least where the lily roots are. Tender kinds may be kept in tubs, which can be sunk in the pond for the summer and stored in a greenhouse during winter. They must be well supplied with rich soil each year. See Colored Plate of AQUATIC PLANTS.

WATER-LILY FAMILY. See NYMPHÆACEÆ.

WATERLOO, wa̤'tĕr-lo͞o′. The county-seat of Blackhawk County, Iowa, 53 miles northwest of Cedar Rapids, on the Red Cedar River, and on the Illinois Central, the Chicago Great Western, the Chicago, Rock Island and Pacific, and other railroads (Map: Iowa, E 2). It is well laid out and has wide streets. Four parks—Cedar River, Sans Souci, Grant, and Lincoln—and a public library are among the prominent features. Waterloo is the shipping centre of a section engaged in farming, dairying, and stock-raising, and having valuable limestone deposits. It also carries on a large jobbing and wholesale trade and has considerable industrial importance. There are beef and pork packing and corn-canning establishments, brick yards, and manufactories of concrete work, gasoline engines, well drills, refrigerators, cigars, flour, creamery supplies, and foundry and machine-shop products. The Illinois Central Railroad maintains extensive repair and construction shops here. Under the charter of 1874, the government is vested in a mayor, elected every two years, and a unicameral council. The majority of the subordinate officials are chosen by the council. Waterloo was settled in 1850, and was incorporated in 1859. Population, in 1890, 6674; in 1900, 12,580.

WATERLOO. One of the county-seats of Seneca County, N. Y., 45 miles west by south of Syracuse, on the Seneca River and the Cayuga and Seneca Canal, and on the New York Central and Hudson River Railroad (Map: New York D 3). It is surrounded by a productive agricultural region, and manufactures woolen goods, wagons, pianos, organs, coke, yeast, flour, lumber, etc. The Library and Historical Society has a collection of over 6000 volumes. There are public parks. Population, in 1890, 4350; in 1900, 4256.

WATERLOO, BATTLE OF. The decisive battle, the culmination of a series of engagements constituting a brief campaign, which finally annihilated the power of Napoleon. It was fought June 18, 1815, about two miles from the village of Waterloo, in Belgium, and twelve miles south of Brussels. Napoleon escaped from Elba at the close of February and made his entry into Paris on March 20th. His professed devotion to peace made no impression upon the Allies, who suspended negotiations at Vienna (see VIENNA, CONGRESS OF) to prepare for a renewal of the struggle. Napoleon made the best preparation possible to recover and hold his empire, but although he was able to count on paper an army of over 500,000 men, there were but 198,000 actually ready for service when the decisive moment arrived. Opposed to him were the English, Dutch, Belgian, and Hanoverian forces, with those of Brunswick and Nassau, all commanded by the Duke of Wellington, and those of Prussia, Saxony, and other smaller German States, under the veteran Marshal Blücher. These two armies were distributed in the Belgian Netherlands, Wellington having his headquarters at Brussels and Blücher at Namur. The Austrians gathered an army on the eastern frontier of France, which was to be joined by the Russian contingent, the united force to be commanded by Prince Schwarzenberg. Napoleon intended to follow the tactics of rapid and aggressive action that had won him his early successes. He planned to destroy his enemies on the north before the Austrian and Russian forces could be made effective and to dispose of Wellington and Blücher separately. He would concentrate near Charleroi, and expected to meet the Germans first, counting on Blücher's aggressive character to bring him into action before the more deliberate Wellington. The forces under Wellington were distributed in numerous cantonments, covering a considerable area about Brussels and to the west of the highway leading south from that city. They had the seacoast for their base by way of Antwerp and Ostend. The Rhine, by way of Liège and Maestricht, was Blücher's base. Thus if either army met with reverses compelling it to fall back on its base the Allies would be separated, and Napoleon seems to have expected by attacking Blücher on the right of that general's line to bring about such a result.

The French forces on the eve of the campaign, exclusive of non-combatants, consisted of 124,588 men—89,415 infantry, 23,595 cavalry, and 11,578 artillery with 344 guns. They were distributed as follows: First Corps (D'Erlon), 19,939 men; Second Corps (Reille), 24,361; Third Corps (Vandamme), 19,160; Fourth Corps (Gérard), 15,995; Sixth Corps (Lobau), 10,465; Imperial Guard (the commander, Marshal Mortier, being ill, orders were given through the adjutant-general, Drouot), 20,884; reserve cavalry (Grouchy, four corps, with horse artillery), 13,784. There seems to have been uncertainty up to the last minute regarding the wing commanders. Marshal Ney was summoned on June 15th and assigned to the command of the corps of D'Erlon and Reille. Grouchy was taken from his command of the reserve cavalry after the campaign had opened and given command of the right wing, comprising the corps of Vandamme and Gérard. Marshal Soult served as Napoleon's chief of staff, his old chief, Berthier, having adhered to the Bourbons. Soult had held independent commands too long to be well placed in a staff position; but Napoleon's staff was always the weakest part of his army organization, and its errors on many previous occasions had been counterbalanced only by the initiative of some of Napoleon's brilliant field officers.

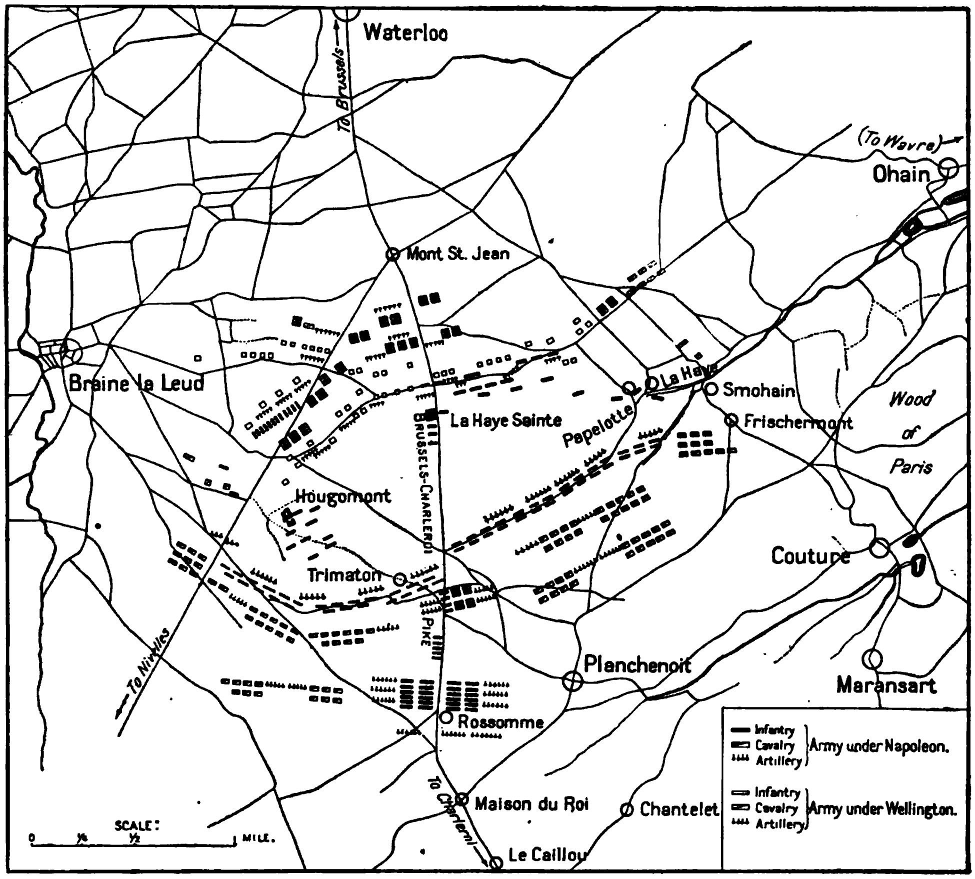
The army under Blücher, who had Gneisenau for his chief of staff, numbered 120,954 men—99,715 infantry, 11,879 cavalry, and 9360 artillery, with 312 guns. Of these the First Corps (Ziethen), 32,692 men, was at Charleroi; the Second (Pirch), 32,704, at Namur; the Third (Thielemann), 24,456, at Ciney; and the Fourth (Bülow), 31,102, at Liège. The line was largely veterans, and Blücher was an experienced old campaigner, not brilliant, but brave, hard-headed and reliable. The army of Wellington numbered 93,717 men—69,829 infantry, 14,842 cavalry, 8166 artillery with 196 guns, and 1240 engineers, etc. Of these the British numbered 31,253 men; the King's German Legion, 6387; the Hanoverians, 15,935; the Dutch and Belgians, with one body of Nassauers, 29,214; the Brunswickers, 6808; and another regiment of Nassauers, 2880. It was a very miscellaneous body of troops, probably the least efficient in its rank and file of any of the three armies.

Ligny and Quatre-Bras. The Emperor's advance northward was along the line of the highway through Charleroi to Brussels. The movement began on June 13th, and on the 14th Napoleon's headquarters were at Beaumont. On the afternoon of the 15th the French army began the passage of the Sambre, moved upon Ziethen's position at Charleroi, and slowly forced him back upon Fleurus. Reille advanced on Gosselies, and had already had an encounter with the Prussian rear guard, when Ney arrived on the field and took command of two corps (the First and Second), with the composition and officers of which he was unacquainted. He continued the advance with Reille's corps through Gosselies to the vicinity of Quatre-Bras, on the main line of communication between Blücher and Wellington. While his German allies were threatened Wellington did not change his position, lest he should uncover Brussels and Ghent. About the middle of the afternoon of the 15th, however, learning of the movement toward Quatre-Bras, he began to concentrate his forces, bringing three divisions of about 25,000 men to Nivelles, west of Quatre-Bras. Some of the Netherland troops occupied Quatre-Bras itself, and they were reinforced on the morning of the 16th by General Sir Thomas Picton with his division. The French were to attack the Prussian position on the 16th in two wings, under Ney and Grouchy, and when Blücher had been disposed of Ney was to move on Brussels. About two o'clock in the afternoon Ney assailed Quatre-Bras, but, owing to reversals of orders, D'Erlon's corps did not join him until he had been forced back upon Frasnes, after several hours of desperate fighting. This engagement prevented Wellington from making a flank movement against the French on the Prussian right right, which he had promised to make if not himself attacked. At Ligny about three o'clock the French divisions of Vandamme and Gérard opened an attack upon Ziethen, who was supported by Pirch and Thielemann. After three hours of hard fighting, the Prussians were thrown into confusion by a charge of the Guard, Blücher himself was disabled, and twenty-one guns were captured. Napoleon assumed that the Prussians would retreat toward Namur. On the morning of the 17th he wrote to Ney that the Prussians were routed and that Pajol was pursuing them on the roads to Namur and Liège. As a matter of fact, the Prussians under Gneisenau were moving north and converging on Wavre, intending to join Wellington, with whom they were in communication. Wellington had passed the night at Genappe and was preparing to take up a position in force at Quatre-Bras, when he learned of the Prussian manœuvre, which left him in an exposed position. He therefore fell back to Waterloo. At noon of the 17th Napoleon detached Marshal Grouchy with 33,000 men to pursue the Prussians and complete their defeat. As the latter had been already eight hours on the march and their real direction was unknown, this was not an easy task. Joining Ney with the remainder of his army, Napoleon followed Wellington. Receiving information at Marbais that threw a doubt on his supposition that the Prussians had retreated to Namur, he sent instructions to Grouchy to ascertain whether the Prussians were attempting to make a juncture with the British or not. When Grouchy received this dispatch, Blücher was nearer to Wellington than Grouchy was to Blücher. When Grouchy reached Gembloux in a heavy rain at ten o'clock in the evening, he knew that the Prussians had marched to Wavre and not to Namur. The main French army arrived at Waterloo on the evening of the 17th and bivouacked opposite the enemy.

Waterloo. Napoleon inspected the position of both armies after midnight, and between seven and eight o'clock on the morning of June 18th he saw that his adversary was ordering his army in line of battle. The rain, which had continued all night, ceased about eight o'clock, and before nine there was a somewhat showy review by the Emperor of his lines. The attack was postponed, however, on Drouot's advice, in order that the ground might be in better condition for the artillery. Wellington had the advantage of choice of position and he had taken a strong one. He there awaited the attack, relying fully upon the assurance of Blücher that the Prussians would be there on time. About ten o'clock Napoleon sent to Grouchy to move upon Wavre, but not even then does the Emperor seem to have realized that the whole Prussian force was concentrating there and preparing to aid Wellington.

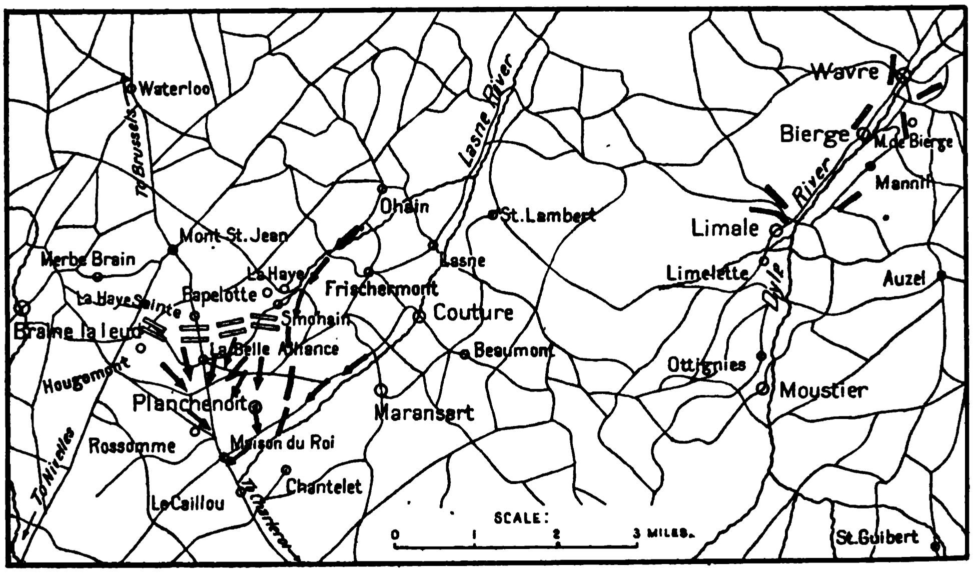
The main British line stretched across the Brussels-Charleroi road, along the line of the highway from Ohain to Wavre. Outposts held the hamlets of La Haye, Papelotte, and Smohain on the extreme left, and the Château of Hougomont, a strong position, on the right. The farmhouse of La Haye Sainte in advance of the centre was also occupied. Wellington had on the field

49,608 infantry, 12,408 cavalry, and 5645 artillery, with 156 guns; but of these the British troops numbered only 23,991. The left was held by the Fifth and Sixth British divisions, the Second Netherland, and the cavalry divisions of Vivian and Vandeleur. General Picton of the Fifth probably commanded this wing. The three hamlets were held by one of the Netherland brigades under Prince Bernhard of Saxe-Weimar, and Bylandt's Netherland brigade was advanced in front of the Wavre road. In the rear was General Ponsonby's Union cavalry brigade (Royal Dragoons, Scots Greys, and Inniskilling Dragoons). West of the Charleroi road lay Alten's Third British division. A battalion of the King's German Legion, under Major Baring, garrisoned La Haye Sainte. Farther on the right were Cooke's First Division, a part of Byng's Second Brigade, and some of the German troops. Clinton's Second Division and Chasse's Netherlanders were in reserve. Napoleon had 48,950 infantry, 15,765 cavalry, and 7,232 artillery, with 246 guns. In his first line the First Corps had the right and the Second the left. According to Napoleon's plan of battle, as dictated in the morning, Ney was to open the attack on the right about one o'clock, the object being to secure possession of the village of Mont-Saint-Jean, lying on the Charleroi road in the rear of the British lines. An hour and a half before the time for the main attack a diversion was made in the form of an assault on Hougomont by Prince Jerome's division of Reille's corps. The first assault proving unsuccessful, another division and another were wasted on this unprofitable action, so that the Second Corps took hardly any part in the main attack on the British centre. This was made in echelon about 1:30 o'clock by D'Erlon's First Corps, after a heavy artillery fire had been directed for an hour and a half on Bylandt's exposed position. His brigade was thus easily routed, but the French pursuing met a terrific fire from Picton's division behind the ridge and were charged by Ponsonby's cavalry and driven back in confusion. The British troops did splendid work in meeting and repulsing this attack. Meanwhile Napoleon had discovered the advance guard of Bülow's Prussian division on the hills of Saint-Lambert, two or three miles away at his right, and the Sixth Corps was detached to hold this new enemy in check, while a dispatch was sent to Grouchy ordering him to return. This Grouchy, having moved off on his fruitless chase to Wavre, did not receive until evening. A rash and ill-managed assault on La Haye Sainte occupied a considerable part of the afternoon, and the house was finally taken at about four o'clock, according to Charras, or between six and seven, according to Heymès, Ney's chief of staff. Between four and six o'clock, under Ney's personal



FIELD OF WATERLOO AT 11 A.M., JUNE 18, 1815.

direction, the cavalry divisions of Milhaud, Lefebvre-Desnouettes, Kellermann, and Guyot were hurled against the British right centre, but the British squares, although suffering fearfully from the French artillery fire, which supported the cavalry, maintained their formation unbroken. The cavalry were unsupported by infantry, and by seven o'clock Ney was compelled to withdraw for lack of troops. Lobau failing to check Bülow on the right, the Young Guard was sent in between five and six o'clock and there was severe fighting around Planchenoit. A little later, believing that his right was secure, Napoleon massed eight available battalions of the Imperial Guard, supported by artillery, for a final attack on Wellington's centre, then almost shattered. General Friant led this assault. As the Guard advanced, D'Erlon made a vigorous and effective assault on the British right. The Guards met a heavy fire from Maitland's brigade, and were repulsed with terrific loss. The prompt support of General Halkett and Colonel Elphinstone protected Maitland's left and the impetuous charge of Colonel Colborne with the Fifty-second Regiment completed the disorder of the Guard. The Prussians began to arrive about 7:30. Ziethen first came up from Ohain and his troops at once went into action, throwing the French right into confusion. Seeing that victory was in his hands, Wellington threw his whole line forward. The French retreat speedily became a rout. There was no more thought of resistance except by detachments of the Guard and by Lobau with the Sixth Corps, who was holding back Bülow and Pirch on the right. Napoleon left the field in the centre of a square of the Guard and reached Paris on June 21st. The exact losses of the two armies at Waterloo are undetermined. Those of the French, in killed, wounded, and missing, probably numbered over 31,000. The official returns for the Allies give their losses as 22,428.



POSITIONS OF THE THREE ARMIES AT 8 P.M., JUNE 18, 1815.

The controverted points relating to the campaign of Waterloo provide abundance of material for the student of military science. Napoleon did not show his usual care and thoroughness in his orders, nor his usual comprehensive judgment in the execution of his plan. Ney and Grouchy both failed in their judgment at critical moments. It was unfortunate for Napoleon that he had as chief of staff a veteran officer who was accustomed to independent command instead of a younger man thoroughly trained in the details of staff work. Wellington, with a less efficient army, showed himself throughout careful, alert, and resourceful, and he was well supported by his division commanders at critical moments. Nevertheless, the fact remains that it was the timely coöperation of the Prussians, and especially the arrival in the evening of Ziethen's corps, that turned the scales finally against the French and gave a positive result to the splendid defense of the British position. Wellington counted on this in planning the engagement. That the junction of the Allies took place so successfully was due to the masterly strategy of Gneisenau, and to the absence of Grouchy on the chase to Wavre, where it was impossible for him to arrive in time. Had he, instead of following his orders literally, crossed the Dyle at Moustier when he learned at Walhain that the battle was on, he might have headed off the Prussians and delayed their arrival. Whether he could have done this, in the condition of the roads, is, however, doubtful. The wisdom of Napoleon in detaching so large a force for a pursuit that rested upon an inference which the issue proved to be mistaken is certainly open to question. When this had been done, Napoleon failed to keep Grouchy sufficiently informed of the exact situation and its needs.

BIBLIOGRAPHY. The literature relating to the campaign of Waterloo is extensive, much being controversial and much unreliable. The best and most impartial critical study from all points of view is that of J. C. Ropes, *The Campaign of Waterloo* (New York, 1892). This is accompanied by an atlas of fourteen maps. There is a partial list of works relating to the campaign, and the important documents and dispatches are given in appendices. J. W. de Peyster published in New York three pamphlets, *Waterloo, the Campaign and Battle; Waterloo, more properly Belle Alliance;* and *The Prussians in the Campaign of Waterloo*, and also a list of *Authorities* (New York, 1894), which will be of some service to the student. A bibliography of the campaign with critical estimates was prepared in 1875 by Justin Winsor, and published in *Bulletin No. 35* of the Public Library of the City of Boston. Colonel Chesney's *Waterloo Lectures* are accompanied by a list of authorities cited. J. Shaw Kennedy, *Notes on the Battle of Waterloo* (London, 1865), is cited as an authority on the tactics of the battle. Maurice, *War* (ib., 1891), contains in the appendix a reference list for the campaign of Waterloo, with comments and estimates. The classic account by Thiers, *Waterloo* (Paris, 1862), is unreliable and colored strongly by the author's admiration for Napoleon. The same is true of La Tour d'Auvergne, *Waterloo* (ib., 1870). Charras, *Histoire de la campagne de 1815* (Leipzig), and Quinet, *Histoire de la campagne de 1815* (Paris, 1862), are almost equally severe in their criticism of Napoleon. Consult also Houssaye, *1815-Waterloo* (Paris, 1898). In addition to that of Ropes, the most valuable works in English are Chesney, *Waterloo Lectures* (London, 1874); Gardner, *Quatre-Bras, Ligny, and Waterloo* (ib., 1882); O'Connor Morris, *The Campaign of 1815* (ib., 1900), the most recent contribution to the subject, and Siborne, *History of the War in France and Belgium in 1815* (ib., 1844). H. T. Siborne has also published a valuable collection of *Waterloo Letters* (London, 1891), side lights on the campaign from the correspondence of British officers. In German are Clausewitz, *Der Feldzug von 1815 in Frankreich* (Berlin, 1862), and Ollsch, *Geschichte des Feldzuges von 1815 nach archivalischen Quellen* (ib., 1876). The student of the campaign will find in these works expression of the different views upon the campaign, and an examination of the reference lists mentioned and of the critical notes of different writers will guide him in a fuller search of the primary and secondary sources. See NAPOLEON I.

WATERLOO BRIDGE. A fine stone bridge over the Thames at London, built by private enterprise in 1811-1817 from designs by John Rennie and sold to the Metropolitan Board of Works in 1878. It rests upon nine arches and has a length of 1380 feet, and a breadth of 42 feet.

WATERLOO-WITH-SEA'FORTH. A town on the southwest coast of Lancashire, England, five miles north-northwest of Liverpool (Map: England, C 3). It is a favorite seaside suburb for Liverpool merchants. Population, in 1891, 17,225; in 1901, 23,101.

WATERMAN, wa̤'tẽr-man, MARCUS (1834—). An American artist, born at Providence, R. I., and educated at Brown, where he graduated in 1855. From 1857 to 1870 he worked in New York City, where, in 1861, he was elected associate of the National Academy. He visited Algeria and Spain and made a specialty of American forest scenes and Arabian subjects. His pictures include "Gulliver in Lilliput," which was exhibited at the Centennial Exposition in 1876, "The Roc's Egg" (1886), and "The Journey to the City of Brass."

WATERMELON. An annual vine, *Citrullus vulgaris*, of the natural order Cucurbitaceæ, native of tropical Africa, and extensively cultivated in warm climates, particularly in Southern Russia and in the United States, where more than 200,000 acres, especially in Texas, Georgia, and Missouri, are annually devoted to it. The refreshing red, greenish, or yellow pulp of its ripe fruit, which weighs from 20 to 50 pounds and even much more under special management, contains about 93 per cent. water and 2 per cent. sugar, to obtain which latter experiments have been made, but without commercial success. A very large number of varieties, especially red-fleshed ones, are in cultivation. The white-fleshed rather solid form used largely in preserving is generally known as a 'citron' or 'preserving melon.' The watermelon is sensitive to frost and is easily stunted in growth by cold. It thrives best in a rich, warm, sandy loam well supplied with humus. In its culture 15 to 20 seeds are planted about two inches deep in well-manured hills spaced 10 to 12 feet apart each way. After the plants get well established they are thinned out to 2 or 3 of the strongest vines in each hill. Many commercial growers plant the seed in rows 18 feet apart and thin the plants to stand 3 to 4 feet apart in the row. By this method the fertilizers used can be easily cultivated into the soil. Thorough cultivation is given until the running vines interfere. (See MELON INSECTS.) The ripe melons are shipped to Northern markets in box cars, the smallest melons being placed on the bottom, since they are less likely to bruise than the larger ones. The earliest melons reach the Northern market about the middle of May and the season continues until about Thanksgiving. See Plate of CUCUMBER ALLIES.

WATER METERS. Instruments used to measure and automatically record the quantity of water or other liquid flowing through pipes. They are divided into three general classes known as the positive, inferential, and proportional. The *positive meter* measures the actual volume of water passing through pipes with which it is connected. The *inferential meter* measures some element or factor of the flow, most generally the velocity. The *proportional meter* measures a fractional part of the full flow, thus making it possible to use a relatively small meter, set on a by-pass or pipe branching from and again joining the main pipe. It is used but little.

Positive meters are provided with reciprocating or rotary pistons, or else with an oscillating or gyrating disk piston. In all three classes of positive meters each complete movement corresponds to the filling and emptying of a chamber or series of chambers of known size. There is no escape for the water until it has actuated the piston. The reciprocating pistons may be single or double. If double, as is generally the case, each piston effects the reciprocal action of the other, much the same as in a duplex pump. (See PUMPS AND PUMPING MACHINERY.) If single, the return stroke is effected by means of a weight or spring. The rotary piston meters may also be double or single. The double type is much like the rotary pump, two pistons with interlocking faces revolving in an air-tight chamber. Some of the single rotary pistons have a series of curved projections and indentations on their outer surfaces. Corresponding to these are similar variations in the cylinder in which the piston revolves. The piston is not fixed rigidly at its centre. The incoming water causes the piston to enter and leave successive indentations in the inclosing cylinder. In other words, a series of chambers are successively filled from the inlet and discharged toward and finally at the outlet of the meter. In place of a piston of this sort a disk or diaphragm is very commonly employed, so constructed as to give an oscillating or wabbling motion. In this way the chambers are alternately filled and emptied. *Inferential meters* generally have as their primary moving part a series of vanes or buckets, or else employ a screw. The velocity of the water is indicated by this means.

The Venturi meter generally stands in a class by itself. Its usefulness depends wholly upon the increase in velocity and consequent reduction in pressure caused by contracting the diameter of a pipe through which water is flowing. By measuring the pressures before and directly at the point of contraction, and taking into account the diameter of the pipe, the flow may be computed. There are no working parts in the meter itself. The contracted tube is composed of two conical-shaped pipes, generally of cast iron or riveted steel, with their small, truncated ends joined together with a bronze throat piece. The whole tube might be made of masonry or wood. The total length of the meter is from 8 to 16 times the diameter of the uncontracted portion. The contraction has from one-half to one-fourth the diameter of the full size of the tube.

REGISTERING MECHANISMS. On all the types of meters described, except the Venturi, which has no working parts, the movements are transmitted through cog-wheel mechanisms to a dial or series of dials; or to what is termed a straight reading register, where the actual quantity passed may be read off at a glance. The mechanism is so arranged as to convert the revolutions or other movements of the meter into any desired unit of volume. In the United States the unit employed is generally cubic feet. The registering device of the Venturi meter is described as a calculating mechanism driven by weights which converts differences in pressure into corresponding velocities, and thence, for a given size of pipe and for a given period of time, into gallons. A drum revolved by clockwork provides for the time element. If occasional observations of rates of flow or of volume are sufficient, these may be read from time to time on pressure gauges, or taken off as desired, from self-recording gauges, and rates or total volumes computed therefrom.

WASTE-WATER METERS OR DISTRICT METERS indicate the rate of consumption per unit of time, instead of the aggregate volume. A horizontal disk is so placed in a chamber shaped like the frustum of a cone as to be lifted by the flow of water upward through the chamber. The greater the volume of water passing through the pipe in which the disk is set, the higher the disk will be lifted, in order to increase the annular space through which the water must pass. The disk is connected by means of a wire with a counter weight and pencil. When the disk rises the weight and pencil fall. The pencil makes a mark on a paper placed on a drum revolved by clockwork. The paper is ruled vertically for elements of time and horizontally for units of volume; thus the device registers the rate of flow. Such meters are so located that all the water of a district must pass through them. By comparing day and night rates of consumption of various districts, abnormal conditions may be detected and further steps may be taken to ascertain the cause of the waste. See WATER-WORKS.

The meter just described was invented by George F. Deacon, of Liverpool, England, and has been more widely used abroad than in America. The Venturi meter may be employed for the same general purpose. It was invented by Clemens Herschel, of New York City, about 1886, but the fact that there is a relation between loss of pressure in a contracted tube and the amount of water flowing through it was discovered by Venturi in 1796. One of the earliest water meters in the United States was the double piston meter, invented by Henry R. Worthington, who also introduced the direct-acting steam pump. Numerous other American meters have been developed to a high state of efficiency. For sizes from ½ to 4 inches in diameter almost any of the well-known makes of positive or inferential meters may be used. Some manufacturers, however, advise a number of 2-inch meters in place of one of a larger size. Some of the highest grade of piston meters are made in sizes of 6 inches or even higher, and an inferential meter of the screw type has been made up to 36 inches in diameter. Venturi meters from 2 inches to 60 inches in diameter were in use in 1900, and some 94½ inches in diameter were then being made. A meter 108 inches in diameter was built some years ago for experimental purposes. There is practically no limit to the possible size of Venturi meters, but for diameters of 6 inches or less the meters with moving parts are cheaper. One of the points of superiority claimed for this meter is that it causes less loss of head, or reduction in pressure, than any other type. The durability and simplicity of the Venturi meter is another point in its favor.

The working parts of meters are made as light and durable as is consistent with accuracy and serviceability, and they are generally so designed to be supported by the water, thus reducing wear and tear and loss of head. Vulcanized rubber is the most common material for the disk and some of the rotary piston meters, but where special strength or power to resist the action of hot water or acids is required, brass or some other composition metal is employed. A variety of devices to protect from damage or clogging are used, including strainers and sieves to keep out gravel and fish, frost cases, and the like. For most purposes a high degree of accuracy of measurement is not an essential quality in a meter, but it is desirable that meters should be sufficiently sensitive to small flows to detect leakage, which, though minute, may amount to large quantities in the course of time. Positive piston meters come to a standstill whenever anything prevents their registration. The inferential and some of the disk meters cease registering without any effect upon the flow of water.

CURRENT METERS (q.v.) are employed to measure the velocity of water in rivers and large aqueducts and also to determine the flow of sewers. See WATER-WORKS.

WATER-MOCCASIN. A snake. See MOCCASIN-SNAKE.

WATER-NET. The common name of the Hydrodictyon, a genus of green algæ. See CHLOROPHYCEÆ.

WATER-PLANTS. See HYDROPHYTES.

WATER POET, THE. A name used of John Taylor (1580-1653). He was apprenticed to a waterman in youth, was pressed into the navy, and called his first volume *The Sculler* and its second edition *Taylor's Water-Works.*

WATER POWER. A term used by engineers to define the power obtained or capable of being obtained from water by its fall from a higher to a lower level; also, more specifically, the term applied to a fall in a stream which is used or is capable of being employed to develop power. Water power is, perhaps, after wind power, the most natural and at the same time the most truly economic source of energy. The term water power is something of a misnomer. The real agent is gravity, the fluid itself being the medium through which the action of gravity is transmitted to the prime motor. In order that water may be available for the purpose of doing work, it must be in such a position that it can fall from a higher to a lower level, or must be under pressure produced by some external force, such as that of a weight or spring acting on the surface of the fluid through a piston or plunger. Under the former condition its utmost capacity for doing work—potential energy or energy of position—is the product of the height through which it can fall into the weight of the water falling, so that if h denote the available height of the fall and G denote the weight of the water falling per second, then $h \times G$ equals the energy or power available per second. If the fluid is allowed to fall without resistance under the action of gravity, either free or confined in pipes, the power available is expended in imparting velocity to the water, and the potential energy of position is converted into kinetic energy or energy of motion, and in this form is available for performing work. It is, however, not necessary that the potential energy of water should first be transformed into kinetic energy in order that it may be employed for motive power. The weight of the fluid can also be allowed to act directly on the prime motor in a manner similar to that in which the weight of a body attached to one end of a rope, passed over a pulley for instance, may be made to raise another body suspended at the opposite end. A third way of using water power for doing work is by means of its pressure, but the difference between this method and the preceding method is more apparent than real. The so-called pressure of water is the result of weight or its equivalent. For practical purposes it may, nevertheless, be said that there are three ways in which water power can be applied to the performance of work: (1) As kinetic energy, or through the velocity of the fluid; (2) by weight; and (3) by pressure. Each of these three methods requires a different type of motor for its application, denoted respectively as (1) turbine (q.v.), (2) water wheel (q.v.), and (3) hydraulic pressure engine (q.v.).

The most usual source of water power in nature is a river or stream, but to make this available for practical purposes some form of work such as dams (q.v.), canals (q.v.), and aqueducts (q.v.) is almost invariably necessary. A river has always a certain fall or gradient, but to be able to take advantage of this fall for doing work, the portion of it utilized must be applied in one or several nearly perpendicular steps. One common way of accomplishing this object is to build a dam across the stream. The effect of this dam is to raise the level of the water above it a height equal to the difference between the original level and the level of the top of the dam, while the level of the stream below the dam remains as it was. To illustrate, let us assume that the stream had originally a fall of 1 foot in 100 feet, and that a dam 6 feet high is built across it. The head which was previously expended almost entirely in overcoming the resistance of the river bed over a distance of 600 feet, while the water gradually descended 6 feet down a gentle incline, will now be available for doing a corresponding amount of useful work by a sudden drop through the same height as before. In other words, the energy originally wasted in useless friction in the gradual descent of the stream is accumulated in the form of head immediately behind the dam before the plunge of the water. To apply this energy the water flowing over the dam is taken into the chamber or reservoir containing the motor through which it passes to the tail race. In other cases, where it is not admissible or possible to construct a dam, or where only a portion of the water of a stream is required, the necessary quantity is drawn off by a separate channel at a sufficient distance above the point

	Year	Fall, feet	Min. H. P.
Lowell, Mass.	1822	35	11,845
Nashua, N. H.	1823	36	1,200
Cohoes, N. Y.	1826	104	9,450
Norwich, Conn.	1828	16	700
Augusta, Me	1834	17	3,500
Manchester, N. H.	1835	54	12,000
Hooksett, N. H.	1841	10	1,800
Lawrence, Mass.	1845	30	11,000
Augusta, Ga.	1847	50	8,500
Holyoke, Mass.	1848	50	14,000
Lewiston, Me.	1849	55	11,900
Columbus, Ga.	1850	26	10,000
Rochester, N. Y	1856	230	8,000
St. Anthony Falls, Minn.	1857	50	15,500
Niagara, N. Y. (Hy. canal)	1861	95	15,000
Turner's Falls, Conn	1866	35	10,000
Fox River, Wis.	1866	182	....
Birmingham, Conn.	1870	29	1,000
Bangor, Me.	1876	0	1,767
Augusta, Ga.	1876	50	8,500
Palmer's Falls, N. Y.	1882	30	1,125
Mechanicsville, N. Y.	1882	24	3,636
St. Cloud, Minn.	1885	14	4,500
Little Falls, Minn.	1887	10	4,000
Spokane, Wash.	1888	72	18,000
Howland, Me.	1888	22	6,000
Great Falls, Mont.	1890	40	16,000
Austin, Tex.	1891	68	10,000
Saulte Ste. Marie, Ont.	1891	15	10,000
Folsom, Cal.	1891	53	6,200
Concord, N. H.	1894	10	5,000
Niagara, N. Y. (tunnel)	1894	176	50,000
Ogden, Utah	1896	442	2,940
Helena, Mont.	1897	38	10,000
Minneapolis, Minn.	1897	18	6,000
Mechanicsville, N. Y.	1898	18	3,270

where the power is required to obtain the desired fall. Occasionally water power is available in the form of a natural waterfall, and then it is simply necessary to guide the water in a tube or channel to the motor. Sometimes the velocity only of the flowing stream is employed for working the motor, the head in that case being already converted into kinetic energy.

The preceding table gives the water powers which have notably enhanced the industrial development of the country.

In this table the hiatus from 1861 to 1866 is accounted for by the stagnation of industrial enterprise due to the Civil War. In recent years the possibility of transforming water power into electrical energy and its transmission to distant points has aided greatly in promoting the development of water-power enterprises of great magnitude. The Great Falls, the Sault Ste. Marie, the Nigara, the Ogden, and the Mechanicsville developments are notable examples of such water-power electric plants. In each of these cases the water power operates turbines or water wheels which drive dynamos.

BIBLIOGRAPHY. A number of authoritative treatises on water-power development are available. Frizell, *Water Power* (New York, 1901), is a comprehensive general treatise on all phases of the subject. Bodmer, *Hydraulic Motors, Turbines, and Pressure Engines* (New York, 1889), is an elaborate technical and descriptive treatise on water motors of all kinds. Merriman, *Treatise on Hydraulics* (New York, 1900), is a general treatise on hydraulics, including water motors of various kinds. Descriptions of plants will be found in the volumes of *Engineering News* (New York, current). See DYNAMO-ELECTRIC MACHINERY; TURBINE; WATER WHEEL; HYDRAULIC ENGINE.

WATER-PROOFING. The coating of articles made of textile fabrics, paper, and other substances, so as to render them impervious to water. Besides the treatment of fabrics with a solution of rubber, various preparations are used, such as a mixture of beeswax and yellow rosin in boiled oil. Fabrics may also be rendered waterproof by thoroughly impregnating them with a solution of soap and then dipping them into a solution of alum. Paraffin finds extensive use for the purpose, and articles of various kinds, including leather, and even wood, are made waterproof by keeping them for a time in hot molten paraffin. Several varnishes, too, are used for rendering articles water-proof.

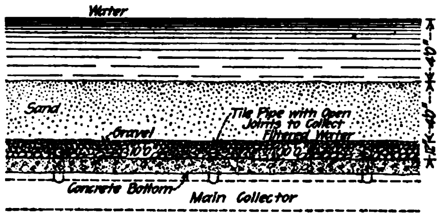
WATER PURIFICATION. The art of removing any objectionable matter from water so as to render it safe for domestic consumption and fit for industrial uses. The objectionable qualities are in the nature of pathogenic bacteria; inert organic matter liable to give rise to offense or injury; turbidity and suspended matters generally; color, taste, and odor; hardness and iron. (See WATER-WORKS, paragraph on *Quality.*) The principal means of purification are sedimentation, which clarifies water and removes a portion of the bacteria; coagulation, an aid to both sedimentation and filtration; aëration, which removes odor and may supplement filtration; filtration, which removes bacteria and reduces inert organic matter, turbidity, and color; and various chemical processes for getting rid of either iron or hardness.

SEDIMENTATION is effected by either bringing water to rest or passing it very slowly through shallow reservoirs or basins. The first is called the intermittent and the second the continuous system of sedimentation. The force of gravity carries down some of the clay and silt which compose turbidity. The degree of clarification effected depends upon the size and specific gravity of the particles and the length of time afforded for sedimentation. Some waters are notably improved in a few hours; others are still turbid after a number of days. Partly through the action of gravity, and partly through entanglement with the other suspended matter, a considerable percentage of bacterial reduction is effected by sedimentation. Where bacterial purification, rather than clarification, is the object, sedimentation alone is insufficient, but it may be a great aid to filtration. Storage reservoirs afford more or less sedimentation and bacterial reduction, depending upon both their size as compared with the daily draught and the character of the water. The design and construction of settling reservoirs does not differ from that of other reservoirs, except in the relative shallowness of the former, the arrangement of the inlets and outlets, and the provisions made for removing the deposits of mud from their bottom. In continuous-flow basins having a number of compartments the water generally passes from one section to another in a thin sheet over a long weir. This insures the drawing off of the upper and clearest layer, minimizes the disturbance of water in the successive basins, and may provide aëration of value. If aëration is desired and the levels permit it there may be a series of steps between each weir and the next basin. Two or more compartments are usually necessary, so one may be at rest while the other is being filled; but where the constant-flow system is used for water containing but little sediment one basin may do. Provision must be made for drawing the water down as quietly as possible to a level well above the deposit of sediment, so as to avoid disturbing the latter. The bottoms of settling reservoirs should slope to some common point, where connection should be made with a pipe for flushing out the mud when the reservoir is cleaned. The mud is often loosened by means of water under pressure, thrown from a hose, much as in hydraulic mining.

COAGULATION is effected by introducing a chemical, generally sulphate of alumina, into water. The substance is broken up into alumina and sulphuric acid. The latter unites with the lime or magnesia in the water and is thereby rendered harmless. The alumina thus set free is transformed into hydrate of alumina, a white, flaky, gelatinous substance, which coagulates the organic matter in the water and entangles the bacteria. The agent and the impurities are deposited in the settling basin or are removed from the water by filtration. It is essential that the water be sufficiently alkaline to decompose the sulphate of alumina, and that plenty of time be allowed for coagulation. If deficiencies in alkalinity are periodic, as in times of heavy floods, they may be made good by adding lime to the water. The time element is secured by providing basins or reservoirs of proper capacity.

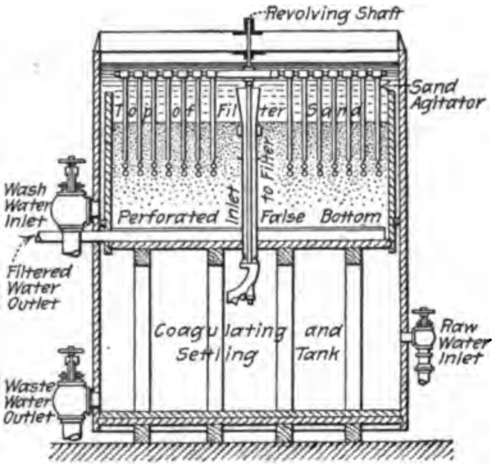
Aëration is accomplished by forcing air into the water requiring treatment, by discharging water over weirs, or by means of fountains. In a few American cities stored water of surface origin is treated with compressed air delivered into the reservoir through perforated pipes. It is claimed that this practice has been very effective in preventing organic growths that give rise to bad tastes and odors. Aëration is also used to precipitate iron before filtration, as mentioned farther on. As a rule, aëration is merely supplementary to other processes, making good a deficiency of oxygen. Where water is high in organic matter any amount of aëration which is economically applicable is insufficient for its removal. The process has little or no effect upon the bacterial contents, and is directly opposed to removal of the latter by sedimentation.

Filtration plants are divided into slow sand and mechanical or rapid, according to the rate of filtration and the methods of cleaning the filters. The filtering material in either case is generally sand. *Slow sand filters* are beds of sand, supported on gravel, and provided with underdrains, the whole being inclosed in a watertight basin or basins. The water is admitted on the top of the bed, percolates through the pores of the filtering material, is collected by the underdrains, and then passed to a clear water reservoir or to the consumer. Each bed has an area of one acre or less. The rates of filtration range from 2,000,000 to 5,000,000 gallons per acre per day, according to the character of the water and the fineness of the sand. The filtering sand is commonly two to four feet deep and rests on one to two feet of gravel. The latter is placed in layers, increasing in size toward the bottom until stones as large as hens' eggs are found. The underdrains are four inches and upward in diameter, of either clay, tile, or vitrified pipe. Automatic devices are employed to regulate the rate of filtration. When the head reaches a maximum fixed by theory and experience to suit the local conditions, ranging from three to six feet, one or more beds are thrown out of use for cleaning. The water is drained down to a point somewhat below the level of the top of the bed, and a thin layer of fouled sand is removed by broad shovels. This is washed immediately or else allowed to accumulate for washing at intervals. The washed sand is not replaced until the thickness of the sand bed has been greatly reduced, oftentimes to as little as 12 inches. This is made possible by the fact that the bulk of the work is done in a very thin upper layer of the bed, sometimes not more than one-eighth of an inch deep. The sand is washed (1) by playing hose upon it and allowing the sand and water to flow together through a long flume; (2) by means of running water in a revolving cylinder, provided with arms, or a screw; and, (3) what is more common in America, by a series of hoppers and ejectors. In the latter process the sand is thrown into a wooden or steel hopper, in the bottom of which is placed an ejector. The jet of water carries the sand up with it to the top of another ejector, where the dirty water is drawn off. The process is continued until the sand is clean. Slow sand filtration removes practically all the bacteria and suspended organic matter, a considerable amount of organic matter in solution, more or less turbidity, and a relatively small amount of color. Where the water has been polluted with sewage the chief object is to reduce the bacteria to a minimum. An average removal of 98 to 99.5 per cent. of the original number is common enough. This is generally considered satisfactory provided the actual number remaining does not exceed say 100 to·200 per cubic centimeter as an average. It is believed that the pathogenic germs succumb more rapidly than the harmless water bacteria, which comprise the great majority of those present, so if the total bacterial reduction be sufficiently high the water is considered perfectly safe. If the water to be treated is very turbid it will clog slow sand filters so rapidly that keeping them clean becomes an economic and even physical impossibility. In such cases slow sand filtration is supplemented by sedimentation. If the two processes combined are inadequate, without too great an outlay for settling basins and filter beds of large area, then coagulation may be employed. In such cases it is the practice, at least in America, to substitute mechanical filtration, which almost invariably includes both coagulation and filtration, and frequently sedimentation as well. In very cold climates it is essential to the best sanitary and economic results that the filter beds be covered as a protection against frost and ice. Masonry vaulting is employed for this purpose.



TYPICAL SECTION OF SLOW SAND FILTER BED.

Mechanical Filtration is, first of all, a straining process, in which the natural capabilities of the filtering medium are aided by coagulation. The gelatinous coagulating material, combined with the more or less sticky organic matters in the water, and with the finely divided clay and silt, form a layer on the surface of the filter and for a greater or less extent on the sides of each sand grain. Thus the effectiveness of the strainer is greatly increased by the reduction in the interstitial passages and by its adhesive qualities. After a comparatively short period, ranging from say two days to twelve hours, the filter becomes clogged. The impurities penetrate the whole mass, so all the filtering material must be washed. This is done by the simple mechanical process of reversing the flow of water through the filter, so it passes upward from the bottom. The dirty water is wasted at the top. Prior to or in connection with the reversed flow the sand is loosened by means of power-driven revolving rakes, gradually lowered into the filtering material. In place of the rakes, compressed air, admitted from the bottom, is used in some mechanical filters. The filter sand is supported on a false bottom, in which are placed the pipes for collecting the filtered and admitting the wash water. Strainers of perforated metal plates or wire netting give the water access to and permit it to flow from these pipes. The coagulant is admitted to the water before it comes to the filter and is given from a few minutes to several hours' time to act before filtration takes place.



SECTION OF A MECHANICAL FILTER.

If the period is brief a coagulating chamber is placed directly beneath the false bottom of each filter tank; otherwise one or at most two larger coagulating basins, or settling reservoirs in which a coagulant is used, are employed. The coagulant is made of the desired strength by proper dilution. The quantity applied to the water being treated is proportioned by various ingenious devices to the changes in rate of pumpage or water consumption. Among these may be mentioned some form of pump, driven or controlled by the flow of water through the supply pipe to the basin or filter. The amount of coagulant used varies from about one-half to three grains per gallon of water, but rarely exceeds one grain except in waters with high turbidity or that have some other unusually troublesome feature. The filtering material used in mechanical filtration is generally confined in wooden or steel tanks which give a filtering surface with a diameter of only some 10 to 16 feet. The depth of sand is about the same or a little deeper than in slow sand filters, but the rate of filtration runs from 90,000,000 to 125,000,000 gallons an acre. The tanks and operating mechanism are almost invariably placed in a building, and are therefore quite free from the extremes of heat, and from rain or snow. Under proper conditions of design and operation, mechanical filtration will remove almost if not quite as many of the bacteria as the slow sand process; more turbidity and color; but less dissolved organic matter. It is more commonly applied to turbid, highly colored waters than to those which are objectionable on account of sewage pollution. In first cost and in labor charges, mechanical filtration has the advantage, but this is largely and sometimes wholly offset by the cost of the coagulant, of operating the machinery and providing wash water. If the slow sand filters have to be covered the capital charges may be so increased as to place them at a financial disadvantage, as compared with mechanical filtration, although covering filter beds often materially reduces their cost of operation. The choice between the two systems depends upon such a variety of local conditions that each case should be most carefully considered on its merits before adopting either system.

Historical Sketch. The history of filtration, as applied to public water supplies, dates from 1829, when James Simpson built some filter beds for the Chelsea Water Company, of London, England. Following that action, slow sand filtration was first gradually, then rapidly adopted in England and on the Continent of Europe. It was not until about 1887 that the real action of slow sand filters was understood. Prior to that time they were supposed to be strainers only, effecting little or no other chemical change upon the water and leaving the bacteria unharmed. In fact, it was not so many years before this that the relation of bacteria to disease (see Disease Germs, Theory of), and particularly of water-borne germs, was established. The perfection by Koch of methods applicable to the enumeration of water bacteria made possible the announcements by Percy Frankland and others about 1887 that filter beds removed nearly all the bacteria in water. England, Germany, and America have each played important parts in the scientific and practical development of the various aspects of the bacterial purification of water. The work in America has been done very largely by the Massachusetts State Board of Health, at its Lawrence Experiment Station (see annual reports, 1887 to date), as has been mentioned under Sewage Disposal. At Lawrence slow sand filtration has been studied in great detail and a mass of scientific data has been accumulated and valuable conclusions drawn therefrom. Other American investigations, begun a number of years later, are mentioned farther on.

The largest slow sand filtration plant in the United States treats a part of the water supply of Albany, N. Y. It was designed primarily to remove bacteria from the badly polluted water of the Hudson River, and secondarily to remove turbidity and effect such a reduction of color as might be feasible. The plant was completed in 1899 with Allen Hazen, of New York, as engineer. Centrifugal pumps lift the water 24 feet or less, according to the river level, after which it passes through a 36-inch Venturi meter to and through 11 vertical perforated pipes, which afford some aëration as they discharge the water into a settling reservoir. The reservoir is 333 × 600 feet in plan, has a water depth of nine feet, and a capacity of 14,600,000 gallons. Eleven outlets discharge the water through proper pipes upon eight filter beds having a combined area of 5.6 acres, which, at a nominal rate of 3,000,000 gallons an acre, have a total daily capacity of 14,700,000 gallons. From the filters the water passes to a small, equalizing clear-water reservoir, having a capacity of 600,000 gallons. From this reservoir it flows through a steel conduit to a second pumping station, for delivery to the reservoirs and consumers. The filter beds and clear-water reservoirs are covered. The cost of this whole plant was $86,638 for the steel conduit to connect with the old pumping station. The settling reservoir cost about $60,000; clear-water reservoir, $9,000; filter beds, $255,000. Thus the filters alone cost about $17,600 per 1,000,000 gallons of rated capacity.

From July 26, 1900, when the Albany purification works were put in use, to December 29, 1901, an average of 6,463,000 gallons of water per day was treated, at a cost of $1.66 per 1,000,000 gallons for filtration alone, and $4.52 for pumping to the settling basins, cleaning the latter, filtration and laboratory expenses. The $1.66 of expense for filtration alone was divided as follows: Scraping sand from beds, 24 cents; wheeling out sand, 42 cents; replacing sand, 32 cents; incidentals, 13 cents; lost time, 10 cents. The bacterial reduction was about 99 per cent. Practically all of the turbidity was removed and the color was reduced by 24 per cent.

The first mechanical filter connected with a municipal water supply was put in operation at Raritan, N. J., in 1882, by the Somerville Water Company, which supplies Raritan and Somerville. No coagulant was used. In March, 1883, John W. Hyatt patented a filter of the same general type as the one erected at Raritan. In February, 1884, Isaiah S. Hyatt, a brother of John, patented a system of coagulation and filtration combined. These and other patents granted to the Hyatt brothers formed the basis of the Hyatt and later on the New York mechanical filters. Rivals appeared in the market from time to time and much litigation ensued. The latter was confined chiefly to the use of a coagulant. In 1897 the United States Circuit Court of Appeals, notwithstanding much expert and other testimony designed to show the prior use of coagulating materials coincident with filtration, declared the Hyatt patent valid. The patent expired early in 1901.

For a number of years the use of mechanical filters was confined almost wholly to the production of a bright, clear water. Very little disinterested evidence was available to show their efficiency in this respect and practically none bearing on their bacterial efficiency. In 1893-94 experiments on a small scale were made under the direction of Edmund B. Weston, at Providence, R. I., which indicated that mechanical filters would remove a high percentage of bacteria. In 1895-07 more extensive investigations, on a large scale, were made at Louisville, Ky., with Mr. George W. Fuller in charge. Mr. Fuller's report on these investigations (see bibliography) marked an era in water purification. It showed that a water as turbid as the Ohio, and with the large number of bacteria sometimes carried by that stream, could be rendered thoroughly acceptable by means of sedimentation, coagulation, and mechanical filtration combined.

Iron Removal is accomplished most frequently by simple aëration to precipitate the iron, followed by filtration for its removal. If aëration is not sufficient to effect precipitation a chemical may be employed, like milk of lime where the iron is in the form of a sulphate. The few iron removal plants built in the United States up to the middle of 1901 were located on or very near the North Atlantic seacoast, to treat water from wells.

Water Softening has been employed but rarely in the United States, and then chiefly for supplies to the boilers of manufacturing plants or locomotives. The pioneer water-softening process, and one that is still largely used, was invented and patented by Prof. Thomas Clark, of Aberdeen, Scotland, about 1841. In the simplest form of this process, lime water, or milk of lime, is thoroughly mixed with the water to be treated. After twelve to twenty-four hours' subsidence the water is so drawn off as to leave the precipitate behind. Modifications of the Clark system include a variety of settling and filtering devices. The process as described will remove only temporary hardness, or carbonate of lime or magnesia. Permanent hardness, caused by the sulphates of lime and magnesia, may be removed or reduced by using carbonate of soda as a precipitate, but the process is too expensive for general use.

Distillation, owing to its high cost, is practicable only for small quantities of water under special conditions. It is used largely at artificial ice plants (see **Refrigeration**) and is sometimes used to freshen sea water. In addition, it is used in connection with various industrial arts. It consists simply in evaporating water in stills by means of heat and subsequently condensing the steam. The heat given off in cooling, in the best large plants, is utilized to aid in raising the water to the boiling point. The process clarifies as well as sterilizes water. *Boiling*, in any convenient way, is a very cheap and thoroughly effective way of sterilizing water used for household purposes. Both distilled and boiled water must be aërated, or it will be very flat and unpleasant to the taste.

Household Filters, with the exception of a very few kinds, had better be avoided whenever it is feared that there are pathogenic bacteria in the water. There are numerous household filters which are more or less useful as strainers for the removal of mud, and some of the very fine-grained filter tubes do good bacterial work if properly cleaned and sterilized at intervals.

Bibliography. Fuertes, *Water Filtration Works* (New York, 1901), treats of the practical details of design and construction; Hazen, *The Filtration of Public Water Supplies* (3d ed., New York, 1900), devoted chiefly to slow sand filtration; Hill, *The Purification of Public Water Supplies* (New York, 1898), a comprehensive general discussion, giving the relation between water pollution and typhoid fever; Collet, *Water Softening and Purification* (London, 1895); Kirkwood, *Report on the Filtration of River Waters* (New York, 1869), largely descriptive and chiefly of historic value; Fuller, *Report on the Purification of the Ohio River Water at Louisville, Ky.* (New York, 1898), a detailed description of exhaustive experiments with mechanical filters; see also reports of the Massachusetts State Board of Health, 1887 to date, and special reports on experiments at Providence, R. I., Pittsburg, Pa., Cincinnati, Ohio, Washington, D. C., and New Orleans, La. See also **Filtration** and **Water-Works**, and the references to general works in latter article.

WATER RAM. See **Hydraulic Ram**.

WATER-RAT. A large vole (*Microtus amphibius*), eight and one-half inches in length of head and body and reddish brown in general color, which is numerous throughout Europe. It is closely related in structure and habits to the voles and American meadow-mice, and has similar habits, except that it is more aquatic and diurnal than other members of the genus. It is one of the most familiar of British mammals and typical of the Muridæ.

WATER RIGHTS. A general expression to describe the legal power of using or of controlling the use of the water of flowing streams, ponds, lakes, and of the sea. These rights are numerous and varied in character, but may be generally classified as (1) natural rights, (2) easements, (3) customary rights, and (4) public rights. Strictly speaking, this classification has to do only with private waters, those, namely, whether flowing or stationary, which occupy land subject to private ownership. By the common law the bed of the sea and of tidal waters generally (technically described as 'navigable' waters) is not subject to private ownership, but belongs to the State—in England to the Crown; in the United States to the people of the several States—and is open to public use for all proper purposes (as navigation, fishing, bathing, etc.) without restriction. But wherever waters ordinarily public have become subjected to private ownership, the nature of the proprietary right so gained and the extent to which it is limited by rights of user vested either in the public or in other private citizens become proper subjects of inquiry, just as in the case of waters originally and inherently private. (See RIPARIAN RIGHTS; RIVERS.) Even waters strictly public, however, may be subject to private rights which to a certain extent limit the public right of user above referred to—as the rights of access of landing, mooring, and wharfing out, enjoyed by an abutting or riparian owner on a navigable river.

It is of the essence of the doctrine of water rights that the water itself is, in our legal system, not deemed to be capable of ownership. It is true that water collected in cisterns, artificial ponds, etc., the water held in marshy or spongy ground, even the water percolating through the soil or flowing in undefined channels on the surface or underground, is regarded as a part of the earth, and to all intents and purposes as belonging to the owner of the land. Wherefore a landowner may drain his land, or may collect the water therein in wells or cisterns, and may make any use he pleases of it, even though in so doing he cuts off his neighbor's supply of surface drainage or of percolating waters which feed the latter's well or stream. But there is no such thing as the ownership of running streams.

Every landowner has a *natural right* to the use and enjoyment of the watercourse which flows through his land. It is not acquired by grant or prescription, like an easement, nor can it be alienated apart from the land, nor is it, like an easement, extinguished by non-user or abandonment, nor by 'unity of possession.' It exists *jure naturæ*, as an incident to the land, and passes with the land upon the alienation of the latter in whole or in part. It includes the use of the water for all proper purposes—for watering stock, for irrigation, for power, for fishing, and navigation, and for drainage—but such use is strictly limited by the right of every other riparian proprietor to make a similar use thereof. Conversely, the right is infringed by any act—such as diverting, fouling, detaining, or damming back the water, or by draining into it—which inflicts actual damage or excessive inconvenience. (See RIPARIAN RIGHTS.) A riparian proprietor has a right to a steady flow of the watercourse without *material* alteration, and the right is not limited to the main stream, but extends to all contributing streams and springs actually connected therewith, but not to percolating or surface waters not flowing in a defined channel. But a stream flowing in a well-defined channel underground is equally subject to the law of user, above outlined, as is a surface stream. The infringement of riparian rights is a nuisance, remediable by an action for damages and by injunction, and, in a proper case, by direct abatement of the nuisance.

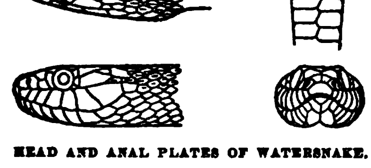
By far the most numerous class of water rights are those which come under the description of *easements*. They include such well-known easements as drainage, or the right of discharging water upon another's land, the right to take water by a pipe, ditch, or otherwise, from another's land, and the right to flood another's land by damming back a running stream upon it. To these may be added, for convenience, the rights (properly described as profits *a prendre* rather than as easements) to take ice from the pond of another, to fish in his stream or trout pond. Like other rights of this character (sometimes comprehensively grouped as servitudes, or rights *in alieno solo*), these may be acquired by grant or prescription and may be lost by release or abandonment. See EASEMENT.

CUSTOMARY WATER RIGHTS are not of frequent occurrence. They consist in the right of a community (as the inhabitants of a town or village), based on immemorial usage, to take water from a private spring or stream or to water cattle at such spring or stream. Rights of this character are not favored in the United States and can hardly be said to exist here, though they are of ancient standing in English law. See CUSTOM.

PUBLIC WATER RIGHTS, or the right of the public at large to use and enjoy private waters, may exist either in waters naturally private, as in non-navigable streams, or in waters which have become subjected to private ownership, as occasionally happens in the seashore or in navigable streams. It is a general rule of the common law that a private stream which is adapted to navigation, even though it be only for floating logs, is subject to the public use for that purpose. This right of the public is strictly limited, however, and does not extend to the taking of fish or cutting ice, or even of landing, but only to the purpose of passing and repassing in a suitable boat, or, as said above, of floating logs at appropriate seasons of the year. The right of fishing, in particular, is an incident of the ownership of the bed of a stream or pond, and no length of user will vest that right in a community or in the public at large. The only exception to this rule appears in the rights enjoyed by the public in the seashore in the rare cases where the latter has become private property. The public ownership of the seashore, i.e. of the strip between low and high water mark to which reference was made above, may be divested by grant from the Crown in England, by legislative act or charter in the United States, in favor of a private individual. In a few of the United States, indeed (Maine, New Hampshire, Massachusetts, and Virginia), the owner of the upland owns the shore. But in all these cases the private owner takes the shore subject to certain immemorial rights of the public, which are deemed of so great importance as to outweigh the consideration of private ownership. The most important of these rights are the right of the public to use the shore at low water as a highway for passing and repassing, to land, dry nets, and dig for shell-fish there, and, when the shore is covered by the tide, to pass in boats and to fish therein. These rights are not inalienable, however, and may be released by the Crown or State, acting in behalf of the public, and vested exclusively in the private owner of the shore. It is on this principle that the numerous and important exclusive rights of sea fishing, and many of the rights of erecting piers, bulkheads, and breakwaters, and the like, have become vested in private persons or corporations in the United States. Consult Gould, *Waters*.

WATER-SCORPION. Any one of the waterbugs of the family Nepidæ. These insects have swollen forelegs fitted for grasping, thus distantly resembling the cheliceres of a true scorpion. The anal end of the body is furnished with two thin, long, grooved, terminal bristles or sheaths, which when pressed together form a tube, through which the insect obtains its supply of air from above the surface of the water. The water-scorpions are carnivorous, feeding upon fishes' eggs, small fish, and water-insects. They are of two types: flat and oval or long and thin. The former belong to the genus Nepa and the latter to Ranatra. The eggs are pushed entirely within slits made by the ovipositor in the stems of aquatic plants. From these slits and attached to the eggs protrude two (in Nepa) or five (in Ranatra) long supposedly pneumatic filaments.

WATERSNAKE. A harmless colubrine serpent of the genus Natrix (or Tropidonotus), closely related to the garter-snakes (q.v.). The common watersnake of the United States is *Natrix fasciata* of Cope, who names six varieties of the species, of which all are Southern except variety *sipedon*. This form, known in the older books as *Tropidonotus sipedon*, is the numerous and well-known watersnake of the Northern and Eastern States as far West as the dry plains. Its average adult length is three feet, but it frequently grows larger. The color is a variable brown, with large dark brown markings on the back and sides, and with the belly yellowish or reddish, spotted with reddish brown rounded spots (absent in some Southern varieties). These colors, together with its habits and somewhat broad head, lead to its often being mistaken for the venomous moccasin snake (q.v.), of which some naturalists consider it a mimic. (See MIMICRY.) This snake is semi-aquatic in its habits, being usually found on the borders of the water, especially quiet millponds and sluggish streams, where it takes refuge when alarmed. It is an expert swimmer and diver, and skillful at catching fishes, on which it mainly subsists; it will also eat dead fishes. When cornered it is pugnacious, but its bite is insignificant and harmless. Its young, 16 to 33 in number, are born alive, when about eight inches long.



HEAD AND ANAL PLATES OF WATERSNAKE.

The watersnake of Europe is *Natrix natrix*, which in several varieties is to be found all over Europe, Western Asia, and the Mediterranean Basin. It is much like the American snake in form, colors, and habits, but very variable. This is the only snake except the viper in Great Britain, and there it does not occur in Ireland or Scotland, and is commonly known in England as 'grass snake.' The main difference between it and our watersnake is that the English one is more active on land, and lays eggs, which are buried in loose loam, or in manure or dust heaps, and hatch after some time. It is described at length by Gadow, *Amphibia and Reptiles* (London, 1901); and by Leighton, *British Serpents* (Edinburgh, 1901). Several other species of the genus occur in the Malayan Archipelago and two in Africa; some of them are large and of savage appearance, but all are harmless. Consult Cope, *Crocodilians, Lizards, and Snakes of North America* (Washington, 1900), and other authorities cited under SNAKE.

WATERSPOUT. A small, rapidly whirling column of air, extending from a cloud down to the ocean or lake, and whose central axis becomes visible as a column of water or cloudy vapor. In some regions, in warm weather, waterspouts are of very frequent occurrence. As they frequently occur in calm weather, it is evident that they are not necessarily produced by wind, but that, on the contrary, the wind that accompanies them is the result of the same process that forms the spout. The formation of a waterspout is due to a strong indraught upward beneath the base of a cumulus cloud. The air that supplies this indraught easily acquires a rapid rotary motion as it ascends. This rotation, by reason of the resulting centrifugal force, produces a very decided low pressure in the central axis of the eddy. The rising air flowing into this region expands by reason of the low pressure, and is therefore cooled dynamically so as to become a visible cloud. One may see a perfect axial cloud formed in a precisely analogous manner in the midst of a rapid dust whirl over a city street. The permanence of the waterspout axis depends largely upon the humidity of the inflowing air. A large waterspout is attended by a cloud of flying salt water spray at its base, but the spout proper consists of fresh water in the form of cloud-particles or rain. Heavy rain generally falls upon any vessel that runs into a waterspout, but the only real danger in that case is from the whirling wind. The firing of cannon to break up a distant spout has often been tried at sea, but it is an error to believe that it has any appreciable effect. Spouts generally last but a few minutes, individually, but many of them may form and disappear in succession, owing to meteorological influences. The term 'waterspout' is often erroneously applied to any very heavy fall of rain from a cloud causing local destructive floods. Such rains may deliver five, ten, or fifteen inches of water in depth over a small region within an hour's time, and cause great destruction. The popular term 'cloudburst' should be applied in these cases, and not the term 'waterspout.' Consult: Ferrel, *Recent Advances* (Washington, 1885); id., *Popular Treatise on the Winds* (New York, 1889).

WATER-STRIDER. A slender, long-legged water-bug of the family Hydrobatidæ. They live upon the surface of quiet waters and dart about with great rapidity. They prey upon other insects and may even leap into the air in pursuit of their prey. The numerous species are found upon both salt and fresh water. They have prominent eyes, a stout beak, long antennæ, and an abdomen which usually tapers to the tip. Many species are dimorphic, one form being wingless and the other winged. Their eggs are attached to submerged parts of plants. A common species upon ponds and in the United States is *Hygrotrechus remigis*, a moderately stout, dark brown insect about half an inch long. It hibernates in mud, beneath leaves upon the banks, or at the bottom of the water under stones. A very strange form common in certain portions of the United States is *Rheumatobates Rileyi.* While truly aquatic, water-striders are structurally more nearly related to the land-bugs than to the other water-bugs.

WATER SUPPLY. Water for irrigation, navigation, water-works, and other industrial and domestic purposes, derived primarily from the rainfall and secondarily from running streams and lakes, or surface water; and from springs, wells, tunnels, and infiltration galleries or underground sources. The quality of water supplied for irrigation, water power, and navigation is of comparatively small consequence, except that a badly polluted stream might be a general nuisance, and that the mineral contents of certain waters are harmful to crops. The water made available by water-works should be above all question as to sewage pollution and should possess other qualities, natural or artificial, discussed under WATER-WORKS and WATER PURIFICATION. A gravity flow is generally an essential in the case of supplies for navigation and water power. The same is often but by no means always true of water for irrigation. These limitations are due to the cost of pumping and do not apply to supplies for domestic and manufacturing purposes. Besides volume, there is a further essential to water for power, namely, sufficient fall to yield the requisite amount of energy to accomplish the desired work. (See WATER POWER.) As has been stated, the common source of all water supplies is the rainfall. Some of this finds its way to the streams, ponds, and lakes; some sinks into the soil to be utilized by plants, or to percolate through the soil to lakes and streams; some is stored in the soil and the permeable layers below it ready to be tapped by wells; and a large part is evaporated directly from the surface of the ground, only to fall to the earth again, in the form of rain, dew, or snow. With a given rainfall in any locality the amount of water naturally available will depend upon the extent, surface slope, and geological formation of the gathering ground, or drainage area, and the nature of the vegetation on that surface. The steeper the slope and the greater the proportion of the rainfall reaching the streams, the less the amount available as underground supplies. With very steep and impervious drainage areas, the streams rise and fall suddenly, leaving comparatively little water available for any useful purpose, and threatening the stability of such water-supply works as are built. Forested and other well-covered areas retain the rainfalls for longer periods, but, in common with all vegetation, they make their own demands upon the water stored in the soil. Nevertheless, such areas, and also flat, sandy stretches of country, tend greatly to equalize the seasonal yield of drainage areas. Temperature and humidity are important factors in all water-supply calculations, high temperatures and low humidities increasing the evaporation from both land and water. When the ground is frozen water cannot percolate into it and the surface flow, or run-off, is so rapid that but little of the rainfall is available, unless there is ample storage. The percentage of water surface to total drainage area plays a very important part, since the evaporation from water surfaces, particularly in hot and dry climates, is much greater than that from land areas.

The excellent maps and reports of the United States Geological Survey and some of the State geological surveys often afford sufficient data relating to the extent, surface, and subsurface character of drainage areas for at least preliminary studies of water supplies. Where these maps are lacking or insufficient, special topographical surveys are necessary, but it may not be so easy to secure geological data. In like manner, meteorological statistics (see RAIN) may be secured from the United States, State, and local weather bureaus or meteorological stations. Still further aids are the observations on the flow of streams made for a number of years past by the Hydrographic Department of the United States Geological Survey, by some of the State engineering bureaus, by municipal water departments, and by owners of private water powers. The New Jersey Geological Survey, the State Engineer of New York, the cities of Boston and New York, the private corporations which control the water power of Lawrence and Lowell, Mass., the East Jersey Water Company, in northeastern New Jersey, and the Spring Valley Water Company at and near San Francisco, Cal., afford the most notable examples of valuable records of this sort. Observations on the amount of water required for various crops, and various phases of ground-water investigation, have been conducted for years past by the United States and the various State agricultural experiment stations, under the control or leadership of the United States Department of Agriculture.

In developing a water supply for any purpose, the first step is to determine the approximate relation between the quantity needed and the various supplies that are or appear to be available. Where the source is to be some large river or lake, or say an artesian well from a basin of known capabilities, and in general where the required supply is obviously only a small part of the minimum yield of the source, no preliminary investigation as to quantity available will be required. But in the majority of cases this point demands at least some consideration. The cardinal principle in estimating the quantitative fitness of a source of water supply is to compare the maximum demand with the minimum supply. Averages are also of great importance, but the foregoing is the crucial test. There should be determined not only the actual or estimated yield of the source of supply during the driest month on record, but also the corresponding yield for the driest two or three years in succession. This will enable those concerned to calculate what storage will be necessary for use during droughts, what supplementary steam plants may be required in connection with water supply developments, and what delays to navigation may be expected in case it is not feasible to provide all the storage indicated as necessary to maintain the levels of navigable canals or rivers. Although the yields of both surface and underground supplies depend primarily upon the rainfall, other factors vary in the two cases. Streams and lakes are supplied partly from the water that flows into them directly from the surface of the ground, hence the name surface water, and partly from water that soaks into the ground, then percolates through the soil to brooks, rivers, and lakes. The underground supplies are replenished from time to time from that portion of the percolating water that does not find its way to the surface supplies, or else is intercepted by artificial means. The drainage areas of surface supplies are well defined and the flow of streams may be readily measured.

The drainage areas of underground sources are not so easily determined, particularly deep-seated waters, and the determination of their volume is often extremely difficult and generally only an approximation. Instead of a stream flowing in a well-defined channel, as is true of surface supplies, underground waters are hidden in the earth and follow a tortuous course through thousands of tiny channels in the voids between the separate grains that compose their water bed. The size of these channels, the general slope of the underground water surface, the depth of the water-bearing stratum, or absence of the pressure that gives rise to artesian conditions, all play their part in the possible yield of wells and springs. Some or all of these factors are but poorly known and their ascertainment may be surrounded with grave difficulties.

The safest and often the only practicable means of determining the yield of an underground source of supply is to measure it, or a portion of it. In the case of springs this may be done by means of a weir (q.v.). Where wells are proposed one or more may be sunk and tested experimentally, but unless the test is for a long period and the deductions are made in the light of the best engineering and geological knowledge the results are quite certain to be misleading and the future yield grossly exaggerated. If a relatively small supply is all that is required one or more test wells may settle the question of capacity with sufficient definiteness at the outset, with the understanding that when the supply, as finally developed, proves inadequate, the plant will be enlarged. If, however, a quantity close to the probable safe yield of the underground basin be desired, the test wells may be so located as to determine approximately the slope of the water level and the porosity of the water-bearing material. From these facts, combined with other valuable data, an estimate of the available supply may be made. The effect of a well is to lower the water level for a greater or less distance around it as a centre, so the new water level in this zone assumes the shape of a flat inverted cone, which has had its surface curved somewhat in the vicinity of the well. The more the water is lowered the flatter becomes the cone and the greater the area of the zone influence, until the water practically fails through exhaustion, or through diminution due to increased friction. Obviously, if wells are placed too close together their zones of influence will overlap and one will rob the other.

In determining the possible yield of surface supplies the first step is to ascertain what gaugings, if any, of the actual flow are available, and particularly whether such gaugings cover a series of years of minimum rainfall. Where no gaugings are to be had it is desirable that a gauging station or stations, should be established. If this cannot be done all the available rainfall records in and near the drainage area should be gathered and studied. These figures may be compared with the rainfall and corresponding yield, or run-off, of other drainage areas, as nearly similar as possible. Deductions may then be drawn as to the average, minimum, and maximum yields. The latter must be known to make possible the provision of adequate means for the passage of flood waters without damage to any of the structures connected with the supply works.

Storage reservoirs may often be provided to make good the deficiency of run-off or stream flow in dry periods. The extent to which this is feasible will depend partly upon the character of the available reservoir sites and largely upon the economic value of the water thus conserved. Absence of proper reservoir sites frequently turns the scales in favor of some other source of supply. The yield of underground water supplies may be supplemented by storage, also, but to a very small extent, as compared with the storage of surface supplies, since most underground waters would have to be pumped as well as stored, and since the conditions for water storage on a large scale are rarely favorable in the vicinity of underground sources. Moreover, underground sources are chiefly used for public water supplies, and ground water in storage for more than brief periods is liable to deteriorate unless protected from the light. The expense of covering large reservoirs would be prohibitive. Relatively small supplies of well water are sometimes stored for irrigation (q.v.).

The yield of drainage areas is expressed in a variety of ways, depending somewhat upon the uses to which the water is put. For preliminary studies the yield may be stated in inches of depth, or in percentage of the total rainfall. The former is readily converted into cubic feet per second, hour, or day, per mile of drainage area, or into millions of gallons per square mile. The gallon is the most convenient unit where waterworks are involved, and the cubic foot where water is to be applied for power or navigation. In the case of irrigation either cubic feet or acre feet may be employed. (See IRRIGATION.) Stream gauging are recorded, primarily, in cubic feet per second.

Springs may be developed and sometimes have their flow increased by digging a basin or well around them, or by driving a tunnel or gallery into a hillside. By either of these means the flow of a number of springs may often be united. The walling up and covering in of springs is frequently desirable to exclude foreign matter of all sorts and to keep the water cool.

Underground waters other than springs are developed by sinking wells, building infiltration galleries, driving tunnels, and, occasionally by the construction of submerged dams. The latter have been employed to intercept percolating waters flowing through valleys in the West, chiefly for use in irrigation. Well-sinking, dam-building and tunnel-driving are described under their proper heads. Infiltration galleries are generally formed by digging a trench and walling up its sides with timber, brick, or stone, laid with open joints. The top is generally tightly covered and the bottom left open.

	Area drained, sq. miles	Years	Average yearly			Year of minimum flow			Average for December-May			Average for June-November		
			Rain inches	Flow inches	Per cent.	Rain inches	Flow inches	Per cent.	Rain inches	Flow inches	Per cent.	Rain inches	Flow in.	Per cent.
Sudbury	75.2	1875–97	45.77	22.22	48.6	37.23	11.19	34.1	22.98	17.52	76.0	22.61	4.70	20.8
Cochituate	18.87	1863–96	47.08	20.33	43.2	31.20	9.76	31.3	22.97	14.37	64.7	24.10	5.46	22.7
Mystic	26.9	1878–96	43.79	19.96	45.6	31.22	9.82	29.3	22.11	15.12	68.4	21.66	4.34	22.4
Connecticut	1023.4	1871–85	44.69	25.25	56.5	40.02	18.25	45.6	20.13	17.95	89.1	24.56	7.38	29.7
Croton	338.0	1870–94	48.38	24.57	50.3	38.52	14.54	37.8	23.39	17.81	76.1	24.99	6.76	27.0
Upper Hudson	450.0	1888–96	39.70	23.36	59.0	33.49	17.46	52.2	18.20	16.23	89.0	21.05	7.13	33.8
Genesee	106.0	1894–96	39.82	12.95	32.5	31.00	6.67	21.5	19.58	10.20	52.2	20.24	2.75	13.6
Passaic	82.2	1877–93	47.08	25.44	54.0	35.64	15.23	42.7	22.47	18.22	81.1	24.39	7.19	29.5
Perkiomen	15.2	1884–97	47.98	23.62	49.2	38.67	15.66	40.4	23.27	16.52	70.8	24.71	6.93	28.3
Tohickon	102.2	1884–97	50.17	28.43	56.7	38.34	18.75	49.0	24.28	20.42	83.3	26.12	8.00	30.6
Neshominy	139.3	1884–97	47.88	23.24	48.5	36.30	16.19	44.3	23.04	17.05	74.0	24.44	6.10	25.0
Potomac	110.43	1886–91	45.47	24.03	52.7	37.03	14.50	39.2	22.13	16.27	73.7	23.34	7.77	33.0
Savannah	729.4	1884–91	45.41	22.19	48.9	43.10	10.26	37.7	21.51	13.03	60.5	23.90	9.16	38.4
Des Plaines	63.0	1889 1889–95	30.56	6.61	21.6	32.38	3.19	9.9	13.01	4.94	37.9	16.30	1.14	7.0
Upper Mississippi	326.5	1885–99	26.57	4.90	18.4	22.86	1.62	7.1	....	....	......	....	......	......

The water of running streams is sometimes diverted to the canal, head-race, or intake pipe by means of a dam, or in the case of a large stream by a wing dam, extending only part way across. Intake pipes are often laid on the bed of large streams or lakes until a point of sufficient depth or remoteness from the shore is reached, where it terminates in a crib or other arrangement for the protection of the exposed end and the strainer frequently placed upon it. Beneath rivers and for a number of the cities on the Great Lakes, the water supply is sometimes drawn through tunnels. These terminate at the shore end in the pumping station and at the river or lake end in a vertical shaft, protected above by a timber and stone crib and tower.

CITY	Average yearly rainfall in inches, three driest years in succession	Square miles required to yield 1,000,000 gallons, in severe drought	Maximum storage room advisable (1-1,000,000 gallons)	
			Per square mile tributary drainage	Per 1,000,000 gallons actually delivered
Boston	38	2.50	260	*650
New York	44	1.70	205	349
San Francisco No. 1	40	3.00	280	840
" " " 2	35	5,00	250	1.250
" " " 3	30	7.00	200	1.400
" " " 4	29	6.25	225	1.406
Oakland	17	9.00	150	1,350

Pumping plants are often important parts of water-supply systems. Their relations to water-works and irrigation are described under those heads, and the various classes of pumps are treated under PUMPS AND PUMPING MACHINERY.

Estimates of the probable yields of drainage areas should be made only after due consideration of all the factors reviewed above. This is particularly true of underground supplies. It is a rare thing to find a single group of wells that yield, year after year, more than any 5,000,000 to 10,000,000 gallons a day, but sometimes a number of groups may be made tributary to one water-supply system by proper pipe connections and pumping plants.

The yield of surface supplies, as has been stated, is far better known than that of underground waters. The accompanying table, taken from Turneaure's *Public Water Supplies*, gives the drainage area and yields of 15 streams in the United States, differing widely in size and location. The records, as will be seen, are mostly for quite long periods and include the average yearly, minimum yearly, and average half-yearly rainfall, run-off, and percentage of run-off to rainfall. A fall of 1 inch of rain on a square mile of area is equal to 2,323,200 cubic feet, or about 17,375,000 gallons. A total flow of 1 cubic foot per second is equal to 646,300 gallons a day. A more detailed study of the records would show that after making allowance for evaporation from water surfaces, there would be a negative yield in some months; or, in other words, the river would run dry were it not for artificial or natural storage. It is to meet just such contingencies that storage reservoirs are provided. There are two ways of considering storage: (1) The amount required to supplement the natural flow so as to give the required daily supply; (2) the economic limit of the storage development. The deficiency is then to be made good by establishing the storage capacity indicated, provided the expense involved is not so great as to render some other source of supply cheaper. The amount of storage will range all the way from nearly the whole run-off of very small streams, to a few months' supply for medium-sized ones, and nothing for large rivers. But whenever an attempt is made to utilize a large percentage of the total run-off, storage will also have to be provided in large quantities. With adequate storage an average daily yield of 500,000 to 700,000 gallons per square mile may be expected in the New England States, New York, and New Jersey, where all the problems involved have been most carefully studied.

In a brief paper on *Storage Water Supplies* presented to the American Water-Works Association in May, 1901, L. J. Le Conte submitted the preceding estimates as to the capabilities and requisite storage of the drainage areas which supply Boston, New York, San Francisco, and Oakland, Cal.

Bibliography. Consult: F. E. Turneaure, *Public Water Supplies* (New York, 1901), and other general reference books under articles on Irrigation and Water-Works; *Water Supply and Irrigation Papers*, and recent annual *Reports* of the United States Geological Survey; and vol. iii. (Water Power) of the *Final Report* of the State Geologist of New Jersey (Trenton, 1894). For further information on the natural sources of water supply, see Water; Artesian Wells; Rain; River; Springs. For the development of water supplies and their useful application, see Aqueducts; Dams and Reservoirs; Irrigation; Water Power; Water Purification; Water-Works; and Well-Sinking.

WATER-THRUSH. A name very suitably applied in Great Britain to the ouzel (q.v.), and transferred in the United States to the terrestrial warblers of the genus Seiurus, also better called 'water wagtails.' They are large, handsome birds, golden or olive brown above and satiny white below, with spotted breast. Three species are observable during the irrigation seasons in the eastern United States, where one remains during the summer as a numerous and familiar resident (see Oven-bird). All show a fondness for the vicinity of water, frequently ponds and forest-streams, near which they make their nests and practice songs surpassed by few American birds in brilliance and melody.

WATER-TIGHT COMPARTMENTS OF VESSELS. See Shipbuilding.

WATER TOWER. See Fire Protection.

WATERTOWN, wa̤'tẽr-toun. A town, including several villages, in Middlesex County, Mass., seven miles west of Boston, on the Charles River, and on the Boston and Maine Railroad (Map: Massachusetts, E 3). It has a public library with 26,000 volumes, and a United States arsenal. A prominent residential suburb of Boston, it is also largely interested in manufacturing. The leading products are paper, paper bags, rubber goods, shirts, soap, woolen goods, waste and shoddy, starch, stoves, furnaces, etc. The water-works are owned and operated by the town. Watertown was settled and incorporated in 1630, and in 1632, when called upon to contribute toward the erection of a fort at Cambridge, made the first protest ever made in America against arbitrary taxation. In 1775-76 the second and third Provincial Congresses of Massachusetts met here, and here the people of Boston, driven from their homes by the British, held several town meetings. Population, in 1890, 7073; in 1900, 9706. Consult: Francis, *An Historical Sketch of Watertown* (Cambridge, 1830); Hurd, *History of Middlesex County* (Philadelphia, 1890).

WATERTOWN. The county-seat of Jefferson County, New York, 70 miles north by east of Syracuse, on the Black River, and on the New York Central and Hudson River Railroad (Map: New York, E 2). Among the prominent buildings are the county court house, State armory, county jail, post office, and the Young Men's Christian Association building. A memorial library to ex-Governor Roswell P. Flower and a handsome high school building are in course of construction. The charitable institutions include the Henry Keep Home for the Aged, two hospitals, and two orphans' homes. There are several small parks, and a new park covering 650 acres is being laid out. Watertown is of considerable commercial importance as the centre of a fertile farming section having extensive deposits of iron and limestone. It also has large industrial interests. In the census year 1900 the various manufacturing establishments had an invested capital of $8,281,845, and a production valued at $7,881,977. The city is especially known for the manufacture of paper and wood pulp, and foundry and machine-shop products. The New York Air Brake Company has an extensive plant here. Other establishments include carriage and wagon factories, flouring and grist mills, lumber mills, steam engine works, farm-implement works, etc. Under the amended charter of 1903, the government is vested in a mayor, chosen biennially, and a unicameral council. The majority of the subordinate officials are appointed by the mayor, subject to the confirmation of the council. The water-works are owned and operated by the municipality. First settled in 1800, Watertown became the county-seat in 1805, and was incorporated as a village in 1816. It was chartered as a city in 1869. Population, in 1890, 14,725; in 1900, 21,696.

WATERTOWN. The county-seat of Codington County, S. D., 140 miles north by east of Yankton, on the Big Sioux River, and on the Chicago and Northwestern, the Chicago, Rock Island and Pacific, the Great Northern, and the Minneapolis and Saint Louis railroads (Map: South Dakota, H 5). It is in a region of attractive scenery, but three miles from Lake Kampeska, one of the most picturesque lakes in the State. The city is an important shipping point for the farming and cattle-raising section adjacent. There are large grain-elevators and warehouses, flouring mills, and manufactories of leather, foundry and machine-shop products, agricultural implements, carriages and wagons, oatmeal, etc. Population, in 1890, 2672; in 1900, 3352.

WATERTOWN. A city in Wisconsin, on the boundary line between Jefferson and Dodge counties, 44 miles west by north of Milwaukee (Map: Wisconsin, E 5). It is on the Rock River, and on the Chicago, Milwaukee and Saint

Paul and the Chicago and Northwestern railroads. Watertown is the seat of Northwestern University (Lutheran), opened in 1865, and of Sacred Heart College (Roman Catholic), established in 1872. Other prominent features include the city hall, the high school building, and the Public Library. The city is the centre of a rich dairy farming section, and manufactures apiary supplies, beer, malt, crackers, confectionery, cheese, lumber products, gas fixtures, flour, and cigars. Under the charter of 1894 the government is vested in a mayor, chosen annually, and a unicameral council. The water-works are owned and operated by the municipality. Watertown was settled in 1836 by a company from Watertown, N. Y., and was incorporated as a village in 1849. It received a city charter in 1853. Population, in 1890, 8755; in 1900, 8437.

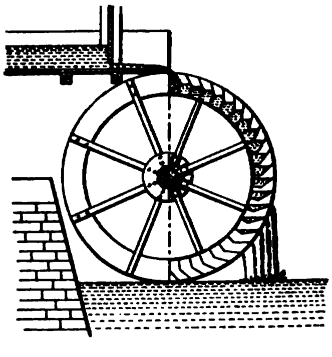
WATER VALLEY. One of the county-seats of Yalobusha County, Miss., 72 miles south by east of Memphis, Tenn., on the Illinois Central Railroad (Map: Mississippi, F 2). It derives considerable commercial importance from its situation in a district extensively engaged in lumbering and cotton-growing, and has railroad repair and construction shops, cotton mills, and broom manufactories. The water-works and the electric light plant are the property of the municipality. Population, in 1890, 2832; in 1900, 3813.

WATERVILLE, wą'tẽr-vĭl. A city in Kennebec County, Maine, 81 miles north by east of Portland, on the Kennebec River, and on the Maine Central Railroad (Map: Maine, D 6). It is the seat of Colby College (q.v.), and of Coburn Classical Institute. The Public Library occupies a handsome building, the gift of Andrew Carnegie. Waterville is engaged to a considerable extent in manufacturing, the most important products being cotton and woolen goods, and furniture. There are also railroad shops, iron works, tanneries, carriage and cigar factories, etc. In Winslow, on the opposite bank of the Kennebec, are large paper and pulp mills. The government is vested in a mayor, chosen annually, and a bicameral council. Formerly a part of Winslow, Waterville was settled in 1764 and was first incorporated in 1802. Its present charter dates from 1888. Population, in 1890, 7107; in 1900, 9477.

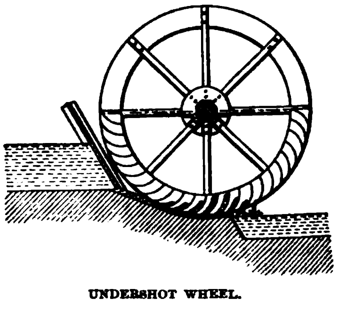
WATERVLIET, wą'tẽr-vlēt'. A city in Albany County, N. Y., on the Hudson River, opposite Troy, with which it has bridge connection, and on the Delaware and Hudson Railroad (Map: New York, G 3). It is also near the termini of the Erie and the Champlain canals. The most interesting feature is the United States Government Arsenal, occupying a large tract of land along the river front. The plant was established in 1807 and includes extensive foundries and shops for the manufacture of guns and other war material. Iron and lumber products, belts, and woolen goods are also manufactured in the city. The electric light plant is owned by the municipality. Watervliet was formed from the village of West Troy, and received a city charter in 1897. Population, in 1900, 14,321.

WATER WHEEL. A wheel for utilizing the weight of falling water to perform mechanical work. (See WATER POWER.) The term water wheel is properly applied to all hydraulic motors that rotate, but it has come to be restricted to wheels which act mainly by the weight of water that they receive on their circumferential parts only, which turn on horizontal shafts, and which move with a low velocity and a velocity that has no relation to the head of water under which the wheel works. In all these respects water wheels as the term is used here differ from turbines (q.v.). Water wheels are designated as overshot or breast wheels according as they receive the water at or near the top, below the centre, or below the top and above the centre.

The *overshot wheel* has a series of buckets arranged on its circumference so that, as the wheel rotates forward, in the direction of the hands of a clock, the buckets on the descending side have their top upward. The water is led to the wheel by a trough or flume which discharges at the top of the wheel just forward of a vertical through its axis. This water fills the buckets and its weight causes the wheel to rotate forward. Each bucket is filled as it comes under the discharge from the flume, and each is emptied as the rotation brings it near the bottom. The object of this is to have the weight of each bucketful of water act throughout the entire vertical distance of the fall. The earlier forms of overshot water wheels were built of wood and were enormously massive and clumsy-looking structures. At a later period iron was substituted for wood, with material gain in lightness and appearance. Overshot wheels were often of enormous size, one of the largest being 72½ feet in diameter, located at Saxey, on the Isle of Man.

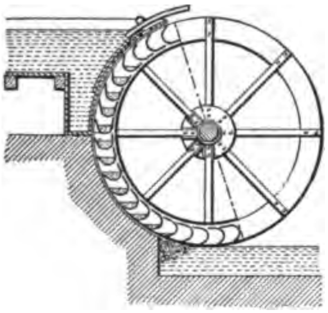


OVERSHOT WHEEL.



UNDERSHOT WHEEL.

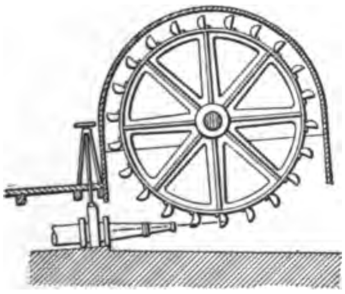
An *undershot* wheel has instead of buckets a series of vanes or paddles on its circumference, and the water, so to speak, flows under the wheel and pushes the paddles forward so as to cause rotation in a direction opposite to the movement of the hands of a watch. In the simplest form of undershot wheel the paddles are radial and the wheel is set so that they dip just their full depth into the current of a flowing stream. In the more approved form of undershot wheel the water passes under the wheel in a rectangular sluice concentric with the wheel, in which the paddles revolve with as little clearance as is consistent with movement. The *breast* wheel, like the overshot wheel, has a series of buckets on its circumference, but they are so arranged that the wheel revolves backward, or in a direction opposite to the movement of the hands of a watch.



BREAST WHEEL.

In the overshot wheel, still using the dial of a watch as an illustration, the water enters the bucket at about the point where number I on the dial is located and leaves it about the point where number V is located; in the breast wheel the water enters the bucket at about X and leaves it at about VII; in the undershot wheel the water hits the paddle at about VIII and leaves it at about VI.

The numerous disadvantages of the water wheels which have been described have caused them to be almost entirely superseded by the turbine. (See TURBINE.) They occupy much more room than turbines of the same power, and must be inclosed in buildings to prevent obstruction by ice in winter. Back-water affects them injuriously, not only by diminishing the head, but by drowning them and causing them to expend their power uselessly in 'wallowing,' a source of loss from which turbines are wholly free. The necessarily low velocity with which they move necessitates cumbrous and expensive gearing to raise the speed to the requirements of industry, which is constantly calling for increased rates of speed.



IMPULSE WHEEL.

Recently a form of water wheel known as the *impulse wheel* has come into extensive use. It consists of a series of cup-shaped vanes attached to the periphery of a wheel and acted on by a jet of water. The water is delivered through a pipe having a nozzle to form a jet which impinges against one bucket after another, as the wheel revolves. A notable feature of this wheel is the shape of the buckets, which is such that they clear themselves of water without obstructing in any way the propelling jet. Sometimes two or three nozzles are employed instead of one, the jet from each striking the wheel at a different point.

Notable among the impulse wheels are those of the Pelton type, some of which have been constructed as large as 18 feet 6 inches in diameter and have been employed to work air compressors in mines. A wheel of this size weighs 10,000 pounds, and runs at 110 revolutions per minute at a 730-foot head of water and develops over 300 horse power. The wheel is made of iron plates riveted together, which are held concentric with the shaft by radial spokes, and a truss consisting of four pairs of two-inch rods. There is a variable nozzle operated by an automatic hydraulic regulator through which the water is applied to the wheel and causes it to run at uniform speed with varying loads.

IMPULSE WATER WHEEL.

BIBLIOGRAPHY. Besides the books mentioned under WATER POWER and TURBINE, the reader will find much valuable data relating to water wheels in Weisbach, *Hydraulics and Hydraulic Motors* (Eng. trans. by Du Bois, New York, 1877), and Bjorling, *Water or Hydraulic Motors* (London, 1894). The best description of wheels of the impulse type will be found in various articles in the engineering papers during the last ten years. See WATER POWER; TURBINE.

WATER-WITCH. Any of various birds quick at diving, as a grebe, bufflehead duck, or dipper.

WATER-WORKS. The various structures and devices used to provide water for domestic and industrial uses, fire protection, and other public services. The term is here restricted to plants for the supply of municipalities. Works limited to the needs of a single establishment generally differ little in principle from municipal works, but are smaller and simpler. The main points to be discussed in this article are the quality and quantity of water to be provided;

the source and mode of supply, the latter involving a choice between gravity and pumping; the size and character of pumping works, reservoirs, tanks, and standpipes; the distribution system; and various details of public policy.

QUALITY, or the fitness of water for its various uses, includes freedom from the specific germs of disease and from minor substances deleterious to health, an absence of turbidity and color, unpleasant taste or odors, and of all mineral matters in sufficient quantities to interfere with the various household and industrial purposes for which the water is designed. The most serious menace to water supplies is *sewage pollution*, which may at any time cause an epidemic of typhoid fever and is likewise one of the chief agents in the spread of cholera. In addition, sewage pollution may give rise to various troubles of the digestive tract and render the system less able to resist various tendencies to ill health and disease. *Sedimentary matter*, otherwise known as muddiness or turbidity, is generally caused by clay and silt suspended in the water. It is more offensive than dangerous, but may prove harmful if taken into the system frequently or in large quantities. *Color* is still more wholly a matter of offensiveness to the eye, instead of a menace to health, than is sediment. The latter gives rise to an apparent color, which disappears with the sediment. True color, as used in water terminology, is generally a stain, rather than matter in suspension. It is frequently due to infusions of vegetable organic matter, like leaves, grass, and peat. *Odor*, in any considerable degree, is less frequent and far more troublesome than either sediment or color. It is commonly due to the life processes of minute organisms in the water and is frequently seasonal in its appearance. Sediment, odor, and taste, as well as the evil effects of sewage pollution, each yield to proper treatment, as described under WATER PURIFICATION.

WATER ANALYSES AND THEIR INTERPRETATION. As an aid to the study of the quality of water recourse is had to an inspection of the drainage area and all possible sources of pollution, and to physical, chemical, and biological examinations of samples of the water. The physical examinations involve observations on temperature, color, odor, and turbidity. Color is generally determined by comparing the samples of water with fixed color standards based on chemical solutions of known composition and regularly varying strength. The most commonly accepted measure of turbidity is the depth at which some bright object will disappear from view if gradually lowered in water. High temperatures give rise to troublesome organic growths. As a rule, however, temperatures are quite beyond control, except in choosing between different sources of supply and in locating the depths of the pipes through which water is drawn from deep lakes and reservoirs. Deep temperature readings are taken by means of the thermophone. Absence of color, odor, and turbidity, combined with low temperatures, are most desirable qualities, but all of them together are of vastly less importance than freedom from organic impurities. Unfortunately, no method of analysis has been discovered which will do more than indicate the probable safety or danger of a given water. Chemical analyses point to past contamination, and give some evidence of its nearness or distance in point of time and whether it was of animal or vegetable origin. Bacterial analyses are of comparatively little avail except to show the numbers of bacteria present, and to throw some light on their probable origin. The differentiation of the typhoid germ, the chief object of fear in America, from the harmless water bacteria is a long, tedious, and at best a very uncertain operation. The more direct microscopical examinations of forms of life above the bacteria, although of much future promise, is limited chiefly to determining the absence or occurrence of those growths that cause bad tastes and odors. But when such growths are detected the most that can be done, ordinarily, is to shut off the water in question, take steps for its purification, or exclude light, when the latter is an essential to troublesome visitors. As an aid to detecting organic impurities, chemical determinations of albuminoid and free ammonia, nitrates, and chlorine are made. The first four substances indicate past contamination. Their relative amounts, in the order named, throw some light upon the degree of natural purification, as measured chemically, that has taken place. The chlorine, if above the local normal for unpolluted water, indicates that the organic matter came from sewage. High nitrates and chlorine combined, especially if accompanied by large numbers of bacteria, render water very suspicious. If, in addition, *coli communis*, a kind of bacteria found in large quantities in the human intestine, are present, the evidence against the water is often held to be conclusive. It may be accepted as quite so if it is learned that sewage is being discharged into the stream or lake above the point of inlet. See DISEASE, GERM THEORY OF.

No determinations of the mineral contents of water are made in the case of surface supplies unless they come from limestone regions and excessive hardness is feared. Underground waters are so likely to contain the sulphates and carbonates that cause hardness, or else other troublesome mineral salts, particularly iron compounds, that it may be well to test for at least those substances when examining well water. Lead poisoning is not due to lead normally in the water, but to lead taken up by the passage of certain water through, and more particularly by its standing in, lead pipes or cisterns. Very soft waters are especially liable to attack lead pipe. Chemical standards for water are very misleading. The best chemists and engineers interpret each set of analyses in the light of all other known facts and attempt to lay down no arbitrary standards. A minimum of 100 to 500 bacteria per cubic centimeter has been set by various authorities; but this, also, depends on all the other local conditions. Hardness is chiefly a question of more or less soap in connection with water used for household purposes, and of scale formation in steam boilers. If excessive, the supply may be rejected, or a softening plant may be supplied. The substitution of pure mountain for contaminated Passaic River water at Newark in 1892, and of filtered for unfiltered water, at Lawrence, Mass., in 1893, and at Albany, N. Y., in 1899, are among the best American examples of the decline in typhoid mortality following upon improved water supplies.

Quantity, while not affecting so vitally the health of a community as quality, since only a small fraction of the total water supply is devoted to hygienic uses, is nevertheless of great importance from the standpoint of health, comfort, æsthetics, and industry. In a purely residential town, with lawn sprinkling for grounds of moderate size, an average daily consumption of 35 to 50 gallons per capita is not only ample for legitimate use, but makes provision for what is termed unavoidable waste. With a moderate amount of manufacturing the consumption ought not to go above 75 gallons; while for all but exceptional conditions 100 gallons per capita should be considered excessive rather than merely ample. For well-managed works, where popular sentiment permits the use of meters, figures no higher than these are reported in America, and still lower ones abroad, but it is no uncommon thing in the United States to hear of cities using (and wasting) all the way from 100 to 200 gallons per capita, while some cities go up to 250 gallons or over, and very likely would go higher still if the capacity of their works were not overtaxed by the excessive demands upon them. Under present conditions few American engineers deem it safe to plan for a water supply of less than 100 gallons per capita, with a provision for some increase in the near future. The tendency of nearly all American cities, for years past, has been to show rapid increases in per capita water consumption.

Pressure is that quality which is imparted to mobile liquids, like water, through differences of elevation, or head, and is due to the force of gravity; or it may be produced artificially by the use of pumping machinery. It is essential in water-works systems that the pressure be ample to give a full and constant supply for all domestic and industrial purposes, and particularly for protection against fire. This may be effected by choosing a source of supply far enough above the general level of the community for the difference in level to overcome the pipe friction and cause the water to rise to the upper stories of buildings for ordinary service, and be sufficient to throw several fire streams over the tops of the highest buildings. Where natural pressure cannot be had pumping is necessary.

Source and Mode of Supply. Modes of supply are classed as gravity or pumping, and the latter mode is sub-classified as pumping direct to the distributing mains and consumers, to standpipe, to tank, or to reservoir. In some cities a combination of two or all these modes is in use. Where there are marked variations in the levels of a city it is customary to divide the works into high and low and perhaps intermediate services. This saves strain on the street and house pipes in the lower levels, and where the water is pumped it may greatly reduce plumbing expenses. In addition, lower pressures result in less leakage at defective joints and pumping fixtures. Several pumps in one station may raise water to different levels, or the water may be repumped for the higher districts. Whatever the source and mode of supply, an ample quantity of water should always be available near the centre of population and fire risk. To accomplish this end, storage reservoirs, or in the case of pumping plants, duplicate pumps, may be required; and several independent lines of main pipes may also be essential.

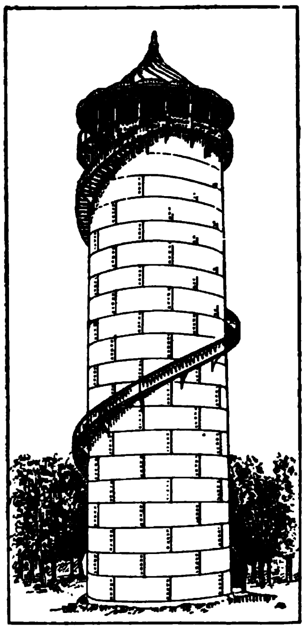
The choice between the various classes of supply, such as springs, wells, streams, and lakes, will be governed by the relative availability of each possible source to meet the three essentials of quality, quantity, and pressure. For large cities surface supplies are most commonly the chief reliance, and in such cases, for all cities not on the larger rivers and lakes, impounding reservoirs are generally employed. Even relatively small supplies from wells are liable to yield less, after a few years, than their original rated capacity. In point of quality, underground waters, except when drawn from wells in populous areas, are generally free from dangerous organic matter, but they may have, or give rise to, bad tastes and odors, and their water may be hard, or may contain iron in such large quantities as to make it unfit for use. Tastes and odors are liable to develop in water from underground sources when exposed to the light. This is due to the life processes of miscroscopic organic growths, mostly of vegetable origin. Water containing iron compounds, on exposure to the air, may become fairly red with a precipitate resembling iron rust. Surface waters are generally soft, unless from limestone drainage areas. They sometimes, on storage, foster odor and taste producing organisms. Their chief danger is from sewage pollution. Surface supplies are relatively warm, and underground waters cool. Surface supplies are also liable to be high in color and turbidity. Swampy or peaty gathering grounds, heavily wooded areas, and improperly cleaned sites for storage reservoirs give rise to color, while readily eroded clay or silt lands contribute turbidity. The Ohio, Mississippi, and many Southern and Western rivers are notable for their turbidity. Swamps may sometimes be drained, or cut out of the collecting area. Soils rich in organic matter may be removed from reservoir sites. See Water Supply.

Pumping Works vary in character with the source and mode of supply, the motive power, the cost of fuel, if fuel is used, and the working pressure on the pumps. The latter is determined by the elevation to which the water is lifted and the frictional resistance in the pipes through which the water is forced. The chief bearing of the source of supply on the pumping plant is the depth of the water below the surface of the earth. If the water is drawn from a depth of more than say 20 to 25 feet as a maximum the pumps must be lowered correspondingly. This suggests, or may render necessary, a vertical rather than a horizontal pump, to economize in the matter of excavations and foundations. (See Pumping Machinery for illustration.) If the pump must be located at a considerable depth below the surface two sets of pumps are used: one in an excavation made to receive it, known as the pump-pit, and the other and main pump at the surface. If the water be very deep-seated some form of deep-well pump, or else the air lift, is required, in order that the motive power may be kept at the surface. In addition to the depth of the source of supply, the necessity of purifying the water is a factor in determining the character of pumping plants. (See Water Purification.) Thus, it may be necessary to lift the water from a river to a settling basin, or from a river or other source to filters, after which it will have to be repumped to the distributing system. Where the water must be pumped twice, and the lift is comparatively low, centrifugal pumps are often used.

Variations in the mode of supply, the extremes of which are direct pumping, with its liability to great and perhaps sudden changes in working pressure, and pumping to a reservoir, against an almost constant head, have important bearings on the choice of pumping machinery. Direct-pumping plants must be quick to respond to sudden changes in pressure, without injury to the machinery. This calls for variable speeds, automatically regulated, and for strong and simple working parts. If, however, water is pumped against a fairly constant head and at either a uniform rate of speed or under such conditions that the rate may be changed gradually, economy in design and operation may receive more consideration. Questions of motive power, particularly as between steam and water, are frequently settled in advance by nature. If ample water power is at hand it is inevitably chosen, on account of its cheapness. If it is not available the year around it may be supplemented with steam power, or possibly storage reservoirs may be constructed to equalize the stream flow. Since the development of the electrical transmission of power it is sometimes possible to utilize waterfalls remote from pumping plants. Electrically driven pumps may also be used where the dynamos are driven by steam engines, but this is not economical except under special conditions, such as pumping plants remote from coal supplies, or located in the residence districts, where a boiler plant for the generation of steam power would be undesirable. Compressed air may be transmitted for the operations of small plants at a distance from the main pumping station or it may be used in the air lift, for raising water from driven and artesian wells. Isolated plants in large cities, and the main pumps of small towns and villages, may be operated by oil or gas engines. Small quantities of water may be lifted by windmills. These various forms of motive power may be applied to any one of a number of kinds of pumps, as explained under PUMPS AND PUMPING MACHINERY.

The vast majority of water-works pumps, however, are driven by steam, the motive power and pump being combined, except in the case of the centrifugal pump, in one machine, known as a pumping engine. The more expensive the fuel the greater the reason for adopting a high-duty pumping engine, or one which, by means of better and more expensive design and workmanship, performs a relatively large amount of work for a small amount of coal. Uniform rates of pumping, as nearly as may be at the full normal capacity of the pumping engine, aid in securing the maximum duty from any sort of pumping machinery. Pumps working under high pressures are selected with special care as to strength of working parts and cylinders, and if of the reciprocating type they have a slow piston and valve movement. For very high pressures plunger pumps are used. The dividing line between high and low pressures is rather arbitrary, but 50 pounds or under might be termed low; 50 to 100 pounds, medium; while anything above the latter figure might be called high.

RESERVOIR TANKS AND STANDPIPES are employed to insure a reserve supply of water, to maintain the pressure in the distribution system at or above a minimum point, and to equalize both the rate of pumping and the head on the pumps. Tanks and standpipes are forms of reservoirs, but the latter term is almost invariably restricted to receptacles built in or partially in the earth, with either earth embankments, masonry walls, or a combination of the two. Tanks and standpipes are built above ground, of wrought iron or steel, except that tanks are very often of wood. Tanks are generally placed on wooden, metal, or masonry towers, and both tanks and standpipes are sometimes inclosed with masonry and covered with some sort of roof. Standpipes rest on masonry foundations, the tops of which are level with or a few feet above the surface of the ground. Metal tanks and standpipes are made from one-fourth to one inch plates of wrought iron or steel, the latter being most commonly employed of late. The plates are riveted together to form the sides and bottom. In recent years the bottoms of steel tanks have been curved to a spherical or conical form and supported at the circumference of the tank, only, instead of resting on a floor system. This is a gain in economy and in appearance. Standpipes are relatively tall for their diameters, a frequent size being from 12 to 20 by 100 feet. Ordinarily only the upper portion of their contents is available, the rest being too low for effective pressure, and serving chiefly as a support for the effective portion.



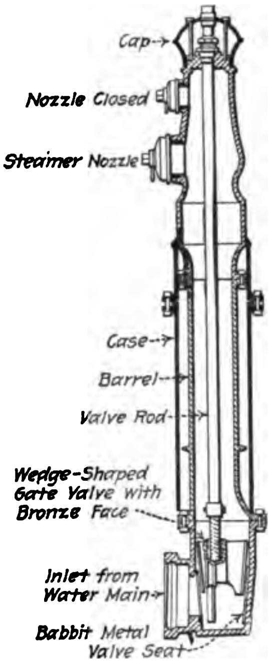
STANDPIPE WITH ROOF, DES MOINES, IOWA.

DISTRIBUTION SYSTEMS comprise the various pipes used to convey the water to the points of use, the valves and hydrants which control the flow and delivery of water, and the meters for recording the consumption. Sometimes the term includes reservoirs, tanks, and standpipes, and more rarely even the pumping plant. The pipe system consists of one or more trunk mains and numerous branches and sub-branches, continually diminishing in size. Pipes are commonly divided into mains and services, the former including all the pipes laid in the streets and the latter the small pipes laid from the street mains to the several buildings supplied. A trunk line which simply feeds other street pipes, but no service pipes, is called a supply main. The latter term is also applied to pipe lines which convey water from a source of supply to the distributing system or to a reservoir feeding the latter. Where water is pumped through such a pipe line it is called a force main. *Mains* are most commonly of cast iron. Wood is also used. Wrought-iron pipe, coated and lined with cement, was extensively used some years ago, but most of it has been replaced with cast iron, on account of the frequent failures which occurred. Steel pipes made from thin plates, riveted both circumferentially and longitudinally, have been used for large supply and force mains since about 1890, superseding the wrought-iron pipe of an earlier date. (See PIPES.) The size of main pipes depends upon the volume and velocity of the water conveyed. Cast-iron pipes range from 4 to 48 inches in diameter, with occasional sizes up to 72 inches. Steel and wood supply mains and steel force mains may be built of almost any size. Bored wood pipes are generally confined to relatively small sizes. Pipes which are to afford fire protection should never be less than four inches in diameter, and that size should be restricted to a few hundred feet on a short street with only one fire hydrant. In the best distributing systems the area served is gridironed with pipes of liberal size, so arranged that any section may be fed from several directions and pipes in case of heavy local draughts for extinguishing fires. *Service pipes* are most commonly of lead or wrought iron. Lead is more expensive than iron, but its flexibility, smooth interior surface, relative non-corrosiveness, and great durability are in its favor. Its chief objection, aside from high first cost, is the ease with which it decomposes when exposed to certain waters. (See *Quality*, above.) Plain wrought-iron pipe corrodes so rapidly as to be out of the question. Galvanized, or zinc-coated, wrought-iron pipe is fairly durable when used for some waters, but corrodes so rapidly with others as to become almost filled with rust after only a few years. Among the various other methods of treating wrought-iron pipe, besides galvanizing, a japan, or baked varnish, coating has been employed of late. Wrought-iron service pipes are quite frequently lined with lead, tin, or cement to avoid corrosion and clogging and to give the smooth inner surface which is a quality of such materials.

VALVES are used in distributing systems to control the flow of water to and through the mains and from the mains to the house services. The latter are generally called *corporation cocks*, and are set at or near the curb, with a *service box* for protection and access. The usual type of valve consists of either a disk or wedge, which is lifted vertically or slid horizontally by means of a screw rod and proper gearing. The latter, in the case of large sizes, may be worked by hydraulic pressure from the water main in which the valve is set. Valves are also operated by electricity, particularly when it is desired to open or shut them from a distance. A free use of valves throughout a distributing system contributes greatly to the reliability of the water-works service and the ease of making repairs to the pipe system. *Check valves* close against a backward flow of water and are used on pumping mains and for the protection of meters against back pressure. *Reducing valves* are automatic devices for relieving the lower levels of a city from excessive pressure where proper division into high and low service is impracticable. The Venturi principle (see WATER METERS) is occasionally profited by to reduce the cost of valves on large mains. That is to say, a 48-inch main may be gradually contracted to 36 inches, and a valve of that size placed, then the main be increased by degrees to its former size. A slight loss of pressure, only, will result, and where there is pressure enough and to spare a considerable sum of money may be saved.

HYDRANTS consist of a valve set at or near the curb line, on a branch pipe. A vertical tube or barrel extends from the valve to and generally above the ground level, with one and more often two or more nozzles for the attachment of fire hose. Hydrants should rarely if ever be placed more than 500 feet apart, and in closely built business sections may need to be much closer together.

METERS are self-registering devices for measuring the quantity of water supplied to a whole city, a section of it, or a single consumer. They afford the most equitable if not the only fair means for dividing the cost of the water service between the several consumers, and are most efficient agents for the detection of leaks and the prevention of waste. Their construction and operation is described in the article WATER METERS. They are set in the line of the service pipe, just inside the cellar or house line; or, where there is no danger of frost, at a convenient point on the house service, as beneath the sidewalk. In the latter case dial extensions are attached to the registering mechanism, so as to bring the dial up where it may be read with ease.



SECTION THROUGH A WATER-WORKS HYDRANT.

WASTE PREVENTION is essential to economy of operation of a water-works plant. As suitable water supplies become more scarce and distant, the conservation of quantity becomes almost as essential as the preservation of the purity of water. The first step in waste prevention is good

WATER CONSUMPTION AND USE OF METERS IN THE 50 LARGEST CITIES OF THE UNITED STATES IN 1900 AND 1890. (From *Engineering News* for April 18, 1901.) The figures for 1900 were compiled from special reports from officials by Geo. I. Bailey; the figures for 1890 are from *The Manual of American Water-Works* for 1891.

PERCENTAGE OF TAPS METERED AND PER CAPITA WATER CONSUMPTION IN THE 50 LARGEST CITIES OF THE UNITED STATES IN 1890 AND IN 1900, ARRANGED IN ORDER OF POPULATION*

CITIES	Percent. taps metered		Per capita consumption		Increase or dec. consumption, in 10 years. gals.
	1890	1900	1890	1900	
New York†	20.2	......	79	116	+ 37
Chicago	......	3.3	140	190	+ 50
Philadelphia	0.3	0.5	132	229	+ 97
Brooklyn†	2.5	......	72	......	....
St. Louis	8.2	6.3	72	159	+ 87
Boston	5.0	5.5	80	143	+ 63
Baltimore	0.1	1.5	94	97	+ 3
San Francisco	41.4	23.0	61	73	+ 12
Cincinnati	4.1	7.6	112	121	+ 7
Cleveland	5.8	4.9	103	159	+ 56
Buffalo	0.2	1.6	186	233	+ 47
New Orleans	0.4	......	37‡	48‡	+ 11
Pittsburg	0.2	0.6	144	231	+ 87
Washington	0.3	2.7	158	185	+ 27
Detroit	2.1	10.0	161	146	— 15
Milwaukee	31.9	67.6	110	80	— 30
Newark	2.4	21.9	76	94	+ 18
Minneapolis	6.3	27.5	75	93	+ 18
Jersey City	1.2	2.0	97	160	+ 63
Louisville	5.9	7.5	74	100	+ 26
Omaha	19.4	34.6	94	176	+ 82
Rochester	11.4	25.3	66	83	+ 17
St. Paul	4.2	28.2	60	67	+ 7
Kansas City	17.6	40.0	71	62	— 9
Providence	62.4	82.6	48	54	+ 6
Denver	0.8	1.2	......	300	....
Indianapolis	7.6	6.0	71	79	+ 8
Allegheny	0.0	......	238	......	....
Albany	0.4	12.3	......	191	....
Columbus	6.4	34.0	78	230	+ 152
Syracuse	14.6	47.4	68	102	+ 34
Worcester	89.4	94.3	59	70	+ 11
Toledo	9.4	50.3	72	119	+ 37
Richmond	1.4	30.4	167	100	— 67
New Haven	.....	2.6	135	150	+ 15
Paterson	......	20.7	128	129	+ 1
Lowell	22.9	52.5	66	85	+ 19
Nashville	0.8	41.5	146	140	— 6
Scranton	......	......	......	......	....
Fall River	74.6	94.3	29	36	+ 7
Cambridge	2.4	6.1	64	79	+ 15
Atlanta	89.6	91.6	36	84	+ 48
Memphis	3.7	8.3	124	125	+ 1
Wilmington	0.2	4.3	113	90	— 23
Dayton	3.8	46.7	47	62	+ 15
Troy	3.9	4.2	125	183	+ 58
Grand Rapids	......	13.4	......	156	....
Reading	0.1	4.0	75	92	+ 17
Camden	......	1.4	131	280	+ 149
Trenton	......	... ..	62	99	+ 37

---

* The classification is by the census of 1890, so as to include all the cities in the earlier grouping.

† New York and Brooklyn consolidated since 1890.

‡ Only a small part of the population supplied.

WATER CONSUMPTION AND PERCENTAGE OF TAPS METERED IN THE 50 LARGEST CITIES OF THE UNITED STATES ARRANGED IN ORDER OF CONSUMPTION*

In 1890			In 1900		
CITIES	Consumption galls.	Per cent. taps metered	CITIES	Consumption galls.	Per cent. taps metered
Allegheny	238	0.0	Denver†	300	1.2
Buffalo	186	0.2	Allegheny	?	?
Richmond	167	1.4	Camden	280	1.4
Detroit	161	2.1	Buffalo	233	1.6
Washington	158	0.3	Pittsburg	231	0.6
Nashville	146	0.8	Columbus	230	34.0
Pittsburg	144	0.2	Philadelphia	229	0.5
Chicago	140	......	Albany	191	12.3
New Haven	135	......	Chicago	190	3.3
Philadelphia	132	0 3	Washington	185	2.7
Camden	131	Small	Troy	183	4.2
Paterson	128	Small	Omaha	176	34.6
Troy	125	3.9	Jersey City	160	2.0
Memphis	124	3.7	St. Louis	159	6.3
Wilmington	113	0.2	Cleveland	159	4.9
Cincinnati	112	4.1	Grand Rapids	156	13.4
Milwaukee	110	31.9	New Haven	150	2.6
Cleveland	103	5.8	Detroit	146	10.0
Jersey City	97	1.2	Boston	143	5.5
Baltimore	94	0.1	Nashville	140	41.5
Omaha	94	19.4	Paterson	129	20.7
Boston	80	5.0	Memphis	125	8.3
New York	79	20.2	Cincinnati	121	7.6
Columbus	78	6.4	Toledo	119	50.3
Newark	76	2.4	New York	116	......
Reading	75	0 1	Syracuse	102	47.3
Minneapolis	75	6.3	Richmond	100	30.4
Louisville	74	5.9	Louisville	100	7.5
Toledo	72	9.4	Trenton	99	......
Brooklyn	72	2.5	Baltimore	97	1.5
St. Louis	72	8.2	Newark	94	21.9
Indianapolis	71	7.6	Minneapolis	93	27.5
Kansas City	71	17.6	Reading	92	4.0
Syracuse	68	14.6	Wilmington	90	4.3
Lowell	66	22.9	Lowell	85	52.5
Rochester	66	11.4	Atlanta	84	91.6
Cambridge	64	2.4	Rochester	83	25.3
Trenton	62	Small	Milwaukee	80	67.6
San Francisco	61	41.4	Cambridge	79	6.1
St. Paul	60	4.2	Indianapolis	79	6.0
Worcester	59	89.4	San Francisco	73	23.0
Providence	48	62.4	Worcester	70	94.3
Dayton	47	3.8	St. Paul	67	28.2
New Orleans	37	0.4	Kansas City	62	40.0
Atlanta	36	89.6	Dayton	62	46.7
Fall River	29	74.6	Providence	54	82.6
			New Orleans	48	......
			Fall River	36	94.3

---

* A few cities are omitted from each list, on account of missing figures. This table is based on the opposite table, which in turn was based on the classification of the census of 1890, instead of that of 1900.

† In Denver, water is used for irrigation.

workmanship in the construction of the plant, particularly in all the underground portions where leaks are difficult to detect and costly to repair. The next step is to insist on high-grade self-closing plumbing fixtures, including all faucets or spigots for drawing hot and cold water, and particularly the flushing devices of water-closets. To detect leaks or other causes of waste inside the house line either meters or house-to-house inspection may be employed. The latter can be made only at long intervals, at best, causes friction, and is insufficient and unsatisfactory. Meters not only detect leaks, but they make the consumer liable for any neglect in stopping them and likewise debit the consumer with all wastefulness due to letting the water run to prevent freezing in cold weather, or to secure cooler water in summer, or because of mere carelessness. Service pipes may be inspected by means of a steel rod with a telephone receiver or similar device at its upper end. The rod is inserted through the service box and placed on the corporation cock. If ever so small a stream of water is running the ear of the trained observer will catch the sound and an inspection is made. The district meter system is also a help in detecting underground leaks. For leaks and waste inside buildings, due to poor plumbing or carelessness, the district meter system, like house-to-house inspection, is so infrequent as to be but a poor competitor of the house meter system. The district plan has not been used much in the United States, but where employed persistently and intelligently, particularly where house meters were impracticable or underground leakage suspected, it has given good results. Such simple plans as observing the rate of pumping or the fall of water in reservoirs during the hours of minimum night consumption, or the relative day and night pressures, often assist in controlling waste. Some idea of the water consumption in the larger American cities, the effect of meters thereon, and the increase in consumption from 1890 to 1900 may be gained from the accompanying table. The first half of the table shows the 50 largest cities of the country grouped in order of population by the census of 1900. In the second, or right-hand half, most of the same cities are rearranged in the order of consumption per capita. It will be seen that as a rule there was an increase in per capita consumption during the ten years, but that it was greatest where few or practically no taps were metered; also that most of the cities with low rates of consumption were well metered. The statistics for 1900 were taken from a collection of figures for 134 of the 159 cities of the United States having a population of 25,000 or more by the Twelfth Census of the United States. The average daily consumption for the 134 cities was 137 gallons per capita, having less than 10 per cent. of their taps metered used and wasted as an average 153 gallons, and those having more than 50 per cent. of metered taps consumed only 62 gallons per capita.

Public Policy. The only points under this head that can be considered here are the apportionment of the cost of service between the various classes of consumers and one or two phases of the municipal ownership question. *Apportionment of cost of service* involves not alone the quantity of water consumed by the various users, but the heavy capital charges incurred to make very large rates of consumption available for the few minutes or at most hours at a time when water is used for the extinguishment of fires. Large reservoirs, pumping plants, and mains are provided for fire protection, and used in the aggregate for a short time only in each year. This makes high capital charges, even though the cost of operation for fire protection is small. The other public uses to which water is put, like street-sprinkling, sewer-flushing, and the supply of parks and school buildings, may be paid for on the same general basis as water supplied to private consumers. It is a rare thing under either public or private ownership to find a scientific adjustment of the cost of public and private service between the general taxpayers and private consumers, respectively. But equity demands such an adjustment. The fire, school, street, and other departments should be debited and the water department, in the case of municipal ownership, credited with the value of the services rendered to each. The taxpayer should not be called upon to meet bills of private consumers, nor should the man who uses water for a bath tub and lawn sprinkler have included in his bills for these services the heavy cost of fire protection in the business district. As between different individual consumers in the same class the meter is the best means of apportioning the charges for water. So-called fixture rates are arbitrary guesses and compel the careful water-user to pay for the waste of the careless.

Public Ownership demands for its proper consideration, from the economic standpoint, accurate detailed figures of expenses and revenue, on a comparative basis. Such figures are rarely available.

The sanitary interests of a community, depending as they do largely upon police measures, are generally considered to be safer where water-works are under public rather than private control. The course of public ownership in this country during the past century is shown below in the table giving the number of works at the close of each half decade:

NUMBER OF PUBLIC AND PRIVATE WORKS IN THE UNITED STATES AT THE END OF EACH HALF-DECADE, BEGINNING WITH 1800

(Compiled from *The Manual of American Water-Works* for 1891 and 1897)

YEAR	Public	Private	Total	Per cent. of total	
				Public	Private
1800	1	15	16	6.3	93.7
1805	2	21	23	8.7	91.3
1810	5	21	26	19.2	80.8
1815	5	21	26	19.2	80.8
1820	5	25	30	16.6	83.4
1825	5	27	32	15.6	84.4
1830	9	35	44	20.5	79.5
1835	15	39	54	27.8	72.2
1840	23	41	64	35.9	64.1
1845	27	43	70	38.6	61.4
1850	33	50	83	39.7	60.3
1855	48	58	106	45.3	54.7
1860	57	79	136	41.9	58.1
1865	68	94	162	42.0	58.0
1870	116	127	243	47.7	52.3
1875	227	195	422	53.8	46.2
1880	293	305	598	49.0	51.0
1885	447	569	1013	44.1	55.9
1890	806	1072	1878	42.9	57.1
1896	1690	1489	3196	53.2	46.8

Include 12 of joint and five of unknown ownership

The water-works of the cities of Western Asia, Greece, Carthage, Rome, and the European countries under Roman dominion all depended upon gravity for the delivery of the water and were notable chiefly for their aqueducts. Most of the latter were of masonry. (See **Aqueducts**.) The water within the cities was conveyed by means of lead, wood, and more rarely bored stone or baked clay conduits. (See **Pipes**.) Some of the earliest pumping works for city supplies, notably those erected at the London Bridge in 1562 by Peter Maurice, are described in the article on **Pumps and Pumping Machinery**. In 1613 water was brought into London from a distance by Sir Hugh Myddleton, who with others secured a charter for the New River Company in 1619. The most notable feature consisted of a water-supply canal about 40 miles long, which brought in water from springs distant, in an air line, about 20 miles. The canal was about 18 feet wide, 5 feet deep, and had an average fall of some 4 inches per mile. Valleys were crossed, for the most part, by means of timber flumes, lined with lead. Subsequently the flumes were replaced by earth embankments. A sale of some of the stock of the New River Company, which for many years shared with seven other companies the profits of supplying the Metropolitan water area, brought a fabulous sum, a few years ago, as compared with the original par value.

The first public water supply in America was introduced in Boston in 1652 by the Water-Works Company. It consisted of a reservoir about 12 feet square, to which water was conveyed through wooden pipes from neighboring springs and drawn upon for both domestic and fire purposes. The second American water-works plant was built at Bethlehem, Pa. It was begun in 1754 by a Danish millwright named Hans Christopher Christiansen and was finished in 1761. Water from a spring was piped for 350 feet to a cistern, or well, from which a wooden pump, five inches in diameter, forced it through bored hemlock logs to a wooden tank in the village square, 70 feet above the pumps. In 1761 Christiansen and others built larger works, including three simple-acting iron force pumps, four inches in diameter and with a stroke of 18 inches, driven by an undershot water wheel. The new pipe from the pump to the tank was of gum wood, and the distributing pipes were of pitch pine. In 1769 the latter had to be renewed and in 1786 lead pipes were substituted for both the force pump or force main and most of the distributing pipes. In 1813 iron pipes were introduced, with leather-packed joints, clamped together with iron. The pumps installed in 1761 were used for seventy-one years, when they were supplanted by 5 × 36-inch double-acting pumps, which were in use as late as 1887. Steam was not substituted for water power until 1868. In 1871 the borough bought the works from their private owners, the Bethlehem Water Company.

To the close of the year 1800 there had been built in the United States 16 water-works plants. All but one of these were originally owned by private companies, but during the ninteeenth century 14 of the 15 remaining cities changed from private to public ownership. The names of the 16 cities, the dates the original works were constructed, and the years of change to public ownership are as follows:

WATER-WORKS IN THE UNITED STATES AT THE CLOSE OF 1800

(From *The Manual of American Water-Works* for 1891.)

Located at	Date built	Change to public ownership
Boston, Mass.	1652	1848
Bethlehem, Pa.	1761	1871
Providence, R. I.	1772	1871
Geneva, N. Y.	1787	1896
Plymouth, Mass.	1796	1855
Salem, Mass.	1795	1875
Hartford, Conn.	1797	1854
Portsmouth, N. H.	1798	1891
Worcester, Mass.	1798	1852
Albany, N. Y.	1798 or 1799	1851
Peabody, Mass.	1799	1873
New York, N. Y.	1799	1845
Morristown, N. J.	1799	Still private
Lynchburg, Va.	1799	1828
Winchester, Va.	Before 1800	Always public
Newark, N. J.	1800	1860

BIBLIOGRAPHY. Consult: Fanning, *Hydraulic and Water Supply Engineering* (New York, 7th ed., 1889), for many years a recognized standard technical work; Turneaure and Russell, *Public Water Supplies* (ib., 1901), a comprehensive technical work, with good bibliographies at the close of the most important chapters; Folwell, *Water Supply Engineering* (ib., 1900), less technical than Fanning; Godell, *Water-Works for Small Cities and Towns* (ib., 1899), somewhat elementary, but containing numerous citations from scattered papers and articles by able engineers; Burton, *Water Supply of Towns* (London, 1894), technical general treatise; Gould, *Elements of Water Supply Engineering* (New York, 1899), relates chiefly to the flow of water in pipes; Billings, *Some Details of Water-Works Construction* (ib., 1893), practical points on pipe-laying, etc.; Mason, *Water Supply* (ib., 1896), "considered principally from a sanitary standpoint;" Fuertes, *Water and Public Health* (ib., 1897), a brief study of the relation between pure water or the reverse and typhoid fever; Richards and Woodman, *Air, Water, and Food* (ib., 1900), a popular work, combined with carefully prepared instructions for making analyses of water; Whipple, *The Microscopy of Drinking Water* (ib., 1899); Percy and Grace Frankland, *Micro-Organisms in Water* (London, 1894); Rafter, *Microscopical Examination of Potable Water* (New York, 1892); Baker, *Potable Water and Methods of Detecting Impurities* (ib., 1899), brief and popular; Meyer, *Water-Waste Prevention* (ib., 1885), a brief account of inspection and the use of meters as preventives of water waste; Hazleton, *Towers and Tanks for Water-Works* (ib., 1901); Pence, *Standpipe Accidents and Failures* (ib., 1895); M. N. Baker (editor), *The Manual of American Water-Works* (ib., 1897), describes all the water-works plants in the United States and Canada, about 3400 in all, at the close of 1896, and gives statistics of extent of works, receipts and expenditures; also see bibliographies in articles under cross-references.

See AQUEDUCTS; DAMS AND RESERVOIRS; FILTRATION; PIPES; PUMPS AND PUMPING MACHINERY; WATER METERS; WATER PURIFICATION; WATER SUPPLY; WINDMILLS.

WATER-YAM. See LATTICELEAF.

WAT'FORD. A market town in Hertfordshire, England, picturesquely situated on the Coln, 15 miles northwest of London (Map: London, B 3). It has fine public buildings, including a restored Perpendicular church and the well-known London Orphan Asylum. There are silk, paper, and flour mills. Population, in 1891, 17,063; in 1901, 29,023.

WAT'KINS. The county-seat of Schuyler County, N. Y., 22 miles north by west of Elmira, on Seneca Lake, and on the New York Central and the Northern Central railroads (Map: New York, D 3). The vicinity abounds in picturesque lakes and mineral springs, but is better known for its numerous glens and ravines. Watkins Glen, with its cascades and waterfalls, and the group of springs known as the Glen Springs, are especially noteworthy. Other features of the village are the Glen Springs Sanatorium and the public and high school libraries. Farming and viticulture are the principal industries of the surrounding country, and the village has large salt works and manufactories of flour, carriages, and iron and lumber products. Population, in 1890, 2604; in 1900, 2943.

WATKINS GLEN. See WATKINS.

WAT'LING'S ISLAND. A small island of the Bahamas, situated in the east central part of the group, 46 miles southeast of Cat Island (Map: Antilles, K 2). It is generally identified with Guanahani or San Salvador, the first landing place of Columbus.

WAT'LING STREET (AS. *Wætlinga stræt*). A celebrated Roman highway of Britain, beginning at Dover, passing through Canterbury and Rochester to London, and thence through Wroxeter and Chester to Caer-Seiont, the ancient *Segontium*, in Caernarvonshire. From Wroxeter a branch proceeded north by Manchester, Lancaster, and Kendal, into Scotland. Traces of the ancient road exist and in some parts of its course it is still an important highway. It forms the boundary between Warwickshire and Leicestershire. The origin of the name is uncertain; the original name was probably *Stratum Vitellianum.*

WAT'SON, Henry Brereton Marriott (1863—). An English novelist, born at Caulfield, a suburb of Melbourne, Australia, where his father was then settled as a clergyman. He was educated at Canterbury College in Christchurch, New Zealand, went to England in 1885, and soon became a journalist. He is known through his contributions to *The National Observer* and as assistant editor of *Black and White* and of the *Pall Mall Gazette.* The type of novel he mostly follows is a cross between the story of exciting adventure and the very modern psychological romance. Some of his short stories are excellent. His novels comprise mainly *Marahuna* (1888); *Lady Faintheart* (1890); *The Web of the Spider,* a tale of adventure among the Maoris (1891); *Diogenes of London* (1893); *Galloping Dick,* consisting of six autobiographical stories of Dick Ryder's adventures on the road in the time of Charles the Second (1895); *At the First Corner,* a collection of short stories (1896); *The Heart of Miranda, and Other Stories,* dealing with modern life (1898); *The Adventurers,* a tale of treasure trove on the Welsh border in the year 188— (1898); *The Princess Xenia* (1899); *Chloris of the Island,* a story of smuggling on the Dorsetshire coast (1900); *The Rebel,* an historical romance of the time of Charles the Second (1900); *The Skirts of Happy Chance,* the fantastic adventures of a young man of wealth and high birth (1901); *The House Divided,* dealing with English life in the time of George the Second (1901); and *Godfrey Merival, Being a Portion of His History* (1902).—His wife, Rosamund (1863—), a daughter of Benjamin Williams Ball, was born in London. She became favorably known for much miscellaneous writing, as *The Art of the House* (1896), and for several volumes of graceful verse, as *The Bird-Bride, and Other Poems* (1889); *A Summer Night, and Other Poems* (1891); *After Sunset* (1895); and *Vespertilia, and Other Poems* (1895). Consult Archer, *Poets of the Younger Generation* (London, 1902).

WATSON, Henry Cood (1816-75). An English-American composer, musical critic and writer, born in London. When but a child he showed remarkable musical talent, and in 1829 appeared at the Covent Garden Theatre in Weber's *Oberon.* In 1840 he went to New York, and in 1845, with Poe and Charles F. Briggs, he founded the *Broadway Journal,* which proved a failure financially, though it was ably conducted. He was one of the founders of the Philharmonic Society of New York, and had a chief share in organizing the celebrated Castle Garden Mendelssohn concert. In 1855 he founded *The Musical Guest,* and published many of his own compositions in its columns. Later he was editor-in-chief of *Frank Leslie's Illustrated Newspaper;* in 1862 started the *Art Journal,* and for the last twelve years of his life was the musical critic of the New York *Tribune.* He wrote several libretti, among them that for Wallace's *Turline* (1860).

WATSON, Hewett Cottrell (1804-81). An English botanist, born at Firbeck, and educated at the University of Edinburgh. In 1831 he was elected senior president of the Royal Medical Society of Edinburgh. He went with a survey to the Azores, where he spent three months collecting specimens, several of which were entirely new in the British Gardens. His writings include *Outlines of the Geographical Distribution of British Plants* (1832), *The New Botanist's Guide to the Localities of the Rarer Plants of Great Britain* (1835), *The London Catalogue of British Plants* (6th ed. 1867), and *Cybele Britannica, or British Plants and Their Geographical Relations* (1847-60).

WATSON, James Craig (1838-80). An American astronomer, born in Ontario, Canada, of American parents. He graduated at the University of Michigan, 1857, and was for some time instructor there in mathematics and assistant at the observatory. He became professor of astronomy in the same institution in 1859, of physics and mathematics in 1860, and director of the observatory in 1863. He discovered many planetoids (q.v.), and was at the head of the American expedition which observed the transit of Venus at Peking, China, 1874. He prepared many astronomical charts, but his principal work was his *Theoretical Astronomy.* This is now a classic treatise on the theory of the motions of comets and planets. Watson left a large sum of money to the National Academy of Sciences (the Watson Fund), the interest of which is used to further astronomical research.

WATSON, John (1847—). An English philosopher. He was born at Glasgow and graduated at Glasgow University in 1872. In the same year he was appointed professor of mental and moral philosophy at Queen's University, Kingston, Canada. Aside from numerous papers in philosophical journals, his publications include: *Kant and His English Critics* (1881); *Schelling's Transcendental Idealism* (1882); *The Philosophy of Kant as Contained in Extracts from His Own Writings* (1888); *Comte, Mill, and Spencer* (1895); and *An Outline of Philosophy* (1898).

WATSON, John (1850—). An English Presbyterian clergyman and author, popularly known by his pseudonym, Ian Maclaren. He was born of Scotch parents at Manningtree, Essex, and studied at Edinburgh University, New College, Edinburgh, and Tübingen. He was licensed by the Free Church of Scotland in 1874 and became assistant at the Barclay Church, Edinburgh. The following year he was ordained minister of the Free Church at Logiealmond, Perthshire. In 1877 he went to Free Saint Matthew's, Glasgow, and in 1880 to Sefton Park Presbyterian Church, Liverpool. He became widely known by his very successful book of stories descriptive of Scotch life and character, *Beside the Bonnie Brier Bush* (1894), which was followed by *The Days of Auld Lang Syne* (1895), *Kate Carnegie* (1896), *A Doctor of the Old School* (1897), *Afterwards* (1898), and *Rabbi Saunderson* (1898). In 1896 Watson gave the Lyman Beecher lectures before the Yale Divinity School, published under the title *The Cure of*

Souls (1896). He has also published on religious themes: *The Upper Room* (1895); *The Mind of the Master* (1896); *The Potter's Wheel* (1897); *Companions of the Sorrowful Way* (1898); *Doctrines of Grace* (1900); and *The Life of the Master* (1901).

WATSON, John Crittenden (1842—). An American naval officer, born in Frankfort, Ky. He was educated at the United States Naval Academy, became a master in the navy in 1861, and served throughout the Civil War, after July, 1862, as a lieutenant, participating in the bombardment of Forts Jackson and Saint Philip, in the passage of the Vicksburg batteries, and in the battle of Mobile Bay. After the war he was assigned to various routine duties, both on sea and shore, became a captain in 1887 and a commodore ten years later, and in the Spanish-American War commanded the blockading squadron on the North Cuban coast from May to June, 1898, when he was made commander-in-chief of the Eastern Squadron, which was to threaten the Spanish coast and thus force the return of the Spanish fleet, under Camara, bound for Manila. News of the movement having reached Spain, Camara was recalled before Watson could execute his orders, and Watson subsequently resumed charge of the blockade of the northern coast of Cuba. He was then commandant of the Mare Island Navy Yard from October, 1898, to May, 1899, was promoted to the rank of rear-admiral in March, 1899, was commander-in-chief of the naval forces on the Asiatic Station from June, 1899, to April, 1900, and in October, 1900, became president of the Naval Examining Board.

WATSON, Musgrave Lewthwaite (1804-47). An English sculptor, born near Carlisle and educated at Raughton School. Upon the death of his father in 1823 he went to London, where he met Flaxman, through whose influence he entered the schools of the Royal Academy. He studied in Rome under Chantrey and Behnes, whom he assisted with his statue of Dr. Babington. His other statues include those of Queen Elizabeth, Flaxman, Cunningham, and Nelson, a statuette of Chaucer, a large group of eleven figures representing Dr. Archibald Cameron tending the wounded on Culloden battlefield, and a terra-cotta *alta-relievo* called "Little Children Come Unto Me."

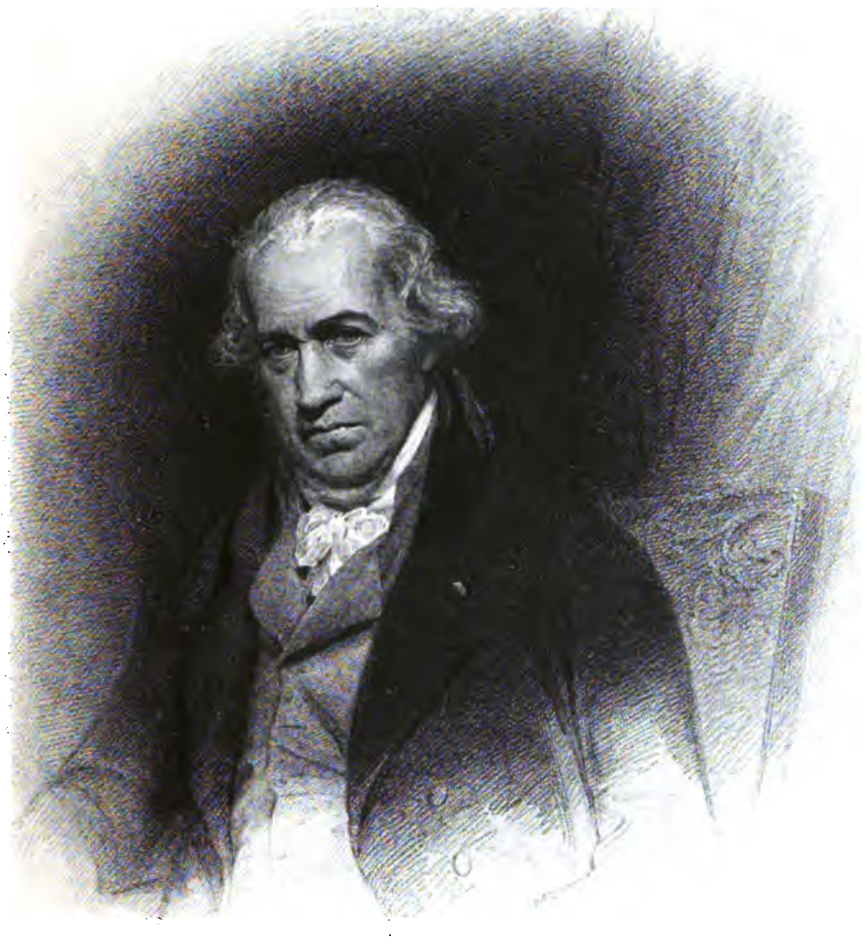
WATSON, Richard (1737-1816). Bishop of Llandaff. He was born at Heversham, West Moreland, England; graduated at Trinity College, Cambridge, 1759; obtained a fellowship, 1760; was appointed professor of chemistry, 1764; regius professor of divinity, Cambridge, and rector of Somersham, 1771; Archdeacon of Ely, 1779; and Bishop of Llandaff, 1782. He was a brilliant and versatile man, noted for his ability to undertake almost any subject. He is now chiefly remembered for his *Apology for Christianity, in a Series of Letters, addressed to Edward Gibbon, Esq.* (1776); and his *Apology for the Bible, in a series of Letters, addressed to Thomas Paine* (1796). His autobiography, edited by his son, appeared at London in 1817.

WATSON, Richard (1781-1833). A Wesleyan theologian. He was born at Barton-upon-Humber, England; was apprenticed at the age of fourteen to a carpenter; joined the Methodists, 1796; and became a member of the Conference, 1800. He joined the Methodist new connection (1803), returned to the regular Wesleyan connection, and edited the Liverpool *Courier*, (1808); was one of the secretaries of the missionary society in London (1816); and was elected president of the Conference in 1826. He published: *A Defense of the Methodist Missions in the West Indies* (1817); *Remarks on the Eternal Sonship of Christ* (against Adam Clarke, 1818); *Theological Institutes* (1823-29; new ed. 1877, one of the standard works in Wesleyan divinity); *Biblical and Theological Dictionary* (1831); and *Life of Rev. John Wesley* (1831). His works were edited with a *Life* by Thomas Jackson (12 vols., London, 1834-37; new ed., 13 vols., 1847).

WATSON, Robert Spence (1837—). An English economist and solicitor. He was born at Gateshead and was educated at the Friends' School, York, and University College, London. From 1890 to 1902 he was president of the National Liberal Federation. Although his writings and public activities cover a wide field, he is best known from his work as an economist. His publications include: *History of English Rule and Policy in South Africa* (1879); *Irish Land Law Reform* (1881); *Boards of Conciliation and Arbitration* (1886); *The Proper Limits of Obedience to the Law* (1887); *The Peaceable Settlement of Labor Disputes* (1889); *Labor, Past, Present, and Future* (1889); and *The Recent History of Industrial Progress* (1891).

WATSON, Sereno (1826-92). An American botanist, born at East Windsor Hill, Conn., and educated at Yale and the medical department of the University of New York. From 1868 to 1869 he was botanist to the geological exploration on the 40th parallel under Clarence King. After Dr. Asa Gray's death in 1888, he was made curator of the Gray Herbarium at Harvard. The greater part of the botanical work of the geological surveys west of the 100th meridian was given to him by Professor Ferdinand V. Hayden. He was a fellow of the National Academy of Science. He wrote *Botany of California* (with Professor Gray and W. H. Brewer, 1876); *Bibliographical Index to North American Botany* (1878); *Contributions to American Botany* (1873-91); and with J. M. Coulter revised and extended Gray's *Manual of Botany* (1890).

WATSON, Thomas (1557-92). An English poet, born probably in London. He studied at Oxford, but left without a degree and nominally took up law in London. In 1581 he visited Paris, where he made the acquaintance of Sir Francis Walsingham, one of his future patrons. Watson's most interesting verse is contained in the *Passionate Century of Love* (1582) and the *Tears of Fancy* (posthumous, 1593), two collections of sonnets taken largely from the French and the Italian. The themes of several of these sonnets seem to have been worked over by Shakespeare in his more famous sonnets. Watson was among the best Latinists of his time. He translated into Latin the *Antigone* of Sophocles (1581) and Tasso's *Aminta* (1585), and composed original Latin verse, much of which has never been published. For his English poems, consult Arber, *English Reprints* (London, 1870; reissue, 1895).



JAMES WATT

FROM AN ENGRAVING BY C. PICART, AFTER A DRAWING BY W. EVANS

WATSON, William (1858—). An English poet, born at Burley-in-Wharfedale, Yorkshire. His *Epigrams of Art* (1884) was his first book to attract attention. During the following year he published in the *National Review* a series of sonnets entitled *Ver Tenebrosum,* in which he attacked the English policy in Egypt. In 1892 his poem "Wordsworth's Grave" gave him considerable fame, and in the same year he wrote "Lachrymæ Musarum," a fine ode in memory of Tennyson. His verse is careful, delicate, and sure in workmanship and is reflective in tone. His sonnets in the *Purple East* contain some of his most significant work. Among his later works are: *Lyric Love* (1892); *The Eloping Angels* (1893); *Excursions in Criticism* (1893); *Odes and Other Poems* (1894); *The Father of the Forest* (1895); *The Purple East* (1896); *The Year of Shame* (1896), a forceful and ringing indictment of England's policy in the Orient, particularly in the Armenian difficulty; *The Hope of the World* (1897); and *Collected Poems* (1898).

WATT (named in honor of James *Watt*). The practical unit of power (q.v.) or activity. The C. G. S. unit of power is 1 *erg* per second, and the watt is 10^7 of these units, or 1 *joule* per second. A horse-power is 33,000 foot pounds per minute and therefore equals 746 watts approximately; 1 watt = 0.0013406 horse-power. The kilowatt, or 1000 watts, is the unit in ordinary use, and is employed, even in countries which have not adopted the metric system, for the rating of electric machinery. See C. G. S. System.

WATT, James (1736-1819). A British mechanical engineer, famous for his improvements on the steam engine, which were so important and fundamental as often to lead to his being styled its inventor. He was born at Greenock, Scotland, the son of a carpenter and merchant, who also at times held such town offices as treasurer and chief magistrate. His early education was obtained at the town schools, which, however, he was unable to attend regularly on account of ill health. At the same time he was learning the use of wood and metal working tools and constructing ingenious models and original pieces of mechanism. He early evinced a taste for mathematics and a fondness for reading which he maintained throughout his life. When eighteen years old Watt went to Glasgow to learn the trade of an instrument-maker, but after a short time proceeded to London, where he followed this calling for a year. In 1756 he returned to Glasgow, but experienced difficulty in starting in business on his own account, owing to the opposition of workers in the same trade. He became connected with the university, however, as an instrument-maker, and remained until 1760, when he became established independently, working also at times as a civil engineer. While at the university he became acquainted with the various professors and students and received from them instruction and suggestions. As early as 1759 he turned his attention to the construction of a steam carriage, and in 1764 he was called upon to repair the model of the Newcomen engine in the cabinet of the university. Studying this machine thoroughly, he soon realized its defects and lack of efficiency, and determined that the losses of heat in the cylinder could be corrected, and the imperfect method of condensing the steam could be improved. Accordingly he contrived an independent condenser where the steam was exhausted and condensed after doing its work on the piston, instead of being condensed by a jet of cold water in the cylinder, as was done in the Newcomen engine. To develop the invention Watt secured the financial cooperation of Dr. John Roebuck, the founder of the Carron Iron Works, and in 1765 constructed a small engine, which was operated with some success. Watt was in the meanwhile spending all of his resources, but at the same time making considerable progress in engine-building, until financial misfortunes deprived him of the cooperation of Dr. Roebuck. At this time (1767), fortunately, an enterprising manufacturer, Matthew Boulton (q.v.), joined with Watt and their names were subsequently associated in the manufacture and improvement of steam engines that resulted from the partnership. In 1774 a steam engine was completed which was noteworthy in that it embodied the essential features of the modern steam engine. So much time had been spent in the development of the engine that in 1775 an act to prolong the life of Watt's original patent until 1800 was passed by Parliament, and during this interval other valuable patents were acquired and many engines were manufactured and disposed of to mines and collieries. Next to the external condensation principle the most important features were: The making of the engine double-acting by the addition of valves, instead of having the steam act only on one side of the piston, which was then returned to its original position by a counterweight; and the use of steam expansively. With the double-acting engine by the use of a fly-wheel it was possible to have continuous rotary motion through the medium of a crank, which, while claimed as an invention of Watt, was actually patented by one Pickard, a former employee of his, and disposed of to a Mr. Washbrough of Bristol. To meet this deficiency Watt contrived various devices, of which the 'sun and planet' gear wheels were the most successful, for changing the reciprocating into rotary motion. The application of the centrifugal governor to the steam engine, the invention of the water gauge, and the mercury steam gauge, are but a few of the many improvements contributed by Watt to the steam engine. With his many improvements and additions to the steam engine it was somewhat singular that Watt did not employ steam at high pressures, as was suggested by Trevithick and others, and which was the next important step in the development of the steam engine. The invention of the steam hammer naturally resulted from his work on the steam engine, but the copying press, a spiral oar or screw propeller, the discovery of the composition of water, a machine for reproducing sculpture, and numerous physical instruments and methods show the diversity of his researches and the breadth of his talents.

Retiring from active business in 1800, he turned over to his two sons his interest in the large and remunerative business which had been built up at Soho by Boulton's effort. He died at Heathfield, in Staffordshire, on August 25, 1819. He was elected a fellow of the Royal Society of Edinburgh in 1784; a fellow of the Royal Society of London in 1785; and in 1808 a corresponding member, and afterwards a foreign member of the Institute of France. The University of Glasgow conferred on him the degree of LL.D. in 1806. A statue, the funds for which had been raised by public subscription, was erected at Birmingham, while a national monument was placed in Westminster Abbey, on which an appropriate inscription written by Lord Berryham was inscribed.

BIBLIOGRAPHY. Smiles, *Lives of Boulton and Watt* (London, 1865); Muirhead, *Origin and Progress of the Mechanical Inventions of James Watt* (London, 1854); id., *Life of Watt* (ib., 1858); Thurston, *The Growth of the Steam Engine* (New York, 1879).

WATT, ROBERT (1774-1819). A Scotch bibliographer and physician, born near Stewarton, Ayreshire. From 1793 to 1797 he studied for the ministry at Glasgow, but afterwards studied medicine at Edinburgh and practiced in Paisley and Glasgow. In 1811 he removed to Glasgow and lectured there very successfully, afterwards becoming physician to the Glasgow Infirmary and president of the faculty of physicians and surgeons. His writings include the valuable *Bibliotheca Britannica*, posthumously published (1819-24) by his sons, who had aided him in the work.

WATTEAU, vȧ'tō', ANTOINE (1684-1721). A celebrated French genre painter, the most original talent of the French school in the eighteenth century, the painter *par excellence* of the 'fêtes galantes.' He was born at Valenciennes, October 10, 1684, the son of a roof-slater, and was first instructed there by Jacques Albert Gérin. He then made his way to Paris, where, after much painting of a commercial character, he entered the school of Claude Gillot, at that time the most reputed designer of ornaments. He afterwards became an assistant to Claude Andran, custodian of the Luxembourg, where, besides acquiring the delicate technique of the prevailing decorative panel painting, Watteau was afforded the opportunity of studying the great allegories of Rubens, thereby greatly improving his coloring. Anxious to visit Italy, he competed for the Prix de Rome in 1709, but obtained only the second prize. He then resolved to petition for a special royal stipend, and hung two pictures in a passageway of the Academy, where they were seen by La Fosse, the director, who induced the young master to stand for the reception into the Academy (1712). His presentation picture, which, however, he did not produce until five years later, was the famous "Embarkation for the Isle of Cythera" (1717, Louvre), a replica of which, richer in detail and more harmonious on the whole, is in the Royal Palace at Berlin. Of the master's few works approaching in excellence this his chief production, the most noteworthy is "Les plaisirs du bal" (Dulwich Gallery, England), a replica of which is in the new royal palace near Potsdam.

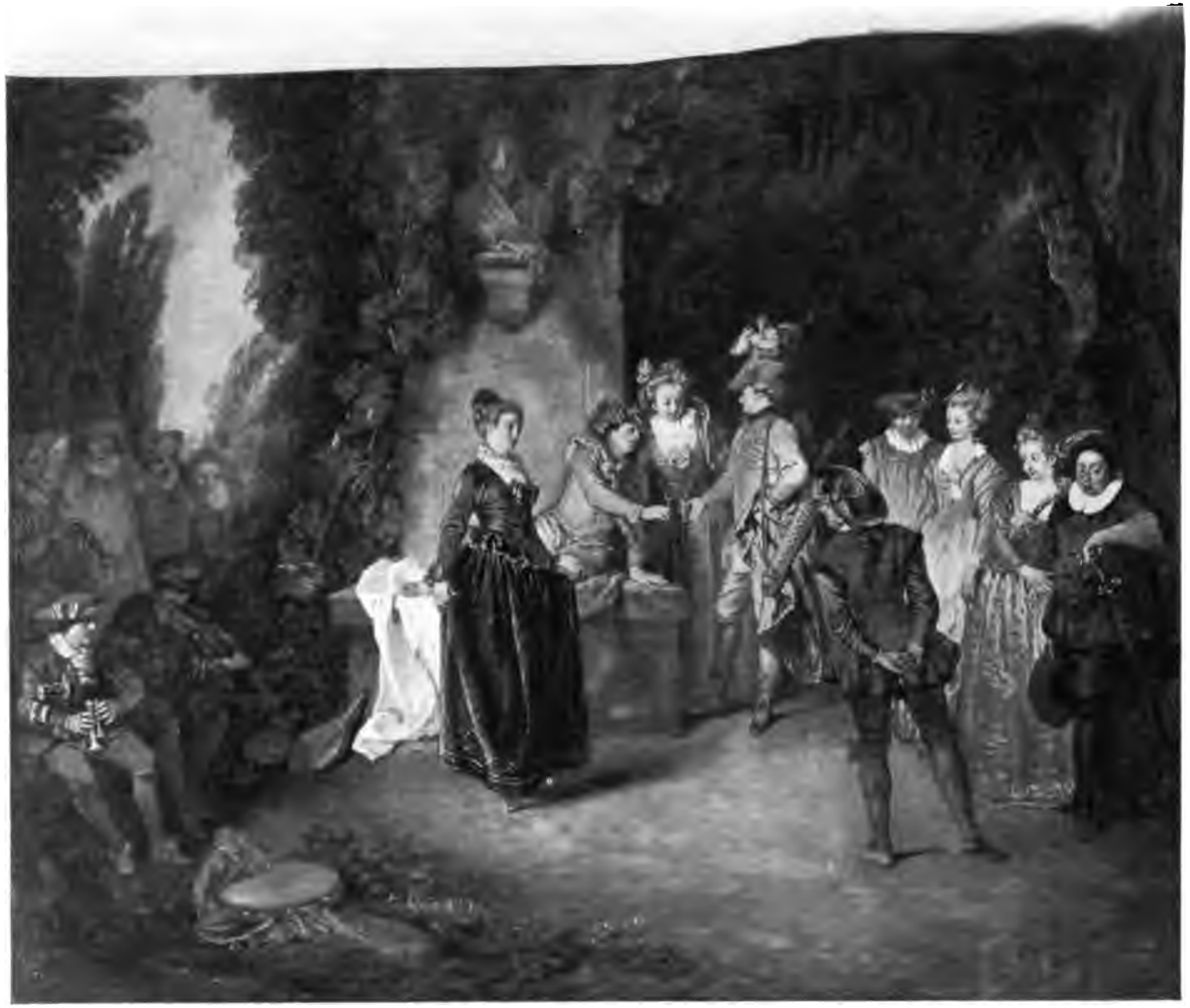
Afflicted with pulmonary consumption, this ingenious delineator of gay festivals was of a melancholy and restless disposition. He died at Nogent-Sur-Marne, July 21, 1721. His last important work was the famous sign for Gersaint's art store, now in the Royal Palace, Berlin. Next to the Louvre, the La Caze collection of which contains "Gilles," "L'Indifférent," "The Cunning Woman," "Assembly in a Park," and five others. Watteau may be best studied in Berlin and Potsdam. In the Berlin Museum may be seen "Love in French Comedy," "Love in Italian Comedy," and "The Collation," while nineteen examples are in the various royal palaces, notably "The Village Bride" (c.1715), at Sans Souci, with more than one hundred figures. The Dresden Gallery contains "Company on a Lawn" and "Conversation on a Terrace," while in London are preserved a "Concert Champêtre" and "Lovers Surprised," in Buckingham Palace, and "Village Fête," "Rendezvous," "Music Lesson," and others in Sir Richard Wallace's collection. The engravings from Watteau's works comprise more than five hundred and sixty plates, including many by famous masters. For his biography, consult: Cellier (Valenciennes, 1867), Dohme, in *Kunst und Künstler*, iii. (Leipzig, 1880), Volbehr (Hamburg, 1885), Hannover (Berlin, 1889), Dargenty (Paris, 1891), Mantz (ib., 1892), Rosenberg (Bielefeld, 1896), and Staley (London, 1903). Consult also: Goncourt, *Catalogue raisonné de l'œuvre d'Antoine Watteau* (Paris, 1875); id., *L'art du XVIII. siècle* (ib., 1883); and Pater, "A Prince of Court Painters," a luminous and sympathetic study, in *Imaginary Portraits* (London, 1887).

WATTENBACH, vät'*en*-bȧG, WILHELM (1819-97). A German historian and paleographer. He was born at Rantzau, in Holstein, and studied in 1837-42 at the Universities of Bonn, Göttingen, and Berlin. In 1862 he was called to the University of Heidelberg as professor of history, and in 1873 to Berlin. Wattenbach's works were all solid contributions to the science of history. The following are the most important: *Beiträge zur Geschichte der christlichen Kirche in Böhmen* (1849); *Deutschlands Geschichtsquellen im Mittelalter* (1859); *Anleitung zur griechischen Paläographie* (1867); *Anleitung zur lateinischen Paläographie* (1869); *Das Schriftwesen im Mittelalter* (1871); and *Geschichte des römischen Papsttums* (1876). He directed the *Monumenta Germaniæ Historica* after 1872.

WATTENSCHEID, vät'*en*-shīt. A town of the District of Arnsberg, Prussia, four miles west of Bochum. Population, in 1895, 15,353; in 1900, 20,295.

WAT'TERS, WILLIAM (1751-1827). A Methodist Episcopal minister. He was born in Baltimore County, Md., entered the Philadelphia Conference, 1773, and labored in Virginia, Maryland, and the District of Columbia. He bore the distinction of being the first American-born Methodist minister. Owing to ill health, his labor was somewhat intermittent, but uniformly successful. He published *A Short Account of the Christian Experience and Ministerial Labors of William Watters* (Alexandria, 1806). Consult D. A. Watters, *The First American Itinerant of Methodism, William Watters* (1898).

WAT'TERSON, HENRY (1840—). An American journalist, born in Washington, D. C. He was educated for the most part privately, entered journalism in Washington as editorial writer for the *States* and general newspaper worker, served in the Confederate Army in 1861-62 as private soldier and aide-de-camp succes-



WATTEAU

"THE FRENCH COMEDY." FROM THE PAINTING IN THE ROYAL MUSEUM, BERLIN

sively to General Forrest and General Polk, and in 1862-63 edited in Chattanooga the *Rebel*, the official newspaper of the State of Tennessee. In 1864 he was again in military service as chief of scouts to General Joseph E. Johnston. Subsequent to the war he edited the *Republican Banner* of Nashville, and in 1867 became editor-in-chief of the Louisville *Journal*. With W. N. Haldeman he established the *Courier-Journal*, of which be became the editor. Under his direction this newspaper came to occupy a foremost place in Southern journalism. In 1876-77 he represented the Louisville district in Congress, in 1876 was presiding officer of the National Democratic Convention at Saint Louis, and in various other national conventions was chairman of the Platform Committee. In 1896 he declared himself a Gold Democrat. In both his editorial and platform utterances he effectively represented the policy of conciliation between North and South. His publications include *Oddities of Southern Life and Character* (1882).

WATTLE. See Acacia.

WATTLE-BIRD. An Australian honey-eater (*Anthochæra carunculata*) about the size of a magpie, grayish brown above, each feather striped, and bordered with white; the tail brown, long, wide, and graduated. It derives its name from a pendulous reddish wattle on each side of the throat, half an inch long. An allied species in Tasmania has the wattles an inch long.

The 'wattle-crow' or 'kokako' of the Maories, of New Zealand, is a very different bird, nearly allied to the jays, with gray and brown plumage, and a black face. It sings well. There are two species, *Callæas cinerea* of the South Island, and *Callæas Wilsoni* of the North Island.

WATTRELOS, vȧ'tr'lō'. A town of the Department of Nord, France, on the Belgian frontier, two miles northeast of Roubaix (q.v.), of which it is a suburb. Population, in 1901, 25,884.

WATTS, Alaric Alexander (1797-1864). An English journalist and poet, born in London. After several private tutorships, he turned journalist, becoming editor of the *Leeds Intelligencer* (1822-25) and the *Manchester Courier* (1825-26), took part in establishing the *Standard* (1827), now one of the leading Conservative newspapers of London, and founded the *United Service Gazette* (1833). In the meantime, he had begun the *Literary Souvenir* (1824), which was one of the most successful of the annuals down to its suspension in 1838. During the next ten years he was engaged in starting several provincial newspapers in the Conservative interest. Though these undertakings led to bankruptcy (1850), he had organized the subsequently popular plan of supplying sheets of general news printed in London to supplement the local news of country newspapers. In 1856 he projected and edited *Men of the Time*, a useful biographical dictionary of contemporary men, which, under varying titles, was continued till 1901, when it was incorporated with *Who's Who*. As an agreeable poet, Watts enjoyed a wide reputation for *Poetical Sketches* (1823; privately printed 1822), and *Lyrics of the Heart* (1850). *The Death of the Firstborn* is especially well known. In the *Poetical Album* (1828, second series 1829), Watts collected some of the best poetry by contemporary writers. Consult *Alaric Watts; a Narrative of His Life*, by his son, A. A. Watts (London, 1884).

WATTS, George Frederick (1817—). An English painter and sculptor, the most prominent artist of the contemporary school. He was born in London, and while still a boy was admitted to the schools of the Royal Academy. He learned far more, however, from his study of the Elgin marbles in the British Museum, the influence of which may be seen in the classical outlines and ideal character of his figures. A prize obtained in 1842 in the competition for the decoration of the new Houses of Parliament enabled him to visit Italy in 1844. Although passing most of the following two years at Florence, he was chiefly influenced by the Venetians, especially Tintoretto, from whom he learned color. In 1846 he obtained another prize with his cartoon "Alfred Inciting the Saxons to Prevent the Landing of the Danes," now in the committee room of the Houses of Parliament, which also led to the commission for the fresco, "Saint George and the Dragon," in the Hall of Poets. Watts lived a quiet, simple life devoted to his art. An early union with Ellen Terry, the actress, was dissolved, and in 1886 he married Miss Mary Fraser-Tytler, whom he greatly assisted in her well-known art pottery works at Compton, Surrey. With a singularly disinterested spirit he devoted himself to the artistic interests of the nation. He gratuitously decorated the dining hall of Lincoln's Inn (one of the Inns of Court) with the fine fresco "Justice: a Hemicycle of Lawgivers." He built the first memorial wall at Saint Botolph's, in honor of those who had lost their lives in saving others, for which he received the Order of Merit upon its institution by the King in 1902. Refusing to sell the best part of his work, with the intention of presenting it to the nation, he was enabled to see it form the nucleus of the "National Gallery of British Art," the best portraits going to the National Portrait Gallery. An Academician in 1867, he twice refused a baronetcy; he took first class medals at Paris and Antwerp, and was elected to the French Institute in 1903.

Watts's art is didactic in the extreme. Each of his canvases is a kind of sermon; but they are usually invested with a strong element of art. Although deficient in academic training, Watts's drawing is good in a large constructive sense, while at times his color is powerful and pure. His most interesting work is perhaps the symbolical pictures forming his message to the age —the danger of riches, the cruelty of greed, and, above all, the power of love and the fallacy of the fear of death. Among the most important of this group are "Love and Life" (1885), which the artist said best portrayed his message to the age, and which the Woman's Christian Temperance Union in vain endeavored to remove from the White House; "Love and Death" (1877-96); and "Love Triumphant" (1898). Other celebrated examples are "Hope" (1885), "Faith" (1890), "The Good Samaritan" (City Hall, Manchester), "Sir Galahad," "Psyche," "Orpheus and Eurydice." There are modern portraitists of greater technical ability than Watts, but in force of expression, in freedom and simplicity of technique he is unsurpassed, and will even bear comparison with Tintoretto.

No other has depicted so many distinguished contemporaries. His sitters include Gladstone, the Duke of Devonshire, Lord Salisbury, and John Burns among public men; Tennyson, Browning, Swinburne, Matthew Arnold, and William Morris among poets; John Stuart Mill, Carlyle, and Meredith among prose-writers; himself (many times), Lord Leighton, Rossetti, and Burne-Jones among painters; and foreign celebrities like Garibaldi, Thiers, Guizot, and Jerome Bonaparte.

In his few works of sculpture Watts stands unsurpassed among modern Englishmen in boldness and breadth of treatment, and in nobility of style. Such works are: the bust of "Clytie;" "Bishop Lonsdale," in Litchfield Cathedral; "Lord Lothian," in Bickling Church; "Hugo Lupus," a large bronze equestrian statue at Eaton Hall; "Physical Energy" (1902), symbolizing the character of Cecil Rhodes, a replica of which is destined for the Mattoppo Hills, in South Africa; and Lord Tennyson (1902), for Lincoln's Inn. Consult: Cartwright, *Art Journal* (extra number, 1896); Monkhouse, *British Contemporary Artists* (London, 1889); and Bateman, *G. F. Watts, R. A.* (ib., 1901).

WATTS, Henry (1815-84). An English chemist, born in London. He was educated at University College, London, and was for years assistant in chemistry there. His writings on chemistry are numerous and very extensive. He translated from the German Gmelin's voluminous *Handbook of Chemistry*, edited Fownes's *Manual of Chemistry*, and was for many years editor of the *Journal of the Chemical Society*. He is best known for his excellent and comprehensive *Dictionary of Chemistry*, of which a new edition in four volumes, thoroughly revised by Muir and Morley, appeared in 1888-94.

WATTS, Isaac (1674-1748). An English Independent minister and hymn-writer. He was born on July 17, 1674, at Southampton; was educated at the grammar school of his native place, and was sent in 1690 to an academy in London. In the same year he became tutor in the family of Sir John Hartopp, at Stoke-Newington, with whom he remained five years. During the latter part of this time he officiated as assistant to Rev. Dr. Chauncey, minister of the Independent Church in Mark Lane, to whose post he succeeded in 1702. His health was infirm; and in 1712 he was prostrated by an illness so violent that he never thoroughly recovered from its effects. A visit which he paid in 1712 to Sir Thomas Abney, at Theobalds, for change of air, resulted in his domestication in the establishment till his death, on November 25, 1748. In theology he was practically an Arian and defended Arian doctrines. He was a popular writer and his theological works were numerous. His *Catechism* (1730) and *The Improvement of the Mind* (1741) are still remembered, and his treatise on *Logic* (1725) had in its day a considerable reputation. But it is his fame as a hymn-writer upon which his permanent reputation rests. His poetical works are: *Horæ Lyricæ* (1706); *Hymns and Spiritual Songs* (1707); *Psalms of David in the Language of the New Testament* (1719); and *Divine and Moral Songs for Children* (1720). A complete collection of his works by Jennings and Doddridge in six volumes was published at London in 1753; with memoir by Burder, 1810. There is a more recent *Life* by E. Paxton Hood (London, 1876).

WATTS, Robert (1820-95). An Irish Presbyterian minister, born at Moneylane, County Down, and educated at the Royal Academical Institute, Belfast, at Washington College, Lexington, Va., and at Princeton, N. J. He founded at Philadelphia in 1852 a Presbyterian mission which was organized under his pastorate as the Westminster Church in 1856. In 1863 he accepted a call to the Lower Gloucester Street Church, Dublin. He became professor of systematic theology in the Assembly's College, Belfast, in 1866. Watts was a strong conservative in theology, and was especially opposed to the influence of German exegesis. He published: *Calvin and Calvinism* (1866); *Utilitarianism* (1868): *What Is Presbyterianism?* (1870); *Armenian Departures from Reformation Principles* (1871); *Dr. Briggs's Theology Traced to Its Organific Principle* (1891); and *Driver's Introduction Examined* (1892).

WATTS, Thomas Hill (1819-92). An American lawyer and political leader, born in Butler County, Ala. He graduated at the University of Virginia in 1840, and in the following year was admitted to the bar at Greenville. In politics he was a strong Henry Clay Whig, and as such was elected from Greenville to the State Legislature in 1842, 1844, and 1845. In 1847 he settled in Montgomery, which he represented several terms in both Houses of the Legislature. As the Civil War approached, he exerted himself continually to keep his State in the Union, but after it had seceded supported the Confederacy. For a time in 1861-62 he served in the field as colonel of the Seventeenth Alabama Infantry, but in April, 1862, entered the Cabinet of Jefferson Davis as Attorney-General. From the fall of 1863 until the end of the war he was Governor of Alabama. After the war he devoted himself to his law practice, and save for a single term in the State Legislature in 1880-81 never held public office.

WATTS-DUNTON, Theodore (1836—). An English poet and critic. He was born at Saint Ives, in Huntingdonshire, and was privately educated in Cambridge, being first trained for a naturalist. He afterwards studied law, and was called to the bar in 1863. His sonnets attracted the attention of Rossetti, under whose influence he studied art in Italy. Returning to England, he joined the staffs of the *Examiner* (1874) and the *Athenæum* (1875), and soon became one of the most influential literary and art critics of the day. He was among the later friends of Rossetti, whom he has depicted as D'Arcy in the beautiful romance of *Aylwin* (1898; privately printed 1883). As a poet he displays rare power of thought and execution, particularly in the sonnets. Perhaps the best-known are "Natura Maligna" and "Natura Benigna," "The Sonnet's Voice," and "Dickens Returns on Christmas Day." Other writings include: *Jubilee Greeting at Spithead to the Men of Greater Britain, and Other Poems* (1897); *The Coming of Love: Rhona Boswell's Story* (1897); *The Christmas Dream*, a dramatic idyl (1901); and *The Renaissance of Wonder: A Treatise on the Romantic Movement* (1902). Consult Miles, *The Poets and the Poetry of the Century*, vol. iv. (London, 1891).

WAT TYLER. An English rebel. See Tyler, Wat.

WAUGH, wa̤, Arthur (1866—). An English author, born at Midsomer Norton, Somersetshire. He was educated at New College, Oxford, where he won the Newdigate prize for English verse in 1888, and graduated with classical honors in 1889. Settling in London in 1890, he became subeditor of the *New Review* (1894), and literary adviser to the publishing house of Kegan Paul & Co. His writings include: *Gordon in Africa* (1888); *Schoolroom Theatricals* (1890); *Alfred, Lord Tennyson, a Study of His Life and Work* (1892); *Legends of the Wheel* (1898); and, in the "Westminster Biographies," *Robert Browning* (1900). He edited Johnson's *Lives of the Poets* (6 vols., 1896) and the *Pamphlet Library* (1897).

WAUKEGAN, wa̤-kē′*gan*. The county-seat of Lake County, Ill., 35 miles north of Chicago, on Lake Michigan, and on the Chicago and Northwestern Railroad (Map: Illinois, E 1). It is situated at an elevation of more than 100 feet, on a bluff overlooking Lake Michigan. The streets are well paved and for the most part beautifully shaded. The city is a popular summer resort, with excellent bathing facilities and mineral springs, and is the home of many Chicago business men. Several picturesque parks and numerous ravines, spanned by bridges, add to the general attractiveness. Sheridan Drive extends along the lake front, affording a magnificent view. The most prominent buildings are the county house, Public Library, and the Masonic Temple. Waukegan has a fine harbor, which has been improved by the United States Government. The city is the commercial centre of a fertile section engaged in farming and dairying, and also has large industrial interests. It is especially known for its manufactures of wire. There are also brass and iron works, a sugar refinery, a brewery, a tannery, and manufactories of boats, electric scales, sashes, doors, and organ stops. The government, under a charter of 1899, is vested in a mayor, elected biennially, and a unicameral council. The water-works are owned and operated by the municipality. Waukegan was organized as a village in 1849, and was incorporated as a city ten years later. Population, in 1890, 4915; in 1900, 9426.

WAUKESHA, wa̤′kê-shȧ. The county-seat of Waukesha County, Wis., 17 miles west of Milwaukee, on the Little Fox River, and on the Chicago, Milwaukee and Saint Paul, the Chicago and Northwestern, and the Wisconsin Central railroads (Map: Wisconsin, E 5). It is the seat of Carroll College, a Presbyterian institution, and of the State Industrial School for Boys. Other features include the court-house, the Waukesha Springs and the Rest Haven, the Public Library, sanitariums, and three parks—Bethesda, Silurian, and Cutler. Waukesha has gained considerable prominence as a health resort owing to its numerous mineral springs, the waters of which possess valuable medicinal properties. The preparation and shipment of mineral waters is one of the most important industries of the city. There are also iron works, steel bridge works, and a canning factory. The government, under the charter of 1896, is vested in a mayor, chosen annually, and a unicameral council. Waukesha was settled in 1836, and was incorporated as a village in 1848. Population, in 1890, 6321; in 1900, 7419.

WAUSAU, wa̤′sa̤. The county-seat of Marathon County, Wis., 200 miles northwest of Milwaukee, on the Wisconsin River, and on the Chicago, Milwaukee and Saint Paul and the Chicago and Northwestern railroads (Map: Wisconsin, D 4). It is on elevated ground on both banks of the Wisconsin River. There are a fine natural park, the Marathon County Training School for Teachers, the County School of Agriculture and Domestic Science, the County Asylum for the Chronic Insane, and a public library. The surrounding section is engaged in lumbering, agriculture, and dairying, and has extensive granite quarries. Wausau is the commercial centre of this region and is largely interested also in manufacturing. The leading products include sashes, doors and blinds, furniture, toys, veneer, boxes, sandpaper, sawmill machinery, flour, leather, canned vegetables, etc. Good water power is furnished by the Big Bull Falls. Under the revised charter of 1892 the government is vested in a mayor, elected biennially, and a unicameral council. The water-works are owned and operated by the municipality. Wausau was settled about 1850, and was incorporated in 1872. Population, in 1890, 9253; in 1900, 12,354.

WAUTERS, vô′tär′, Emile (1846—). A Belgian historical painter, born in Brussels. He studied under Portaëls in Brussels and under Gérôme in Paris. He was first brought to public notice when but sixteen years of age, by a picture called "Ulysses in the Isle of Calypso," which he exhibited in the salon at Brussels. Strength of portrayal and beauty and depth of color are the best points in his works, which include: "Mary of Burgundy Before the Magistrates of Ghent" (1872); the decoration of the Lion's Staircase at the Brussels Hôtel de Ville; the panorama "Cairo and the Banks of the Nile;" and "A View of Cairo."

WAVELLITE (named in honor of its discoverer, William *Wavel*, an English physician of the early nineteenth century). A mineral hydrated aluminum phosphate crystallized in the orthorhombic system. It has a vitreous lustre, and is yellow or green, varying to brown and black, in color. It occurs on the sides and cracks of schistose rocks, frequently in little spherical mamelons which are made up of convergent crystals, and is found in Ireland, France, Bohemia, Saxony, Brazil, and in the United States in New Hampshire, Pennsylvania, North Carolina, and Arkansas, where it occurs in fine stellate radiations of a green color.

WA′VERLEY, or 'Tis Sixty Years Since. A novel by Scott, begun in 1805, but several times put aside, and finally published anonymously in 1814. It attained an immediate success and gave the name to the succeeding series of Scott's novels. The identity of the author was successfully concealed for thirteen years. The title of the novel was suggested by that of an abbey, near Farnam, and close to the home of the author's friend, Ellis. The scene is for the most part laid in Scotland, during the Highland Rebellion raised by the Young Pretender in 1745.

WAVERLEY NOVELS. See Scott, Sir Walter.

WAVERLY. The county-seat of Bremer County, Iowa, 71 miles northwest of Cedar Rapids, on the Red Cedar River, and on the Chicago Great Western, the Illinois Central, and the Chicago, Rock Island and Pacific railroads (Map: Iowa, E 2). It has the Wartburg Teachers' Seminary and Academy, and a public library. Waverly is the commercial centre of a farming, dairying, and cattle-breeding section, and carries on considerable trade also in its manufactured products, which include condensed milk, butter, cheese, canned goods, fruit, paint, etc. The water-works are the property of the municipality. Population, in 1890, 2346; in 1900, 3177.

WAVERLY. A village in Tioga County, N. Y., 18 miles southeast of Elmira, on the Cayuta Creek, and on the Erie, the Lehigh Valley, and the Delaware, Lackawanna and Western railroads (Map: New York, D 3). It is surrounded by a dairying and farming section, and manufactures stove pipe, furniture, baskets, butter packages, etc. Waverly is also an important distributing point for the Wyoming Valley coal fields. The government is vested in a president, chosen annually, and a board of trustees. Waverly was settled about 1810, and was incorporated in 1854. Population, in 1890, 4123; in 1900, 4465.

WAVES (AS. *wafian*, to wave, fluctuate, waver, MHG. *waben*, to wave, Bavarian Ger. *waiben*, to waver, totter). Wave-motions are of two kinds; one is the advance of a disturbance into a medium, and the other is its advance along a surface. Illustrations of the former kind are given by waves produced in air or in the interior of water by a vibrating body such as a bell, and those produced in the ether by an electrical or atomic vibration; illustrations of the latter kind are given by waves on the surface of a lake or ocean. The former class of waves are due to the elasticity and inertia of the medium; and the velocity with which the disturbance spreads out from the vibrating centre depends upon these two properties of the fluid alone. Elastic waves in homogenous media have a velocity given by the formula velocity $= \sqrt{\frac{E}{d}}$, where E is the coefficient of elasticity and d is the density. See ACOUSTICS; ETHER; ELECTRICITY.

Waves on the surface of a liquid are due to the action of gravitation, which tends to make the surface of a liquid horizontal (to the surface-tension if the waves are nothing but ripples), and to the inertia of the liquid. (For a discussion of these 'water-waves,' see HYDROSTATICS.) The 'wave-front' of a train of waves is the surface which at any instant includes all those points of the medium which the disturbances have just reached; or, more generally, it is a surface in the medium including those points where the motion is in the same 'phase.' The wave-front from a point source is a sphere in the case of an elastic wave in an isotropic medium; it is a circle for waves on the surface of water.

Since all waves consist in the motion of portions of matter, and since the medium carrying the waves is not in its natural position or condition, there is both kinetic and potential energy associated with wave-motion. This energy is lost by the vibrating source and gained by the body absorbing the waves. The 'intensity' of the waves is defined to be the energy carried in unit time through an area of one square centimeter of surface at right angles to the direction of advance of the waves. Thus, if the source of waves is a point and if the energy emitted per unit time is E, the intensity of the waves at a distance r, is $I_1 = \frac{E}{4\pi r_1^2}$, because the area of the surface of a sphere of radius r_1, inclosing the point-source as a centre, is $4\pi r_1^2$. Similarly, the intensity at a distance r_2 is $I_2 = \frac{E}{4\pi r_2^2}$. Therefore

$$\frac{I_1}{I_2} = \frac{r_2^2}{r_1^2}$$

or the intensity of the waves from a point-source varies inversely as the square of the distance.

Since waves are due to some vibrating centre, the simplest type of train of waves will be one produced by the simplest vibration, that is a simple harmonic vibration, such as that of a tuning fork in the case of aërial waves. A train of waves produced by a simple harmonic vibration is called a simple harmonic train. It is characterized by its 'amplitude' and its 'wave-length' or 'wave-number.' The amplitude is the extent of the vibration of any individual particle of the medium owing to the passage of the waves. The wave-length is the distance from any one point in the medium to the next point, in the direction of advance of the waves, where the conditions are at any instant exactly the same—both in displacement of the particle of the medium and in its velocity. The wave-number is the number of complete vibrations which each particle of the medium makes in one second; or, what is the same thing, it is the number of waves which pass any one point of the medium in one second. The velocity of the train of waves is, then, obviously the product of the wave-length and the wave-number. Moreover, since, in the case of waves due to the elasticity of a homogeneous medium, their velocity depends upon the elasticity and inertia alone, it is the same for waves of all lengths. Therefore, for a given medium, if the wave-length is known, the wave-number may be at once calculated. If the medium is not homogeneous, waves of different length have different velocities. (See LIGHT and DISPERSION.) It is not difficult to prove that the energy carried by a train of waves varies as the square of the amplitude; and, since in the case of waves emitted by a point-source the intensity of the waves varies inversely as the square of the distance from the source, the amplitude of the waves must vary inversely as the distance itself.

A complex vibration, made up of several simple harmonic vibrations, will produce a complex train of waves which is equivalent to the superposition of several trains of simple harmonic waves. The characteristics of such a complex train of waves are, first, the number of the component trains, and, secondly, their amplitudes, wave-numbers, and relative 'phases.' By relative phases is simply meant their relative positions in the medium. (See ACOUSTICS.) As trains of waves pass through any medium some energy is always absorbed, as is shown by the gradual decrease in amplitude. This is called 'attenuation;' and it is found that long waves are less attenuated than short ones in general. Consequently, as a complex train of waves advances, its different component trains are attenuated to different degrees, and the 'shape' of the wave changes. This is called 'distortion.' If the inertia of the medium is very great, the attenuation is diminished, and the distortion almost vanishes. Waves along stretched cords are special cases of elastic waves. See ACOUSTICS.

STATIONARY WAVES are the particular kind of *vibration* observed in stretched cords, the air in organ-pipes, etc. (See ACOUSTICS.) It is evident that, if waves are sent down a stretched rope toward the end which is fastened to some rigid support, they will be reflected when they reach the end. Consequently, if waves are continued to be produced, there will be in the rope at any instant two trains of waves of the same wave-length, velocity, and amplitude, but advancing in opposite directions. It must happen at certain points in the rope that one train of waves neutralizes the action of the other; and it is evident that these points must lie at a distance of half a wave-length apart. These positions of no motion are called 'nodes;' and the fixed end of the rope is one. In between two nodes the rope vibrates exactly like a short rope of a length equal to the distance from node to node and fastened at its two ends. A point midway between two nodes is called a 'loop.' If a long rope is hanging vertically from a balcony, with its lower end free, waves sent down it will be reflected; and there will be nodes and loops as before, only in this case the free end is a loop. Such a vibration is called a 'stationary wave,' an extremely poor name, because it is not a wave-motion at all. The vibrations of the air in an organ-pipe are of this kind; the nodes are points where there is the least motion but the greatest fluctuation in pressure, while the loops are the points of greatest motion but the least change in pressure. The open end of an organ-pipe is a loop. The effect of opening a hole in a flute is to make that point a loop and thus alter the vibration of the column of air. Stationary waves may be produced by the ether-waves, as has been shown by Wiener and others. See LIGHT; for Electrical Waves, see ELECTRICITY, paragraphs on *Alternating Currents* and *Electrical Waves Along Conductors.*

WAVRE, vä'vr'. A town of the Province of Brabant, Belgium, on the Dyle, 15 miles southeast of Brussels (Map: Belgium, C 4). There are breweries, tanneries, paper mills, and cotton manufactures. Population, in 1899, 8200. Here on July 18, 1815, after their defeat at Ligny (q.v.), the Prussians under Thielmann repulsed a greatly superior force of the French under Grouchy, and thereby prevented the latter from bringing timely assistance to Napoleon at Waterloo (q.v.).

WAVRIN, vȧ'vrăN' (or WAURIN), JEHAN DE, Seigneur du Forestel (c.1394-c.1474). A French chronicler of England, whose work covers the history of Great Britain, both real and fabled, from the earliest time to 1471. It has been edited by Sir W. Hardy and translated by E. L. C. P. Hardy, under the title "Recueil des Croniques et anciennes Istories de la Grant Bretaigne à présent nommé Engleterre" ("Master of Rolls Series," (1864-91). Consult *Anciennes croniques d'Engleterre, choix de chapitres inédits,* edited by Mlle. Dupont (publications Société de l'Histoire de France, Paris, 1858-63).

WAXES. A class of substances of animal or vegetable origin containing mainly one or more esters (q.v.) composed of higher monatomic or diatomic alcohols and higher fatty acids. Waxes have a somewhat characteristic consistence, similar to that of their prototype, beeswax, although some (e.g. the so-called sperm oil) are liquid, and others (e.g. carnauba wax) are so hard that they can be readily pulverized in a mortar. The principal difference, chemically, between waxes and fats consists in the fact that the alcohol found combined in the latter is ordinary glycerin (a tri-atomic alcohol). The term waxes, however, as used commercially, is often extended to substances having a 'waxy' consistence, but containing no ester of a monatomic or diatomic alcohol at all. Thus the so-called 'Japan wax' is really a fat, almost entirely composed of glycerin and palmitic acid; the so-called 'myrtle wax' consists of about 20 per cent. of tri-palmitin (i.e. the fat composed of glycerin and palmitic acid) and about 80 per cent. of free palmitic acid. On the other hand, the term 'oil,' which is generally applied to the true liquid fats, is in commercial usage extended also to liquid waxes, like the sperm oil already mentioned. Free fatty acids (as well as free monatomic or diatomic alcohols and hydrocarbons) are found also, in limited quantities, in the true waxes. But if waxes are at all to be classed separately from the fats, the term waxes should not be applied to materials containing glycerides, and the term oils should not be applied to materials containing no glycerides and composed chiefly of the substances that characterize the true waxes. Of course, since the true waxes contain no glycerin, the latter does not appear among their saponification products, nor can acrolein be produced during their combustion. (See FATS.) Another difference between waxes and fats becomes apparent when they are subjected to processes of saponification. Thus, while any fat may be more or less readily saponified by alkalies dissolved in water, waxes can hardly be thus saponified at all, so that it is necessary to use potash or soda dissolved in alcohol when it is required to effect the saponification of a true wax. The following paragraphs contain accounts of the principal waxes known. They may be divided into liquid and solid waxes, the former including sperm oil and bottlenose oil, both of animal origin. The solid waxes may be subdivided into those of animal and those of vegetable origin. The former include spermaceti, beeswax, wool wax, and serum wax. The solid waxes of vegetable origin include carnauba wax, Chinese wax, opium wax, palm wax, ocuba wax, getah wax, ocotilla wax, and cottonseed wax.

SPERM OIL. This is derived from the head matter of the sperm whale (*Physeter macrocephalus*). The blubber, i.e. the material containing the wax, when tried out yields a crude oily liquid composed chiefly of sperm oil and spermaceti (see below), the latter being subsequently removed by chilling and pressure. Sperm oil is a pale yellow thin liquid with a slight odor. Its specific gravity is from 0.875 to 0.880. If of good quality it contains very little free fatty acid. The composition of sperm oil is as yet in dispute. By some authorities it is said to contain dodecatyl and cetyl alcohols. Its viscosity, which is high for a low-gravity oil, does not change materially with rise of temperature as is the case with fatty oils, and, as it is a non-drying substance and not liable to become rancid, it has long been a favorite lubricant for light high-speed machinery. Sperm oil is often largely adulterated, mainly with other fish oils. These are usually quite easy to detect by their odor, especially on heating. Mineral oils can be best detected by the flash test. (See Oils.) As an illuminant sperm oil has been almost entirely superseded by the cheaper mineral oils.

Bottlenose Oil. This is derived from the so-called Arctic sperm whale (*Hyperoödon rostratus*). It is a liquid darker than sperm oil and has a peculiar and characteristic taste and odor. It is more likely to gum than sperm oil. But chemically considered the two liquid waxes are probably identical, the main constituent of either being the ester composed of dodecatyl alcohol and doeglic acid. Bottlenose oil is chiefly used as a lubricant and as an adulterant for sperm oil.

Spermaceti. This is the solid crystalline wax occurring with sperm oil (see above) in the head matter of the sperm whale. It is isolated by chilling and pressure. Crude spermaceti, which has a brown or yellow color and a scaly structure, is treated with caustic potash, which bleaches it and removes traces of oil. The product is white, semi-transparent, solid, odorless, and tasteless. It melts at 45° C. (113° F.). Its specific gravity is 0.943. Chemically spermaceti is almost pure cetyl palmitate. It is largely used in candle-making, pharmacy, and confectionery. In burning it gives a clear smokeless flame. Spermaceti is not often adulterated, as any admixture would interfere with its peculiar transparency and crystalline structure.

Beeswax. This is the material secreted by the common honey bees and used by them to construct the comb. It is obtained in the crude state by melting the comb over hot water and washing several times to remove soluble and suspended impurities. The natural color is yellow, but it may be bleached by the prolonged action of sunlight or of various oxidizing agents, such as the bichromate or permanganate of potassium and sulphuric acid, or nitric acid, hydrogen peroxide, etc. Bleached wax is odorless, colorless, and tasteless. It consists chiefly of myricyl palmitate with some free cerotic acid. It melts at 63° C. (154.4° F.) and has a specific gravity of 0.965 to 0.969. It is often adulterated with water, starch, flour, stearin, paraffin, ceresin, tallow, vegetable wax, or white mineral substances. While some of these adulterants are very easy to detect, others require the work of a skilled analyst. It has been stated that beeswax invariably contains pollen. This may, of course, be detected by means of the microscope. Beeswax is still used for making candles. It is also used in the preparation of water-proofing materials, as a furniture polish, and in pharmacy.

Chinese Wax. This is secreted by the *Coccus ceriferus* (an insect) and deposited on the twigs of the Chinese ash. From these it is removed by hand and melted in hot water to remove mechanical impurities. The wax is a hard, white, crystalline solid, without taste or smell. It somewhat resembles spermaceti, but is harder and more fibrous. It is slightly soluble in alcohol and completely so in light hydrocarbons. It consists chiefly of ceryl cerotate. Its specific gravity is 0.970 and its melting-point is 82° to 83° C. (about 180° F.). It is used in the East as a substitute for beeswax, but is rarely brought to the United States.

Wool Wax. This is obtained as a by-product in the wool-washing process, either by alkaline water or by some hydrocarbon solvent. Wool wax is in reality the sweat of the sheep exuding from the skin of the animal, and is a very complex mixture, but contains among other compounds large quantities of the stearic and palmitic esters of cholesterin and iso-cholesterin, and potassium salts of various fatty acids. As prepared by acidifying the wash waters, or distilling off the organic solvent, it is a dark brown compound with a disagreeable odor resembling that of the sheep; by repeated washing in water the soluble compounds are removed, the residue is melted over water, cooled, and allowed to solidify. In this purified state wool wax is a pale-yellow, soft, translucent substance with little if any odor. Its specific gravity is 0.973. One of the most remarkable properties of this substance is its capacity for combining mechanically with as much as 80 per cent. of its weight of water. The neutral wax with 22 to 25 per cent. of water is sold under the name of *lanolin* and is used in pharmacy as a basis for ointments. Wool wax is used as a leather-dressing and as a lubricant for wool yarn.

Carnauba Wax. This is derived from a species of palm (*Copernica cerifera*) indigenous to Brazil. The wax forms a coating on the leaves and is removed by shaking and pounding the trees. The raw wax is of a dirty greenish-yellow color and so hard that it can be readily pulverized. When pure it is odorless and tasteless, melts at 83° to 88° C. (186.5° to 190.5° F.), and has a specific gravity of 0.990 to 0.999. Its composition is very complex. Its main ingredient is myricyl cerotate, with small quantities of free cerotic acid and myricyl alcohol. Besides these, there are present a hydrocarbon melting at 59° C. (138° F.), a diatomic alcohol, and carnaubic acid. The wax is chiefly used in the manufacture of candles and wax varnishes, and as an admixture with commercial stearic acid, cerasin, and paraffin, for the purpose of raising their melting-points.

Bibliography. Sedna, *Das Wachs und seine technische Verwendung* (Vienna, 1886); Schaedler, *Die Untersuchung der Fette, Oele und Wachsarten* (Leipzig, 1898); Alder Wright, *Oils, Fats, and Waxes* (London, 1894); Benedikt, *Commercial Analysis of Oils, Fats, and Waxes* (trans. by Lewkowitsch, London, 1895); Allen, *Commercial Organic Analysis* (Philadelphia, 1899). See Beeswax; Fats; Oils; Esters.

WAX, Mineral. See Ozocerite.

WAXAHACHIE, wăks'ȧ-hăch'ē. The county-seat of Ellis County, Tex., 30 miles south of Dallas, on the Missouri, Kansas and Texas and the Houston and Texas Central railroads (Map: Texas, F 3). It is the shipping point of one of the richest farming sections in the State, a district which produces cotton, wheat, oats, corn, etc. Cotton gins, a cottonseed-oil mill, a flour mill, and lumber yards are among the more important industrial establishments. The waterworks are owned by the municipality. Population, in 1890, 3076; in 1900, 4215.

WAXBILL. One of several weaver-birds (q.v.) having a coral-red, waxy beak; especially the astrild (*Estrilda astrilda*), a near relative of the amidavad (q.v.)—a common cage-bird.

WAX CLUSTER. See Gaultheria.

WAX-INSECT. A name for two or more scale-insects, but also equally applicable to several other insects. *Ericerus pela*, called by the Chinese lah-shoo, which makes the so-called Chinese white wax, is found about the beginning of June on the branches of an ash (*Fraxinus Sinensis*) and certain other trees. It has long been cultivated in China for its wax, which is used chiefly in candle-making, although the industry has declined since the introduction into China of kerosene oil. Though little is known of the insect, it is altogether likely the females produce larger quantities than the winged males, which are popularly reputed to be producers. It is said that the wax is scraped off of the branches toward the end of August, melted with boiling water, and strained through cloth. The insect has been introduced into Algeria by the French. The East Indian wax-insect (*Ceroplastes ceriferus*), which is found on *Celastrus ceriferus* and other trees, is rather rare and has not been used commercially. Its wax is not altogether suitable for candle-making, as both the wax itself and its mixtures with olive oil burn with a dim, smoky light, and give out a resinous odor. The wax, which is reputed medicinal, is sweet when fresh and is eaten by children.

Two American scale-insects, the barnacle scale (*Ceroplastes cirripediformis*) and *Ceroplastes Floridensis*, are known as wax-scales. No commercial use has been made of their wax. Nearly all of the Coccidæ secrete wax in varying proportions, most of them only in small amounts. Several species of the genus Icerya, however, secrete large quantities. In *Icerya Ægyptiacum* and *Icerya Montserratensis* wax is secreted to form the egg-sac and also in long filaments which so readily break off that a jar or a shake of a badly infested tree will bring down the wax in quantity. In the genus Pulvinaria also white wax is secreted for the protection of eggs.

Certain of the lantern-flies (q.v.) of the family Fulgoridæ secrete large quantities of a white flocculent wax, and in tropical America the small lantern-flies of the genus Phenax fly about with large masses of this waxy substance sometimes twice as long as their bodies. This fulgorid wax is said to be used in China for candles, etc. The larvæ of an East Indian species (*Phromnia marginella*) are covered with masses of white wax which is secreted by small glands distributed over the abdomen.

Various plant-lice or aphids (q.v.), especially the genera Pemphigus, Chermes, and Schizoneura, also secrete white wax from glands which replace the honey-tubes. One species (*Lachnus longistigma*) infests certain coniferous trees in the United States, and when abundant the insects may be scraped off and sifted to obtain the wax. Some of the Psyllidæ also produce waxen threads. Certain caterpillars secrete wax, as the larva of one of the Tortricidæ (*Retinia resinella*) and of a butterfly (*Parnassius apollo*); the bodies of certain sawfly larvæ are covered with a white, powdery, waxen secretion, in one case (genus Selandria) nearly concealing the body. The wax in all of these insects is secreted by small one-celled skin-glands which in the Hemiptera are distributed nearly all over the body, but in the bees are restricted either to the under or upper side of the end of the abdomen. See Bees.

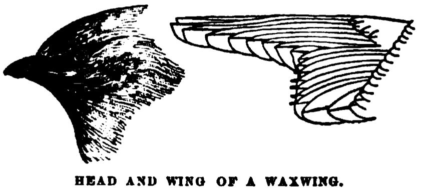
WAX-MOTH, or Honey Moth. See Bee, paragraph *Winter Life and Enemies.*

WAX-MYRTLE. See Candleberry.

WAX-SHRUB. See Candleberry.

WAXWING, or Chatterer. Any bird of the genus Ampelis, of the passerine family Ampelidæ, characterized by having a short, straight, elevated bill, with a very wide gape, as in the fly-catchers, but without bristles; both mandibles notched at the tip; the wings rather long, broad, and pointed; the legs short. The genus Ampelis is peculiar in having many of the shafts of the wing-quills tipped with a horny material resembling red sealing-wax. The three species are widely diffused over northern regions and are much alike. One, the Bohemian waxwing (*Ampelis garrulus*), inhabits the Arctic regions, breeds to near the limit of timber growth, and makes its nest in a tree long before the winter snows have melted. It migrates southward in winter, and in severe seasons reaches the United States, but always irregularly and at long intervals. It feeds on insects and worms, seeds, berries, and other fruits. It is a handsome bird, nearly as large as a thrush; is reddish gray, with a black patch on the throat, and a black band on the forehead; the tail-coverts brownish orange; the primaries, secondaries, and tail-feathers tipped with yellow, two white bands on the wings; the lower parts silvery gray. The head is surmounted by an erectile crest of brownish orange feathers. The song of the waxwing is a weak whistling, bearing a little resemblance to that of the thrush. It is easily tamed.

The more common American waxwing, 'cherry-bird,' or 'cedar-bird' (*Ampelis cedrorum*), is a very similar but smaller species, found from Canada to Central America, less migratory, and never visiting Arctic regions. The general color is purplish cinnamon in front and ash-color behind; the chin, forehead, and a stripe through the eye black; no white on the wings; the belly yellow, fading into white on the under tail-coverts. It is crested. Great flocks of cedar-birds collect in the end of summer. They feed on cherries and garden berries, and are particularly fond of those of the red cedar, but they eat seeds and in-



HEAD AND WING OF A WAXWING.

Head of Cedar-bird (*Ampelis cedrorum*); wing of same showing the 'sealing wax' tips of the secondaries.

sects too. They breed late in the summer, and build a bulky nest of grass, bark, rootlets, and the like, in which the female deposits 3 to 5 eggs, pale bluish gray, spotted with black.

The third species of waxwing is a native of Eastern Asia and Japan.

WAXWORK (so called from the waxy scarlet aril), STAFF TREE, or SHRUBBY BITTERSWEET (*Celastrus scandens*). An American climbing shrub of the natural order Celastraceæ. It flourishes in most soils from Canada to South Carolina, and west to South Dakota and New Mexico, climbing upon rocks and trees to a height of 20 feet or more. When the globular, rich orange fruits open they expose beautiful crimson berries. The fibre of the bark has been shown experimentally to be valuable, but little if any use is made of it. *Celastrus articulatus* or *Celastrus orbiculatus*, a native of China and Japan, which is somewhat cultivated, differs mainly in the shape of the leaves.

WAXY (or **AMYLOID**) **DEGENERATION.** A morbid process in which the healthy tissue of various organs is replaced by a nitrogenous substance, resembling in some respects amyloid compounds. Organs affected by this degeneration have a certain resemblance in consistency and physical character to wax. They are abnormally translucent, increased in volume, solidity, and weight. Usually, the first parts affected are the small blood-vessels, the intima and media being first changed. Subsequently, adjacent connective tissues become similarly affected. When a solution of iodine is brought in contact with such tissues, a mahogany-brown color is produced; and this color is a sufficiently characteristic test. Iodine and sulphuric acid yield a blue color. Although amyloid degeneration is common to many tissues and organs, the parts most frequently affected are the spleen, liver, and kidneys. The heart muscles, the supra-renal capsules, the lymphatic glands, and the intestinal mucous membrane may also be involved. The causes of waxy degeneration are chronic suppuration, especially of bone, as well as syphilis, tubercle, cancer, and probably gout. It is uncertain whether any symptoms are referable to this degeneration, as it is associated with wasting diseases. If the degeneration occurs in the intestines, chronic diarrhœa results. There is no remedy for the degeneration.

WAY (AS. *weg*, Goth. *wigs*, OHG. *wec*, Ger. *Weg*, way; connected with Lat. *via*, road, Gk. ὄχος, *ochos*, carriage, Lith. *weza*, track of a cart, Skt. *saha*, road, from *vah*, to carry, convey). In law, an easement or right in a person to pass over the land of another. The term is also employed to denote a path or road over which a right of way may be exercised. Where the right of way can be used only by one person, or a limited number of individuals, it is considered private. Where it may be used by all persons in common it is public. Twenty years' open and adverse exercise of a right of way makes it a permanent easement by prescription. A 'way by necessity' arises where a person sells to another a portion of his land, to which there is no road or way leading to a public highway, or which is so located as to cut off access from the remainder of the vendor's land to the highway. The person whose land is thus cut off from access to a public highway may pass over the vendor's or purchaser's land, as the case may be, by the most convenient and direct route to the nearest highway, having due regard for the best interests of the person over whose land he passes. A way may consist merely of the right to pass over a narrow path on foot, or on horseback, or may extend to the use of vehicles of any description. The latter class of ways is the most common in the United States. A private way may be dedicated to the public, but a mere license to the public to pass over a way will not destroy its private character. See EASEMENT.

WAY, ARTHUR S. (1847—). An English translator, born at Dorking. He was educated at Kingswood School, Bath, and at Queen's College, Melbourne (Australia), where he was afterwards fellow. In 1870-76 he was a lecturer at Queen's College, Taunton, in 1876-81 vice-master of Kingswood School, Bath, and from 1882 to 1892 headmaster of Wesley College, Melbourne. He published verse translations of the *Odyssey* (1880), of the *Iliad* (1886-89), of *Euripides* (1894-98), and of the *Epodes* of Horace (1898). They are among the most skillful examples of translation from the classics to be found in English. He also published in 1901 *Apollonius Rhodius' Tale of the Argonauts* and *Letters of Saint Paul to Seven Churches and Three Friends.*

WAY BILL. See RAILWAYS.

WAY'CROSS. The county-seat of Ware County, Ga., 96 miles southwest of Savannah; on the Atlantic Coast Line, the Savannah, Florida and Western, and the Waycross Air Line railroads (Map: Georgia, D 4). It is in a farming section producing cotton and sugar cane; but its business interests are centred chiefly in lumber and naval stores. Extensive car works have recently been established here. The government is vested in a mayor, chosen annually, and a unicameral council. The water-works are owned and operated by the municipality. Population, in 1890, 3364; in 1900, 5919.

WAY'LAND, FRANCIS (1796-1865). An American educator, born in New York City. He graduated at Union College in 1813, studied medicine for three years, and in 1816 entered Andover Theological Seminary. Before graduating he left to become a tutor at Union College, where he remained four years. In 1821 he accepted a call to the pulpit of the First Baptist Church in Boston, where he became known as a preacher of great ability and energy. After a year's professorship at Union College in 1826-27 he left in February of the latter year to accept the presidency of Brown University at Providence. The twenty-eight years (1827-1855) during which he remained at the head of this institution saw its rapid development and change from a narrow sectarian college to a modern college on more liberal lines. These reforms marked Dr. Wayland, although a conservative in most matters, as a leader in educational reform. He himself delivered lectures in psychology, political economy, and ethics. Retiring from the presidency of the university in 1855, he served for some time as pastor of the First Baptist Church, Providence, and devoted himself to prison reform and other movements of a similar nature. His published works include, in addition to numerous individual sermons and addresses: *Occa-*

sional Discourses (1833); *Elements of Moral Science* (1835), which has run through a large number of editions and revisions and has been translated into several foreign languages; *Elements of Political Economy* (1837); *Moral Laws of Accumulation* (1837); *The Limitations of Human Responsibility* (1838); *The Present Collegiate System in the United States* (1842); *Domestic Slavery Considered as a Scriptural Institution* (1845); *Sermons Delivered in the Chapel of Brown University* (1849); *Memoirs of Harriet Ware* (1850); *Memoirs of Adoniram Judson* (2 vols., 1853); *Elements of Intellectual Philosophy* (1854); *Notes on the Principles and Practices of the Baptist Churches* (1857). Consult also his *Life and Labors*, by his sons, Francis and Henry L. Wayland (New York, 1867). See BROWN UNIVERSITY.

WAYLAND, FRANCIS (1826-1904). An American lawyer and educator, son of Francis Wayland (1796-1865). He was born in Boston, Mass., graduated at Brown University in 1846, studied law at Harvard, began the practice of the law at Worcester, Mass., in 1850, and eight years later removed to New Haven, Conn., where he was judge of probate in 1864-65. In 1869 he was Lieutenant-Governor of Connecticut, and in 1872 became professor of jurisprudence in Yale University, of whose law school he served as dean from 1873 until 1903. He took an active interest in social science, especially in prison reform and vagrancy, and was president of the American Social Science Association in 1880, and, after 1872, of the Prison Aid Association. Besides papers and addresses on social science, he, with his brother, Henry L. Wayland, a Baptist minister of Philadelphia, published *Life and Labors of Francis Wayland* (2 vols., 1867).

WAYLAND THE SMITH (AS. *Wēland*, OIcel. *Völundr*, Ger. *Wieland*). A famous Germanic hero, originally a semi-divine goldsmith. According to the usual account, he was a son of the sea-giant Wade, who apprenticed him to Mimi, a skilled smith. He was then taken across the sea to the dwarf's, whom he soon surpassed at the forge. He afterwards long dwelt in Ulfdaler (the Wolf's Valley) along with his two brothers, Slagfidr and Eigil. Here the brothers met three swan-nymphs, with whom they lived for seven years. Afterwards Wayland came to King Nidung, who cut the sinews of his feet, thus laming him forever, and then imprisoned him. For this cruel treatment Wayland put the King's two sons to death and violated his daughter Beadohild, who became the mother of Wittich, a mighty champion. Wayland then made a feather robe in which he flew away. The legend, with many variations and episodes, was long a favorite among the Germanic peoples, as is shown by the frequent allusions to it in Scandinavian, German, and English poetry, and by numerous fragments yet extant in oral tradition. Wayland also appears as *Galant* in the French *Chansons de Geste*. But the fullest single account is to be found in the *Elder Edda* and in the *Wilkina Saga*. A still older version of the story is contained in *Déor*, an old English lyric. By piecing together the old legends and filling in here and there, Karl Simrock reproduced the saga in his poem *Wieland der Schmied* (Bonn, 1835), and again in the fourth part of his *Heldenbuch* (Stuttgart, 1843). The Germanic origin of the Wayland legend has been questioned. Although this seems to be going too far, it is nevertheless clear that in the course of its growth something was taken from the Greek myths of Hephæstus and Dædalus. Consult the *Corpus Poeticum Boreale*, ed. with translations by Vigfusson and Powell (2 vols., Oxford, 1883); and J. Grimm's *Deutsche Mythologie* (4th ed., Berlin, 1875-78; English translation by Stallybrass, 4 vols., London, 1882-88).

WAYNE, ANTHONY (1745-96). An American soldier, prominent in the Revolutionary War. He was born at Easttown, Pa., and was educated at Philadelphia. At the age of eighteen he was employed as a land-surveyor, and in 1765 was selected by Benjamin Franklin and his associates to act as agent and surveyor of a projected settlement in Nova Scotia. He was for two years (1774-75) a member of the Pennsylvania Legislature, and in 1775 he also became a member of the Committee of Safety. At the outbreak of hostilities with England he raised a regiment of volunteers, of which, in January, 1776, he was appointed colonel, and was sent to Canada, where he covered the retreat of the American forces at Three Rivers. He commanded at Ticonderoga until 1777, when he was made brigadier-general and joined Washington in New Jersey. He commanded the rear-guard in the retreat at Brandywine; led the attack at Germantown; captured supplies for the distressed army at Valley Forge; distinguished himself at Monmouth; was defeated at Paoli, and finally achieved a brilliant victory in the storming of Stony Point (q.v.), July 16, 1779. His courage and skill greatly aided Lafayette in Virginia in 1780, where he also took part in the siege of Yorktown. Later he served in Georgia, and finally occupied Charleston, S. C., on its surrender by the British, December 14, 1782. On October 10, 1783, he was made brevet major-general, and in the following year, having retired from the army, he entered the Pennsylvania Legislature, and in 1787 was a member of the Pennsylvania convention which ratified the Federal Constitution. Having removed to Georgia and settled on a plantation given him by the State in recognition of his services, he entered Congress from that State in 1791, but in 1792 upon a contest his seat was declared vacant, and in April of that year he became commander-in-chief of the national army with the rank of major-general. His reputation as the 'Mad Anthony' of the Revolution survived and he was now called upon to end the Indian troubles on the frontier, where Harmar and Saint Clair had failed. He began his campaigns in Ohio in the fall of 1793; in 1794 he was active on the Maumee, and on August 20th defeated the Indians decisively at Fallen Timbers, and in August, 1795, he, with twelve of the Northwestern tribes, signed the Treaty of Greenville by which the United States acquired a large tract of territory. While still engaged on this service his death occurred at Erie, Pa. There are two *Lives:* by J. Armstrong (Boston, 1834), and by H. N. Moore (Philadelphia, 1845). His *Orderly Book* on the northern campaign has been edited by J. Munsell (Albany, 1859); and Stillé has written *Wayne and the Pennsylvania Line* (Philadelphia, 1893). For Wayne's campaign against the Indians, consult Roosevelt, *Winning* *of the West,* vol. iv. (New York, 1889-84). The best and most recent biography is that by Spears, *Anthony Wayne* (New York, 1903).

WAYNE, James Moore (1790-1867). An American jurist, born in Savannah, Ga., and educated at Princeton College, where he graduated in 1808. He then studied law, was admitted to the bar, and practiced at Savannah. In 1829-35 he was a member of Congress. He was a strong supporter of President Jackson's policy and was appointed by him associate justice of the United States Supreme Court in 1835. Wayne was an able orator and logician, and an authority upon admiralty jurisprudence. He favored free trade, but opposed internal improvements by Congress except of rivers and harbors, and opposed the rechartering of the United States Bank.

WAYN'FLETE, or **WAINFLEET,** William of (1395?-1486). An English bishop and statesman. He was born at Wainfleet and probably educated at Winchester and New College, Oxford. He was ordained priest in 1426, and on the foundation of Eton College, removed thither in 1442 as a fellow, becoming the second provost in the following year. He succeeded Cardinal Beaufort as Bishop of Winchester in 1447, and a year later obtained letters patent for the foundation of a hall at Oxford to promote the study of theology and philosophy, which ten years later he merged into his foundation of Magdalen College. As a member of the Royal Council, he was called upon to treat with the rebel Jack Cade, and incurred the hatred of the Yorkist party by his intervention. He was appointed Lord Chancellor by Henry VI. in 1456, and took a decided part against the Yorkists when the crisis became acute. He lost his office on their triumph in 1460, acquiesced for the time in the rule of Edward IV., but released Henry VI. from the Tower in 1470, and was obliged to purchase a pardon in 1471. After this he was much at court, and occupied with the completion of Eton and Magdalen colleges. The last few months of his life were spent in retirement at his manor of South Waltham, Hampshire, where he died.

WAYNES'BORO. A borough in Franklin County, Pa., 14 miles south by east of Chambersburg, the county seat, on the Western Maryland and the Mont Alto railroads (Map: Pennsylvania, D 4). It is chiefly an industrial town, being especially known for the manufacture of engines, boilers, farm and dairy implements, and various kinds of machinery. There are also foundries and machine shops, and manufactories of pottery, flour, and lumber products. In the census year 1900 the various industrial establishments had $3,984,774 capital, and an output valued at $2,731,059. The region is engaged in agriculture. Population, in 1890, 3811; in 1900, 5396.

WAY OF THE WORLD, The. The last play of William Congreve, produced in 1700 at Lincoln's Inn Fields and at first coolly received. The characters are in many cases suggested by Molière's types. The plot rests on the attempt of Millimant and her lover to save the former's dowry from her jealous guardian, Lady Wishfort, by marrying that elderly coquette to a disguised valet. They finally succeed in acquiring the property by rescuing Lady Wishfort's daughter from the threatened exposures of a shameless and avaricious husband.

WAYS AND MEANS, Committee of. In the United States, the most important committee both in the State and national legislatures, having been borrowed from the usage of Great Britain. In the House of Representatives the chairmanship of the committee usually goes to one of the acknowledged leaders of the majority party and is regarded as second only in rank to the Speakership. The Committee of Ways and Means was employed in the first Congress of 1789 and became a standing committee in 1795. Like its English prototype, it is charged with the preparation of all legislation relating to the raising of revenue or the payment of the national bonded debt. The committee is appointed by the Speaker; the number of members was originally seven, but is now seventeen; and the minority party is usually given from one-fourth to one-third of the places on the committee. For the dispatch of business the committee usually appoints from its membership several sub-committees. In 1850 it was given a temporary right of way over other committees of the House, and at the outbreak of the Civil War the privilege became permanent. Until 1865 the Ways and Means Committee also considered appropriation measures, but since then that duty has developed upon a Committee of Appropriations, which ranks second in importance among the House committees. Consult: McConachie, *Congressional Committees* (New York, 1898); Wilson, *Congressional Government* (Boston, 1888).

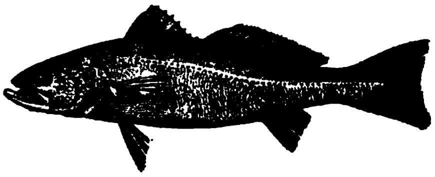
WAYZ-GOOSE. See Bean-Feast.

WAZAN, wä-zän'. A holy city of Morocco, situated about 53 miles north of Fez. It has a number of fine mosques and a fine palace. The sherif, to whose residence Wazan owes its importance, is regarded as the spiritual ruler of Morocco, and as such is superior even to the Sultan himself. The town is outside of the jurisdiction of the Sultan and is regarded as an asylum by fugitives from justice. Under Muley Abd is-Salem (d.1892), who was married to an English woman, the office of the sherif lost somewhat in importance. The inhabitants of Wazan, estimated at 10,000, are mostly descendants of the sherifs.

WAZIRISTAN, wä-zē'rē-stän'. A mountainous region in the northwestern part of India, bordering upon Afghanistan and included in the territory between the Gomul and Tochi rivers, now forming part of the Northwest Frontier Province. It is well watered and the higher altitudes abound in picturesque scenery and have a healthful climate. Iron-mining and the breeding of horses and donkeys are the principal industries. Its isolated situation renders Waziristan practically independent, although in 1897, as a result of depredations committed by the inhabitants, a British force took possession of the Tochi Valley. The chief town is Kanigoram.

WEA (abbreviated from *Wawiatenong*, referring to a settlement near an eddy in a stream). A subtribe of the Miami (q.v.). At the beginning of the nineteenth century they were resident upon the Upper Wabash River, with their principal village, known to the French as Quiatenon, just below the mouth of Wea Creek, below the present site of Lafayette, Indiana. The Wea and the Piankishaw (q. v.) were always considered divisions of the Miami, apart from whom they have no separate history until Little Turtle secured their recognition as distinct tribes at the Greenville treaty in 1795 in order to obtain from them separate tribal annuities. In 1820 the Wea sold their reserved lands in Indiana and removed with the Piankishaw to Illinois and Missouri, whence they afterwards removed to Kansas. In 1854 the two tribes, reduced to a mere remnant, united with the remnants of the Peoria (q.v.) and Kaskaskia (q.v.), all that were left of the ancient Illinois (q.v.). In 1868 they removed to a reservation in the northeast corner of Indian Territory, where they number now all told only 180, probably not one being of pure blood.

WEAKFISH (so called on account of its tender mouth), or SQUETEAGUE. A common fish of the family Sciænidæ (*Cynoscion regalis*), found on sandy shores along the Atlantic coast of the United States. It is pale brownish above, with a greenish tinge, grading into silvery along the sides and belly, variegated with brown vermicular blotches, some of which form undulating lines running downward and forward. Its average weight is about five pounds, but it may attain a weight of 30 pounds. From its shape and habit of taking the hook it is sometimes called 'sea trout.' It is an important food-fish along the coast. It spawns in May and June. The eggs are buoyant and hatch in about forty-eight hours.



WEAKFISH.

WEALDEN (wēl′den) **FORMATION**. An important series of fresh-water strata belonging to the Lower Cretaceous series as developed in England. Having been originally studied in the parts of Kent, Surrey, and Sussex called the Weald, this local name was given to the formation. It has been divided into two series, which do not differ very materially from each other, viz. Weald clay, 560 feet; Hastings sand, 740; total, 1300. The formation was deposited in an inland sea which covered much of Southern England and extended into Germany.

WEALTH (ME. *welthe*, *weolthe*, OHG. *welida*, *welitha*, wealth, from AS. *wel*, *well*, Goth. *waila*, OHG. *wela*, *wola*, Ger. *wohl*, well; connected with Gk. *βέλτερος*, *belteros*, better, Skt. *vara*, better, wish, from *var*, to choose). The term wealth in political economy is applied to all objects possessing value (q.v.). As a rule, objects which fall under the category of wealth are useful, limited in supply, and transferable. Some authors would exclude, others include, under wealth, personal services; a few would include health, strength, intelligence, and other personal attributes. The best usage confines the term to objects that are external to man. See POLITICAL ECONOMY; VALUE.

WEALTH OF NATIONS, THE. See SMITH, ADAM.

WEANING (from *wean*, AS. *wenian*, Goth. *wanjan*, OHG. *wenjan*, *wennan*, *wenan*, Ger. *gewöhnen*, to accustom; connected with Goth. *wunan*, to enjoy, OHG. *wini*, friend, Lat. *Venus*, goddess of love, Skt. *van*, to hold dear, wish, win). The substituting of artificial food for breast milk, in the case of an infant. This process should be gradual. If sudden, the mother suffers from painful breasts, and the child suffers from indigestion. Weaning should not be accomplished in hot weather, if it can be postponed without harm. Nursing should be continued in normal cases for nine months after birth. If it be protracted beyond this limit the vitality of the mother is apt to suffer, and the child is apt to lose weight from subsisting upon insufficiently nourishing food. A stationary weight for a few weeks or a loss of weight in the child is a signal that nutrition needs supplementing, and weaning must be accomplished, even though the child seems well and is natural. Pregnancy in the mother is an imperative reason for weaning. It is wise to accustom every child to take water from a bottle after it is a few months old, before the time for weaning approaches. Sudden weaning may become imperative because the mother has no milk, or becomes the victim of an acute disease, such as pneumonia, typhoid fever, Bright's disease, or tuberculosis. Inflammatory disease of the breast is also a counter-indication for nursing. During a short acute illness, the breasts may be emptied at regular intervals with a pump, while the child is fed from a bottle, and breast feeding may be resumed upon the mother's recovery. If the mother has no milk, the child must be weaned as soon as the breasts have been emptied of colostrum. It is safe to wait for two days for the milk to appear in the breasts. When weaning is sudden, reason must be employed in the use of artificial food. That is, a five-month-old child must not be put at once on a diet for that age, but gradually brought up to it after beginning with food which is proper for a child of a month old. See INFANTS, FEEDING OF.

WEARE, MESHECH (1713-86). An American political leader, born at Hampton Falls, N. H. He graduated at Harvard in 1735; studied for the ministry, and preached for a short time. He later studied law; represented his town for many years in the New Hampshire General Court; was Speaker in 1752; and served as a justice, and then as Chief Justice, of the Superior Court of Judicature. He was also colonel of a regiment of militia, and was a commissioner to the famous Albany Congress of 1754. At the beginning of the Revolutionary War he was made chairman of the Committee of Public Safety; when the new courts were organized, was placed at their head; and was active in raising troops to oppose the British under Burgoyne. Under the temporary Constitution of 1776 he was annually elected President of the State until 1784, when he was almost unanimously chosen under the new Constitution, but resigned before the end of his term.

WEARING. See TACKING AND WEARING.

WEARING OF THE GREEN. A popular Irish song by Dion Boucicault, occurring in his play *Arrah na Pogue.* See Tandy, James Napper.

WEASEL (AS. *wesle*, OHG. *wisala*, Ger. *Wiesel*, weasel; of uncertain etymology, perhaps akin to Gk. *αἴλουρος*, *ailouros*, cat, weasel; possibly connected, in allusion to its habitat, with OHG. *wisa*, Ger. *Wiese*, meadow, AS. *wās*, moisture, or, in allusion to its odor, with OHG. *wesanīn*, to become foul, Lat. *virus*, Gk. *ἰός*, *ios*, Skt. *viṣa*, poison). One of the small, slender carnivores of the family Mustelidæ, typical of the genus Putorius. The name was first applied to the small European *Putorius vulgaris*, noted for its constant pursuit of moles and field-mice (voles), other European species being known as polecats (q.v.) and stoats. The latter animal (*Putorius erminea*) turns white in winter in northern localities, and its fur is 'ermine' (q.v.). In North America are several species or varieties of weasels, all confusingly similar to one another and to the European ones. The one most familiar is the long-tailed or New York weasel (*Putorius noveboracensis*) of the Eastern States, the male of which is sixteen inches long, but the female only thirteen inches, more than one-third of which belongs to the tail. It is dark chocolate-brown above and white beneath, with the end of the tail black. This stoat-like weasel turns pure white in winter wherever the climate is cold and snowy, except (as in all other species) for the black tip of the tail. A smaller species, much more widely distributed through the Northern United States and Canada, is the short-tailed, or Bonaparte's weasel (*Putorius Cicognani*), the male and female measuring eleven and nine inches respectively, of which the tail takes less than a quarter; its brown is darker and its white rather yellowish. This is the one which supplies most of the ermine procured in British America in winter, although the Arctic 'least' weasel (*Putorius rixosus*) supplies some. This last species is only six inches long. Another 'least' weasel (*Putorius Alleghaniensis*) dwells in the Western Alleghanies; while Florida and Texas have large species that never turn white. For various other species and subspecies, consult Elliot, *Synopsis of the Mammals of North America* (Chicago, 1901).

The disposition and habits of all weasels are alike. It is a slim, lithe, swift, muscular, ferocious little beast, diligent and persevering in pursuit of prey, and alert and clever in escaping its enemies—chiefly hawks and owls. It is an admirable hunter, and its scent is as keen as its sight. It quarters the ground like a dog, and wearies out animals larger and apparently much stronger than itself. It preys on mice, rats, birds, and other small animals, sometimes even on hares and rabbits, robs birds' nests, devouring the young birds or sucking the eggs, and is often troublesome in poultry yards. On the other hand, it does great good by devouring field-mice and the vermin about barns and granaries. It climbs walls and trees with great agility, and does not hesitate to plunge into water in pursuit of the water-rat. It sometimes begins by abstracting the blood of the animal which it has killed, and generally devours the brain; but when food is abundant, it carries the body to its retreat, where a considerable quantity of prey is often found, the weasel continuing to eat it in a half-putrefied state. It is one of the few animals that apparently kill for the love of killing, or at least this characteristic is suggested by the slaughter it will sometimes work in a poultry yard, and the fact that many of the chickens killed are left untouched, and seemingly without even having had their blood sucked. The weasel generally sleeps during the day, and is most active at night. It has a disagreeable smell, which is strongest in hot weather, or when it has been pursued or irritated. It is capable of being tamed when taken young, and becomes docile and gentle. The female weasel makes a nest of straw, leaves, and moss for her young, which are produced in spring, four or five in a litter, often in a crevice of a bank, or in a hollow tree. See Fur-Bearing Animals, and the bibliography and references there given.

WEATHER (AS. *weder*, OHG. *wetar*, Ger. *Wetter*, weather; connected with OChurch Slav. *vedro*, good weather, *vedrŭ*, clear, bright, Skt. *vā*, to blow). The condition of the atmosphere at any time in respect of temperature, moisture, precipitation, sunshine, wind, electricity, dust, or any other meteorological element. The study of weather is of fundamental importance to mankind, and has always received great attention, especially because of the desire to anticipate or predict approaching important changes in the weather. The weather bureau (q.v.) or meteorological office, as now established in every civilized nation of the globe, represents the latest practical application of physical science to the needs of mankind; its primary duty is to preserve and study the records of local weather in order to make satisfactory local forecasts.

Modern physical meteorology with its elaborate weather records may be said to have begun in 1653, when Ferdinand II., Grand Duke of Tuscany, distributed thermometers to several cloisters in Italy and organized a system of daily records under the general oversight of Father Luigi Antinori. In 1657 barometers, wind vanes, and hygrometers were added to the equipment of these stations. Continuous automatic records of the individual features of the weather probably began in England between 1666 and 1670, with the Moreland barometer and other apparatus devised by a special committee of the Royal Society, of which Sir Christopher Wren was chairman. A great advance has been made in meteorology since the 'great exhibition' or 'World's Fair' of 1851 at London, when for the first time the items appropriate to the weather map were telegraphed for display upon charts first time the items appropriate to the weather maps are compiled by all nations so that the student quickly acquires a comprehensive view of the conditions existing in any part of the world. In 1873 the United States Weather Bureau, then a part of the Signal Service of the army, commenced the formation of a daily weather map of the whole Northern Hemisphere, which was published continuously from 1875 to 1883, inclusive, and was kept up in manuscript for ten years later. This gigantic undertaking included observations from the ocean as well as the land, and only by the use of similar maps can we hope to understand and predict changes of the weather in distant parts of the globe. In order to make satisfactory predictions of the monsoon rains in India, a daily weather map of the Indian Ocean or the monsoon area, was compiled at Calcutta during the years 1893-99, and by agreement between the Secretary of War and the Secretary of the Navy. daily weather maps of the Atlantic and Pacific oceans have been compiled by the United States Hydrographic Office since 1888. (See Page, *Instructions to Voluntary Observers of the Hydrographic Office*, Washington, 1901.) Similar maps for the North Atlantic for 1881-82 were published by the London Meteorological Office.

WEATHER FORECASTS are based on the general study of types of weather, combined with the study of the series of the daily weather maps for a few days immediately preceding the period for which predictions are to be made. No forecast of weather is made for a period in advance longer than is warranted by the rapidity with which atmospheric changes happen to be going on at that time. The forecast usually covers all questions bearing on destructive winds, excessive heat or cold, injurious frosts, local thunderstorms, rain or snow, and river floods. Special forecasts of the weather for any given locality or time are usually made whenever requested. See METEOROLOGY; WEATHER BUREAU; CLIMATE, etc.

WEATHER BUREAU. A governmental organization for the purpose of maintaining regular meteorological observations, compiling statistics of the climate, predicting weather and storms, river floods, frosts, rain, and such other atmospheric phenomena as affect the welfare of mankind. Among early meteorological services of importance were those of the Surgeon-General of the United States Army (1818): Russia (1837); Austria (1848); Prussia (1848); Smithsonian Institution (1849); Netherlands (1849); England (1860); and France (1863). At the present time every civilized nation has its weather bureau or meteorological office, and many have also marine or hydrographic offices. The United States Weather Bureau was reorganized under the Department of Agriculture, July 1, 1891, by the transfer of the meteorological records and duties of the Chief Signal Officer of the Army, hence its history goes back to February 9, 1870. But in fact the system of observation by voluntary and unpaid observers, which forms so large a part of the work of the bureau, goes back to the year 1849, when the Secretary of the Smithsonian Institution began to organize this corps of observers; indeed, one may go back to the year 1817, when Josiah Meigs issued his meteorological instructions to the registrars of the United States Land Office, and 1818, when Dr. Lovell, Surgeon-General United States Army, issued similar instructions to his officials. In 1838 Professor James P. Espy secured the appointment of a joint committee on meteorology, representing various scientific interests in Philadelphia. This committee began the collection of daily observations and the preparation of daily weather maps. In 1842 Espy was appointed meteorologist to the Government, and assigned to duty in the War Department, where he continued to compile and study daily weather maps. In 1851 he was ordered to continue his work under Professor Henry as Secretary of the Smithsonian Institution; in 1854 the latter began the preparation for the daily display of weather maps based on telegrams from all parts of the country, and from 1856 to 1861 such a map was daily exhibited and studied, and frequently made the basis of weather prediction. This work was discontinued on account of the irregularities in the telegraph service incident to the Civil War, and was taken up again jointly by the observatory of the Astronomical Society and the Chamber of Commerce in Cincinnati in 1868. In February, 1870, an act of Congress ordered the Secretary of War to provide for the observation and prediction of storms, to which subsequently were added floods and weather. The work that was then being carried on at Cincinnati was therefore transferred to Washington. In 1891 these duties were transferred to the Weather Bureau, which was reorganized under the Department of Agriculture.

As at present organized, the Weather Bureau comes under the rules governing the civil service of the country. Its first chief was Professor Mark W. Harrington (q.v.), to whom Professor Willis L. Moore (q.v.) succeeded July 4, 1895. The Weather Bureau employs the whole time of about six hundred paid employees, located at about 180 stations, distributed throughout this country and the West Indies. It also receives reports of temperature or rain or rivers from several hundred special observers and from 2500 voluntary observers of local climatological matters; also about 20,000 special reports on the condition of the growing crops from a meteorological point of view.

The bureau receives daily two regular sets of weather telegrams at 8 A.M. and 8 P.M. on which are based the morning and evening weather charts and the forecasts for the next thirty-six hours. These forecasts are immediately telegraphed to all concerned throughout the country and to vessels about to sail in any direction over the adjacent oceans; they are published in local newspapers, on special telegraph forms, on special postal cards, by flag signals, and by other methods of communication, so that within an hour's time after the forecasts leave Washington they can be obtained by any one who lives within sight of a telegraph or telephone office. Those who can be reached only by mail receive the forecasts a few hours later. The forecasts of heavy storms, cold waves, and injurious frosts and specially hot weather are verified almost without exception; the forecasts of rain are the least successful of any. (See STORM AND WEATHER SIGNALS.) Special efforts are being made to develop a system of so-called wireless telegraphy so that the forecasts can be communicated to vessels passing by, off the coast, without altering their courses, thus saving the delay which they now frequently incur by coming within signaling distance to inquire about the presence of storms. The condition of the rivers, especially in times of flood, is telegraphed to all those interested; predictions of the rise and fall of the water were formerly made from the central office and oftentimes with remarkable success, but at present it is considered sufficient to leave these to the judgment of the local river men. In the special interest of the crops and agriculture, a weather crop bulletin began to be published in 1887, and is now continued by the Climate and Crop Division; this is a weekly bulletin during the summer season, giving full details of the temperature, and rainfall as compared with normal conditions, and showing the influence of the weather on the development of the future crop. In the winter season this weekly bulletin is replaced by a monthly bulletin showing the quantity of snowfall, the ice in the rivers, the opening and closing of navigation, the condition of winter wheat, and the injury done to crops by cold waves, frosts, or floods. In the interests of the lake navigation, a monthly lake chart is published, showing every feature in regard to the weather or the condition of the lakes that can interest navigators.

In addition to the central forecast district at Washington, seven others are maintained, having their centres at Chicago, Boston, Galveston, San Francisco, Portland, Oregon, and Denver, each of which issues independent forecasts or local modifications of those issued from Washington. In the interests of local climatology, the larger States, or groups of smaller States, are organized as sections, and publish monthly a section report, which gives every observation of rainfall and temperature made during the month, as also charts of isotherms and rainfall. There are at present forty-five such sections, including those from Cuba and Porto Rico. The analogous publications for the Hawaiian Islands and for the Philippines are specially provided for by those territories. The general climatology of the United States is provided for by the publication of the *Annual Report of the Chief of the Weather Bureau,* which contains several hundred quarto pages of tabular matter and additional special reports or memoirs. In order to secure prompt publication of general climatological data, the bureau publishes a *Monthly Weather Review,* which contains not only a summary relative to storms, forecasts and warnings, and the general climate and crop conditions, but also ten or twenty pages of special contributions and notes bearing on questions of meteorology.

All apparatus used by the bureau is carefully tested, and all stations are frequently inspected, so as to secure the greatest possible exactness and uniformity. The Instrument Division is in charge of apparatus and methods of observation. New instruments and improvements on old apparatus emanate from this division, which has become especially famous for Professor Marvin's work on anemometers, psychrometers, meteorographs, and the development of the Hargrave kite for atmospheric exploration. When ordinary telegraph and telephone lines and cables are not otherwise available, the bureau builds and controls its own lines. Special researches of any magnitude are generally published as bulletins, of which there are an octavo and a quarto series. Among these are those relating to international weather charts and storm tracks for the Northern Hemisphere; the results of observations with kites; and the study of the radiation of heat by the air. The headquarters of the Weather Bureau are located in a special building in Washington, D. C. The early history of this and other national weather bureaus is given in *Bulletin No. 11;* many additional details will be found in Moore. *Meteorology, Practical and Applied* (London, 1894). See also Abbe, *Aims and Methods of State Weather Services* (Baltimore, 1900)'; Bayard, *Annual Presidential Address,* before Royal Meteorological Society (London, January, 1899); Bartholomew, *Physical Atlas,* vol. iii., "Meteorology" (London, 1900). See SIGNALLING AND TELEGRAPHING, MILITARY; METEOROLOGY; WEATHER, etc.

WEATHERFORD, wĕth'ẽr-fẽrd. The county-seat of Parker County, Texas, 31 miles west of Fort Worth, on a branch of the Trinity River, and on the Texas and Pacific, the Gulf, Colorado and Santa Fe, and the Weatherford, Mineral Wells and Northwestern railroads (Map: Texas, F 3). It is the seat of Weatherford College (Methodist Episcopal, South), and has the Texas Female Seminary and Saint Joseph's Academy. There is a handsome court house. Farming, cattle-raising, and cotton-growing are important industries of the region, which also produces building stone and coal. Weatherford is the shipping point for this section, and has a cotton mill, cotton gins and a compress, bottling works, and manufactories of flour, pottery, and lumber products. Population, in 1890, 3369; in 1900, 4786.

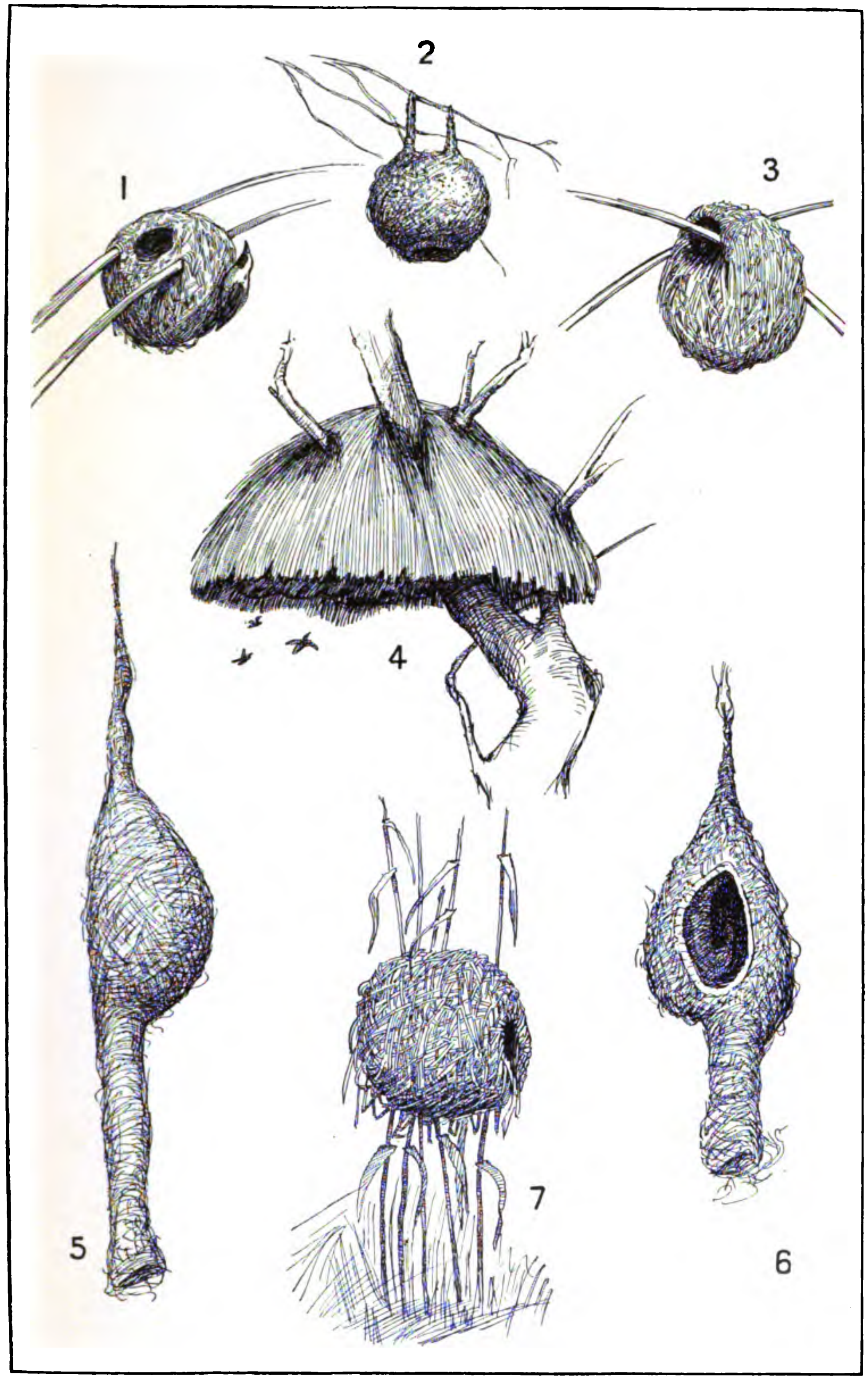
WEATHERFORD, WILLIAM (c.1780-1826). A mixed-blood chief of the Creek Indians, the leader of the hostiles in the Creek War of 1813-14. He was the son of a white father by a half-breed woman whose father was a Scotchman. He first came into prominence by leading the attack upon Fort Mims (q.v.) August 30, 1813. It is maintained, with apparent truth, that he did his best to prevent the excesses which followed the victory, and left the scene rather than witness the atrocities when he found that he could not restrain his warriors. At the battle of the Holy Ground in the following December he was defeated and narrowly escaped capture by Claiborne's troops. When the last hope of the Creeks had been destroyed and their power of resistance broken by the bloody battle of the Horseshoe Bend, March 27, 1814, in which nearly one thousand Creek warriors perished, Weatherford voluntarily surrendered to Jackson, creating such an impression by his straightforward and fearless manner that the General, after a friendly interview, allowed him to go back alone to collect his people preliminary to arranging terms of peace. After the treaty he retired to a plantation at Little River, Ala., where he passed the remainder of his life.

WEATHERLY, wĕth'ẽr-lē, FREDERIC EDWARD (1848—). An English song-writer, born at Portishead, on the Severn Estuary, October 4, 1848. He was graduated at Brasenose College, Oxford, in 1871, and was called to the bar at the Inner Temple in 1887. Beginning with *Muriel and Other Poems* (1870), he wrote a large number of widely popular songs, of which many have been set to music. Among them are "London Bridge," "The Three Old Maids of Lee," and "Darby and Joan." Among the best known of his writings are *Lays for Little Ones* (1898), and many delightful stories and sketches, such as *Wilton School* (1872), *Oxford Days* (1879), and *Two Children* (1884). He also wrote *The Rudiments of Logic* (1879) and *Questions in Logic* (1883).

WEATHER SIGNALS. See STORM AND WEATHER SIGNALS.

WEAVER, HENRY A. (1832-1903). An American actor. He was born in London, England, but was brought to the United States when a child. His début on the professional stage was made in Brooklyn in 1853. During his long

TYPES OF NESTS OF WEAVER-BIRDS



1. AFRICAN YELLOW-CAPPED WEAVER-BIRD (Ploceus icterocephalus).
2. AFRICAN SPOTTED-BACKED WEAVER-BIRD (Ploceus spilonotus).
3. AFRICAN TAHA WEAVER-BIRD (Euplectes taha).
4. COMMUNITY NEST OF AFRICAN SOCIAL WEAVERS (Philetærus socius).
5. ASIATIC YELLOW WEAVER-BIRD or BAYA SPARROW (Ploceus Philippinus).
6. THE SAME, with the side cut away to show the chambered interior.
7. LONG-TAILED WHYDAH-BIRD (Vidua paradisea).

career he supported 'Lotta' (playing Quilp in her *Little Nell and the Marchioness*, Boston, 1866), Mme. Janauschek, J. B. Booth, Tommaso Salvini (with whom he played Iago), Mrs. Langtry, Julia Marlowe, Stuart Robson (with whom he played Doctor Johnson in *Oliver Goldsmith*), and other well-known stars. His last part was that of the Duc de Brissac in *Du Barry*, with Mrs. Carter, which he played till the illness that ended with his death, in Philadelphia. He left a son, Henry A. Weaver, Jr. (1858—), also an actor. Consult Clapp and Edgett, *Players of the Present* (New York, Dunlap Society Publications, 1901).

WEAVER, James Baird (1833—). An American politician, born at Dayton, Ohio. He graduated at the Ohio University Law School at Cincinnati in 1856, then removed to Iowa, and there began the practice of his profession. During the Civil War he enlisted in the Second Iowa Volunteers, eventually became colonel of the regiment, and in 1865 was brevetted brigadier-general of volunteers. From 1866 to 1870 he was district attorney for the Second Judicial District of Iowa, and from 1867 to 1873 was an assessor of the United States internal revenue. For a time he edited the *Iowa Tribune* at Des Moines. He was active in the organization of the National Greenback Party, was elected to represent that party in Congress in 1878, and in 1880 was its candidate for the Presidency, receiving a popular vote of 308,578. In 1884 and 1886 he was again elected to Congress by a fusion of Democrat and Greenback votes, but was defeated in 1888. In 1892 he was the candidate of the People's Party for the Presidency, receiving 22 electoral votes, and a popular vote of 1,041,028. In 1901 he became Mayor of Colfax, Iowa. He published *A Call to Action* (1892).

WEAVER, Jonathan (1824-1901). A bishop of the United Brethren in Christ. He was born in Carroll County, Ohio; entered the university in 1847 and became bishop in 1865; in 1893 he was made emeritus. He wrote much for the Church organ, *The Religious Telescope*, and published several volumes, including *Universal Restoration Not Sustained by the Word of God* (1878) and *A Practical Comment on the Confession of Faith of the United Brethren* (1892). Consult the biography by Thompson (Dayton, 1902); and Berger, *History of the United Brethren in Christ* (Dayton, 1897).

WEAVER-BIRD. The popular name for a group of birds, forming the family Ploceidæ, very similar to the finches. The name has reference to the remarkable structure of the nests of these birds, which are woven in a very wonderful manner of various vegetable substances. About 250 species of Ploceidæ are known, of which 200 are found in Africa, and the remainder in tropical Asia, the Philippines and other East Indian islands, and in Australia. They are small birds, with a strong conical bill, sometimes coral red. The claws are large and very long. The wings are pointed, the first quill remarkably short. The plumage is frequently handsomely colored, many of the South African species being black and red, orange, or yellow, and some of them are much like the American orioles. There is great diversity in the form and appearance of the nests constructed by different species. One of the best-known species is the yellow weaver (*Ploceus Philippinus*), the baya (q.v.) of India. Many of the other weaver-birds construct nests pretty much on the same plan with this—pouches elongated into tubes, entered from below; those of some are kidney-shaped, and the entrance is in the side. They are very likely to suspend their nests in the same way from the extremities of branches, and often prefer branches which hang over water, probably as affording further security against monkeys, squirrels, snakes, and other enemies. Social habits are prevalent among them, and many nests of the same species are often found close together. Some of them attach the nest of one year to that of the year preceding, as certain Madagascan species, which sometimes thus makes five nests in succession, one hanging to another. Some of the African species build their nests in company, the whole forming one structure. Thus, the social weaver-birds (*Philetærus socius*) of South Africa construct in communities an umbrella-shaped roof in a tree, beneath which as many as 300 bird-homes are sometimes sheltered. An acacia with straight, smooth stem, such as predaceous animals cannot easily climb, is often selected by the bird-community. The birds begin by constructing the roof, which is made of coarse grass, each pair afterwards building their own nest, which is formed in an excavation on the under side of the 'roof.' As new nests are built every year, the weight of the structure often becomes so great as to break down its support. The wax bills, Java sparrows, nutmeg-birds, African oxpeckers, and other species elsewhere described belong to this large family, and make remarkable nests, often in communities. The widow-birds (q.v.) are closely related to them. See Plate of Nests of Weaver-Birds.

WEAVER'S-SHUTTLE SHELL. A smooth, usually white gastropod, related to the cowry (q.v.), whose aperture is drawn out into a long canal at each end. The foot is narrow and adapted for clasping the round stems of the alcyonarian coral Gorgonia on which the mollusk feeds. The best-known species is *Ovulum volva.* The genus contains many species inhabiting all warm seas, and the group is sometimes called 'China shells.'

WEAVER'S SHUTTLE SHELL.

WEAVING (from *weave*, AS. *wefan*, OHG. *weban*, Ger. *weben*, to weave; connected with Gk. ὕφος, *hyphos*, web, Skt. *ūrṇavābhi*, wool-spinner, spider). The art by which yarns or threads of any substance are interlaced so as to form a continuous web, the threads being in two groups running at right angles to each other. The threads running throughout the length of the web are the *warp*; those interlacing with it transversely are the *filling-threads* or *woof.*

The operation is performed by hand in a machine called a *hand-loom* and by power in the *power-loom.* (See Loom.) The warp-threads are arranged on a warp-beam and set up in the loom, having been arranged on the various loom-harnesses and passed through the interspaces of the loom-reed—usually before the warp is placed in the loom—and after being stretched tight from the warp-beam placed at the back to the cloth-roll in front are ready to be woven.

There are three underlying principle movements in the weaving of textile fabrics: First, the 'forming of the shed' is accomplished in various ways, but results in separating the warp-threads into two or more series which may be raised or depressed, leaving a horizontal space through which the filling is 'picked,' either by the hand of the weaver or the mechanism of the loom, completing the second movement; by the third movement the thread left in the shed is 'beaten up' by the action of the lathe or batten which carries the reed.

The process of weaving is simply a continual repetition of these three movements in the order named.

The simplest form of weaving was that employed in making the mats of uncivilized nations. These consisted of single untwisted fibres, usually vegetable, arranged side by side to the required width, the length being governed by the length of the fibres themselves; these were tied at each end to a stick so arranged that the fibres were kept straight, and on the same plane. The weaver then lifted up every other of these longitudinal threads and passed under them a transverse thread which he first attached by tying or twisting to the outermost fibre of the side commenced with and afterwards in the same way to that on the other after it had been passed through the whole series. The acquisition of the art of spinning threads of any length enabled more advanced nations to give greater length to the warp threads, which after being arranged in parallel lines between two beams and held in position by parallel tree-trunks, to which they were secured, were ready for the weft-yarn, which, secured to a stick or threaded into a needle, was woven in and out of the warp threads by hand, as in the more primitive basket-weaving. The development of the modern loom and its mechanism is described in detail in the article LOOM.

Up to the end of the eighteenth century weaving was performed wholly by hand-looms; these were usually operated by the weavers in their own homes, and the fabrics produced were usually made from yarns spun by the weaver or some member of the family. About the middle of the eighteenth century machinery for spinning yarns began to be improved so that there came a demand for an improved loom; the result was the production of a power-loom in 1785 by Dr. Edmund Cartwright, which came into successful operation in weaving-sheds or factories in the early part of the nineteenth century. The development of the industry has been attended by some of the most wonderful mechanical inventions. The result is the automatic production by machinery of fabrics rivaling if not surpassing the most elaborate and costly made by hand with far greater rapidity and a greater degree of perfection.

WEAVES. While there are innumerable arrangements, called *weaves,* for the interlacing of the warp and filling threads in weaving various textile fabrics, these arrangements are all based on three primary weaves, illustrated in Figs. 1, 2, and 3, technically called the *plain, twill,* and *satin* weaves, respectively. Practically all other arrangements are made by variations or combinations of these three.

In Figs. 1, 2, and 3, the horizontal lines A represent the *loom-harness* with the disposition of the warp threads on same; the *weave* is shown at B written out on squared design or cross-section paper, each section representing the crossing of a warp and filling thread and the X marks showing that the warp is above the filling at the point they appear; the blank sections show that the filling is above the warp; the threads as interlaced are shown at C and a section of the fabric cut through the warp is shown at D. The *plain weave* (Fig. 1) is the simplest form of weaving, requiring but two different movements of the warp threads. Four repeats of the weave in warp and filling are shown. From an examination of the several diagrams it will be seen that the movements of threads marked 1 are identical and of threads marked 2, while all alike, are exactly opposite to the movement of the former; this makes it possible to arrange the warp for the loom on the harness frames, as at A, and by raising No. 1 and depressing No. 2 the shed is formed while the first *pick,* or shot, of the filling is passed through, then harness No. 1 is depressed and No. 2 raised and the second filling thread is passed through the new shed; the third shed is like the first, the fourth like the second, and the weave repeated forms the fabric with the plain weave. Patterns in this weave can only be produced by the use of threads of different colors or material. It is not only the simplest but the firmest and strongest of weaves.

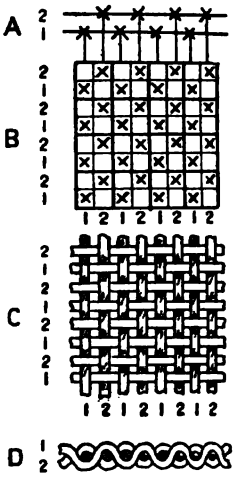


FIG. 1. PLAIN WEAVE.

The *twill weave,* as illustrated in Fig. 2 by one of the simplest forms, is a weave in which the filling threads pass over or under two of more adjacent warp threads at a time, at least once in a repeat, each of the picks being alike except that each is stepped one thread to the right or the left of the one preceding it. The simplest twills may be woven on three harness and are technically 'one up and two down,' $\frac{1}{2}$, or 'two up and one down,' $\frac{2}{1}$, twills, the former being a

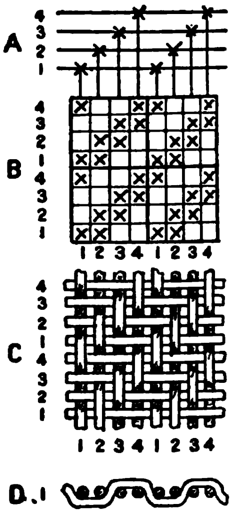


FIG. 2. TWILL WEAVE.

'filling-face' and the latter a 'warp-face' weave as the warp or filling predominates on the face. The next twills are the four harness twills, ${}^{3}_{1}$, ${}^{1}_{3}$, which are warp face and filling face weaves respectively, and ${}^{2}_{2}$, which is 'even-sided;' the twill used in the diagrams under Fig. 2 is a ${}^{2}_{2}$ twill. The twill weave is distinguished by having a distinct wale, or diagonal pattern, and by changing the number of threads taken up a great variety of twill weaves may be produced. Twill weaves are designated as *right twills* and *left twills*, as the diagonal, when traced from the bottom of a piece of cloth held lengthwise, leads to the right or left respectively. The twill shown in Fig. 2 is a right twill. By various arrangements of the twill weaves, curved twills or weaves may be formed instead of plain diagonals. By drawing the warp threads in different ways on the loom-harness fancy weave effects are produced, such as the 'herring-bone,' where a section of right twill and a section of left twill alternate.

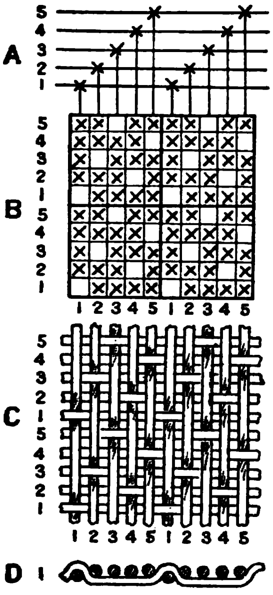


FIG. 3. SATIN WEAVE.

The third of the primary weaves is the *satin weave;* this produces a smooth-faced fabric and is distinguished from the twill in that the warp interlaces with the filling at points distributed over the surface, differing from the stepping of the twill in which the stitching follows closely. The simplest satin weave is produced with five harness and is used in Fig. 3 to illustrate this class of weaves; an examination of the diagram shows that the stitching of the warp-threads to the filling is so distributed that no two intersections are adjacent; and in order to make a smooth surface the warp-threads stitch down to but one filling thread in a repeat of the weave. The weave as shown produces a warp-faced fabric, while the warp, being thrown on the back by being raised above but one filling thread in a repeat, forms a filling-faced fabric. Satin, sateens, and similar fabrics are produced with the satin weave.

Damask weaves are combinations usually of warp and filling-faced satin, the pattern effects being produced by using the warp-faced satin for the ground and the filling-faced satin for the figures.

One very important division of weaving is the production of fabrics of more than one system of warp and filling. In some instances the extra warp or filling is introduced to produce special figured or corded effects; in others to produce what is called *double cloth.* True double cloth consists of two sets of warp and filling interlacing separately to form a face and a back cloth, but with occasionally interwoven threads to bind the two cloths into one fabric. There are also fabrics formed with two systems of warp and one filling interlacing with and thrown between them; and others both faces of filling interlacing with a single system of warp, which they cover. Fabrics for men's wear, *piqués, quiltings, bed-spreads, tapestries,* so called, and other *hangings* are woven on the double-cloth principle.

The weaving of *pile fabrics* is usually accomplished by the use of two systems of warp and one of filling so arranged in the loom that small wires are inserted in the shed under the pile-warp-threads to be raised, then these threads are lowered and interlaced with the other warp and filling; and the process repeated, the wires being withdrawn after a half dozen or so have been woven in, leaving the pile of *loop-pile* fabrics, such as *Brussels* carpet, *Turkish* or *Terry* toweling, standing: for velvets, plushes, and *cut-pile* fabrics the rods are often supplied with a knife at one end, so that as they are withdrawn the loop is cut to form the pile, otherwise it is cut by hand.

Corduroy, velvets, velveteens, and *figured velvets* are woven on the filling-pile principle by having one system of warp and two of filling; the ground filling is interlaced closely with the warp, while the pile filling is allowed to float across several threads of warp at a time and the floats afterwards are cut to form the pile. The *figured-pile* effects are produced by cutting part of the pile and leaving the balance in loops or a different weave, the contrast between the cut and uncut-pile being marked.

Lappet weaving consists of the ornamentation of a fabric by the introduction of a special warp which is made to cross small sections of the regular warp and is manipulated by the lappet or needle attachment of the loom in such a manner that it is stitched down first on one side then on the other of the figure it is to produce.

Swivel weaving is accomplished by a special attachment described in the article LOOM. The *swivel* introduces a special filling to form figures on the face of the fabric—usually at a distance one from another—and while the result is similar to that secured by lappet weaving much more elaborate effects can be produced, as the warp threads may be manipulated to bind the filling in a weave which, while causing it to predominate on the face of the fabric, does not make it float as in the lappet weave, where the figuring thread is bound down only at the right and left sides of the figure to be produced, with no intermediate stitches. By the use of a tier of shuttles in the swivel attachment several colors may be introduced in the figure, as when weaving a fabric where the ground may be figured in an all-over pattern of leaves or vines produced by the regular warp and filling, and the flowers are scattered over the surface and blended of two or three different colored threads by the swivel attachment. The great advantage of producing figured effects by lappet or swivel weaving over the use of a regular warp or filling is that in the latter the warp or filling floats from figure to figure on the back of the fabric, there being as many floating threads as there are threads in the figure, and these threads must be trimmed off after weaving, causing a great waste of material, while in the former mode of weaving the special warp or filling floats from figure to figure in but a single thread.

As has been explained, there must be as many harness-frames used in weaving a fabric as there are threads or series of warp-threads which interlace with the filling by different movements, and as the space in the loom usually limits the number of harness to not exceeding 24 frames, it must be the object of the designer or weaver to reduce the weave to the smallest number of harness possible to get the best results. A simple illustration of this feature of weaving is shown in Fig. 4. The weave B repeats itself on 12 threads and could be woven on 12 harness, but the number of harness may be reduced to four by drawing all threads which have like movements on the same harness as designated at A. The same principle is applied to more elaborate patterns where the weave may repeat on 100 or more warp threads and could be reduced, by the special *drawing-in,* to a number of harness which can be handled in the loom. In the harness looms the movements of the various harness are governed either by cams or a pattern-chain which is so arranged that as it passes over a small intermittently revolving cylinder the bars of the chain, which are supplied with a roll, or small cam, for each harness that is to be raised, act on certain levers which control the harness and raise or lower them according to the arrangement of the harness-chain. Diagram C in Fig. 4 is the plan for the harness-chain to produce the weave B when the warp is drawn in the harness as at A.

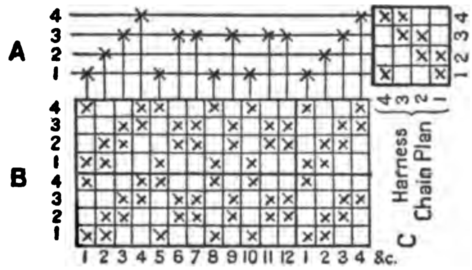


FIG 4. DRAWING-IN DRAFT AND HARNESS—CHAIN PLAN.

For patterns where the warp threads interlace with so many different movements that the weave may not be reduced as above, the patterns must be produced in a loom supplied with the Jacquard machine, which is a special head motion or harness motion and is fully described in the article LOOM.

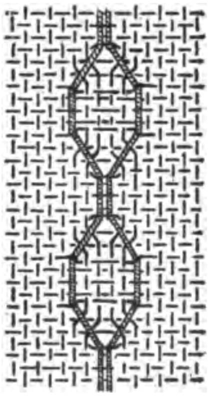


FIG. 5. SIMPLE LENO EFFECT.

In addition to the several classes of weaving already described there is the weaving of gauze or open-work fabrics in what are called *Leno* effects, in which certain of the warp threads are made to cross over or twist part way around each other instead of running parallel throughout the length of the fabric. The cross-over threads may cross one thread or over several and interlace with the filling for one or more picks, then cross over on the face of the cloth to interlace on the opposite side of the ground threads. This kind of weaving cannot easily be described briefly, but an examination of Fig. 5 will show a simple effect produced in this manner; the single lines represent the warp and filling threads interlacing in the plain weave, while the cross-over threads, creating the *Leno* effect, are designated by the heavy lines. On account of the difference of the take-up of the warp threads because of some running parallel and others crossing from side to side, it is often necessary to arrange the warp threads for the loom on two or more warp-beams, that they may be allowed to unwind and weave up at different speeds.

Consult: Ashenhurst, *Weaving and Designing of Textile Fabrics* (London, 1887); Posselt, *Textile Machinery Relating to Weaving* (Philadelphia, 1901); Barlow, *The History and Principles of Weaving by Hand and by Power* (London, 1879); Posselt, *Jacquard Machine Analyzed and Explained* (Philadelphia, 1893). See LOOM; TEXTILE MANUFACTURING; COTTON; WOOL; etc.

WEBB, ALEXANDER STEWART (1835—). An American soldier and educator, born in New York City. He graduated at West Point in 1855; was assistant professor of mathematics there in 1857-61; and during the Civil War served in the defense of Fort Pickens, at the first battle of Bull Run, and in the Peninsular and Maryland campaigns, and was made a brigadier-general of volunteers in June, 1863. At Gettysburg his brigade played a conspicuous part in repelling Pickett's famous charge. He commanded a division in the Rapidan campaign, and a brigade in the campaign of the Wilderness; was severely wounded at Spottsylvania; and acted as chief of staff to General Meade after his return to active service. In August, 1864, he was brevetted major-general of volunteers for his services at Gettysburg and in the Wilderness campaign, and in March, 1865, was brevetted brigadier-general in the Regular Army for his services in the last campaign against General Lee, and major-general for his services during the war. In December, 1870, at his own request, he was honorably discharged. From 1869 until 1903 he was president of the College of the City of New York. He published *The Peninsula: McClellan's Campaign of 1862* (1882).

WEBB, CHARLES HENRY (1834—). An American author, born at Rouse's Point, N. Y. He ran away to sea in his youth, was on the staff of the New York *Times* in 1860-63, and, having in the latter year gone to California, there founded *The Californian,* which he edited until 1866. He subsequently contributed to the New York *Tribune* humorous articles over the signature John Paul. His publications include *Liffith Lank* (1867), *Saint Twel'mo* (1868), *John Paul's Book* (1874), *Parodies, Prose and Verse* (1876), and *Vagrom Verse* (1889).

WEBB, GEORGE JAMES (1805-87). An American musician and teacher, born near Salisbury, England. In 1830 he settled in Boston, Mass., where in 1836 he became co-founder of the Boston Academy of Music and in 1840 president of the Handel and Haydn Society. He taught for several years in New York and Orange, and together with Lowell Mason (whose daughter he married), edited and arranged many musical publications.

WEBB, James Watson (1802-84). An American journalist. He was born in Claverack, N. Y. In 1819 he entered the United States army as second lieutenant of artillery, was stationed in the West, and in 1827 resigned his commission. In 1827 he became the editor of the New York *Morning Courier*, and having united with this the *Enquirer*, edited the *Morning Courier and New York Enquirer* until 1861. He was in 1843 appointed engineer-in-chief of the State of New York, with rank of major-general, and in 1861 Minister and Envoy Extraordinary to Brazil. In 1865 he negotiated the secret treaty with the French Emperor for the removal of French troops from Mexico, and in 1869 resigned. After his return from Brazil he lived in New York till his death. He published: *Altowan, or Incidents of Life and Adventure in the Rocky Mountains* (1846); *Slavery and Its Tendencies* (1856); and *National Currency*, a pamphlet (1875).

WEBB, John Richmond (c.1667-1724). An English general, born probably at Rodbourne Cheney, Wiltshire, an old possession of the family. He distinguished himself under Marlborough at Blenheim and at Oudenarde, where he commanded the left. He became brigadier-general in 1704 and major-general in 1706. His clever victory at Wynendaele in 1708 over a French force three times as large as his own was credited by the Whigs at home, notably Addison, to Cadogan, a junior officer, an injustice which heightened rather than lowered the popularity of Webb, who readily took the cue from his Tory friends and played the part of one persecuted for politics' sake. In 1709 he became lieutenant-general and was severely wounded at Malplaquet. From 1712 to 1715 he was general and commander of the land forces in Great Britain, but the Whigs turned him out, and in 1722 by charging him with membership in a Jacobite society forced his retirement from public life. His character as the big, handsome soldier and simple politician is excellently portrayed in *Henry Esmond* by Thackeray, who through his paternal grandmother was descended from Richmond Webb, the General's second cousin.

WEBB, Samuel Blatchley (1753-1807). An American soldier, born at Wethersfield, Conn. He was educated under the supervision of his step-father, Silas Deane, early joined the Patriot Party, and as lieutenant in the Second Connecticut Company, joined the Continental Army at Cambridge. He served with great gallantry and was wounded at Bunker Hill, and on July 22, 1775, became aide-de-camp to General Putnam, with the rank of major. In 1776 (June 21st) he was chosen by Washington as his private secretary and aide, with the rank of lieutenant-colonel, and as such wrote the order (July 9) for promulgating the Declaration of Independence in New York City. He participated in the battles of Long Island, White Plains, Trenton, and Brandywine, being wounded at White Plains and Trenton, and on December 10, 1777, during an expedition to Long Island, was taken prisoner. Exchanged in December, 1780, he was transferred to the Third Connecticut Regiment in January, 1781, and in September, 1783, was brevetted brigadier-general. He was one of the sixteen officers who on June 19, 1783, founded the Society of the Cincinnati. In 1789 he removed to Claverack, N. Y., where he died.

WEBB, Sidney (1859—). An English author and barrister, born in London. He was educated in Switzerland, Germany, and at the City of London College. In 1878 he entered the English civil service, where he was employed in many capacities. He was called to the bar in 1885. He became a lecturer in the London School of Economics and Political Science and a member of the senate and the economic faculty of London University. His publications include: *Socialism in England* (1890); *The London Programme* (1891); *The Eight Hours Day* (1891), which he wrote in conjunction with Harold Cox; and *Labor in the Longest Reign* (1897). More important, however, are *The History of Trade Unionism* (1894), and *Industrial Democracy* (1897), written in collaboration with his wife. The *History*, which is based upon an extensive survey of original trade union records, is the most complete work extant on the progress of English labor organizations. *Industrial Democracy* aims to show the structure and spirit of the contemporary trade union world. His wife, Beatrice Potter Webb, became known for her minute knowledge of working class life obtained from a careful study of social conditions in Lancashire and East London, where she assisted Charles Booth in his great investigation of *The Labor and Life of the People*. In 1888 she gave her experiences in sweating dens to the House of Lords' Committee on Sweating. Besides collaborating with her husband, she published *The Coöperative Movement in Great Britain* (1891).

WEBB, Thomas (1724-96). A British soldier and Methodist lay preacher. Of his early life little is known except that he was a man of wealth and education. He was for several years lieutenant of the Forty-eighth Regiment of Foot. He lost an eye and nearly lost his life in the storming of Louisburg, Nova Scotia, 1758; was one of the few officers surviving with Washington from Braddock's defeat, 1755; and scaled the Heights of Abraham with Wolfe, 1759. He was converted under the preaching of John Wesley, 1765, united with the Methodists and began preaching. Soon after, when the John Street Church was erected in New York City, in 1768, he was one of the chief contributors. At this time being placed on the retired list, though with full pay, he began the life of an itinerant. When Saint George's was purchased in Philadelphia he helped this church also with a liberal contribution. In 1772-73 he visited England to secure aid for the struggling churches and preached in England and Ireland. He returned to England with the last preachers who left America at the breaking out of the War of the Revolution. He settled at Portland, near Bristol, but preached everywhere as opportunity offered. He labored among the French prisoners at Winchester, 1776-82, and also among the sailors of Portsmouth. He was a liberal contributor to the beautiful Portland Chapel, built in 1792, and was buried under the chancel of this church.

WEBB, Thomas E. (1827—). An English judge, born at Cornwall, and educated at Kingswood School and Trinity College, Dublin. He became professor of moral philosophy in the University of Dublin in 1857, regius professor of laws in 1867, and public orator in 1879. For several years he was examiner in law at the University of New Zealand. He published *The Intellectualism of Locke* (1857), *The Veil of Isis* (1885), and *The Irish Land Question* (1886).

WEBB CITY. A city in Jasper County, Mo., 160 miles south of Kansas City, on the Missouri Pacific and the Saint Louis and San Francisco railroads (Map: Missouri, B 4). It is chiefly important as a mining centre, being situated in the lead and zinc district of southwest Missouri. There are more than two hundred mining plants in operation in the city and vicinity. Other establishments include a large foundry, iron works, a flour mill, etc. The government is vested in a mayor, chosen biennially, and a unicameral council. Population, in 1890, 5043; in 1900, 9201.

WEBBE, wĕb, William. An English author, who seems to have been active between 1568 and 1591. He was educated at Saint John's College, Cambridge, where he made the acquaintance of Gabriel Harvey and Edmund Spenser, and graduated B.A. in 1573. About ten years later he became a private tutor in the household of Edward Sulyard of Flemyngs in Essex. There he composed *A Discourse of English Poetrie* (1586; reissued in E. A. Arber's *English Reprints*, London, 1870). The work is of interest for the light it throws upon contemporary literature and canons of criticism. To it are appended the first two eclogues of Vergil in hexameter verse.

WEB'BER, Charles Wilkins (1819-56). An American journalist and explorer, born in Russellville, Ky. He was one of the Texas Rangers and saw much of the wild frontier life. Afterwards he studied medicine and then theology, but abandoned both professions and became connected with the *New World*, the *Democratic Review*, and the *Sunday Despatch* in New York City. He organized an expedition to the Colorado and Gila Rivers in 1849. In 1855 he went to Central America. He was killed in Nicaragua, while a member of Walker's filibustering party. He wrote *Old Hicks, the Guide, or Adventures in the Comanche Country in Search of a Gold Mine* (1848), *The Gold Mines of the Gila* (1849), *Tales of the Southern Border* (1852), and *Shot in the Eye* and *Adventures with the Texan Rifle Rangers* (1853).

WEBER, vā'bĕr, Albrecht (1825-1901). A German Orientalist. He was born at Breslau; studied at the universities of Breslau, Bonn, and Berlin, 1842-45, devoting himself especially to Sanskrit; visited England and France in connection with his studies, 1846; returned to Germany and was privat-docent at the University of Berlin, 1848-56. In 1856 he became professor of Indian languages and literature, holding this position until his death. Among his works the most important are his edition of the *White Yajur Veda* (1849-59); *Indische Studien* (1849-85); *Akademische Vorlesungen über indische Litteraturgeschichte* (2d ed. 1876, translated by Zachariae and Mann, London, 1878); *Verzeichnis der Sanskrithandschriften der königlichen Bibliothek zu Berlin* (1853-92); a translation of Kalidasa's drama *Mālavikāgnimitra* (1856); an edition of Hala's *Saptaśataka* (1881); *Indische Streifen* (1868-79); and numerous briefer contributions to Oriental periodicals. He also contributed much lexicographical material, especially from Vedic literature, to the *Sanskrit-Wörterbuch* of Böhtlingk (q.v.) and Roth (q.v.) (Saint Petersburg, 1852-75).

WEBER, Ernst Heinrich (1795-1878). A German physiologist and anatomist, born at Wittenberg. He studied medicine at Wittenberg and Leipzig, and was appointed professor of comparative anatomy at Leipzig in 1818, professor of human anatomy in 1821, and, in addition, professor of physiology in 1840. His principal works are *Anatomia Comparata Nervi Sympathici* (1817); *De Aure et Auditu Hominis et Animalium* (1820); *Wellenlehre* (with his brother Wilhelm, 1825); *Zusätzen zur Lehre vom Bau und von der Verrichtung der Geschlechtsorgane* (1846); *Der Tastsinn und das Gemeingefühl*, in Wagner's *Handwörterbuch der Physiologie* (vol. iii., pt. ii., 1846; also published separately, 1851); and an important collection of shorter essays and monographs, entitled *Annotationes Anatomicæ et Physiologicæ* (1851). Weber is well known for his discoveries in anatomy, notably that of the existence of a rudimentary uterus in male mammals, but his greater fame rests upon his pioneer work in the exploration of the sense organs. His work upon the ear and upon the cutaneous senses—pressure, temperature, and what was then called the 'space sense'—gave the deciding impulse to the introduction of the experimental movement into psychology. The important generalization which bears his name (see Weber's Law) was the first valid generalization in psychophysics.

WEBER, Georg (1808-88). A German historian, born at Bergzabern, in the Rhenish Palatinate. He studied at Erlangen, in 1839 became a teacher in the High School of Heidelberg, and from 1848 to 1872 was its director. Among Weber's historical publications may be mentioned *Geschichte der englischen Reformation* (1845-53); *Weltgeschichte in übersichtlicher Darstellung* (1866); *Geschichte des Volkes Israel* (with Holtzmann, 1867); and *Allgemeine Weltgeschichte für die gebildeten Stände* (1857-80).

WEBER, Karl Julius (1767-1832). A German writer born at Langenburg, in Württemberg. He received his education at Erlangen and Göttingen, and after some time passed in Switzerland, became, in 1792, private secretary to the Count of Erbach-Schönberg, whom he left in 1799 to accept the post of Government councilor at König in Odenwald. Until 1804 he filled various administrative offices, retired then to private life, but from 1820 to 1824 was a member of the popular chamber of the Württemberg Estates. Weber is best known for his writings, in which he displays a fresh, original spirit, fine powers of observation, and a talent for witty satire. He was largely influenced by the humanistic teachings of the French literature and philosophy, but his reading was wider than France and his sympathies were cosmopolitan. The most celebrated of his works is *Demokritos, oder hinterlassene Papiere eines lachenden Philosophen* (1832-40), which is still very popular in Germany. He also wrote *Möncherei* (1818-20), more clever than reliable; *Das Ritterwesen* (1822-24); and *Deutschland, oder Briefe eines in Deutschland reisenden Deutschen* (1826-28). His collected works were published at Stuttgart in 1834-45.

WEBER, Karl Maria von (1786-1826). A famous German composer, born at Eutin, Oldenburg, December 18, 1786. His musical training began at a very early age. His father, a shiftless musician, was anxious to make him a musical prodigy like Mozart and exhibit him for profit. Up to 1880 he received lessons from his stepbrother Fritz; J. P. Heuschkel at Hildburghausen, who grounded him thoroughly in piano playing; Michael Haydn at Salzburg; and at Munich, from Valesi in singing, and Kalcher, under whose direction he composed his first opera, *Die Macht der Liebe und des Weines*, the score of which, with other youthful compositions, was accidentally burned. At Freiberg in Saxony Weber produced in November, 1800, an opera, *Das Waldmädchen*, which failed, however, of lasting success there or elsewhere. The impulse to the composing of operas so early in his career came from his association with stage life through his father's wandering troupe. At Salzburg, where the family was again in 1801, his third opera, *Peter Schmoll und seine Freunde*, was privately heard at the house of his teacher, Michael Haydn; subsequently it was given at Augsburg. Important for Weber was his association as pupil and friend with Abbé Vogler at Vienna in 1803. In 1804, through Vogler's influence, he was appointed kapellmeister at Breslau. In 1806 he accepted the post of private secretary to Duke Louis of Württemberg. At Stuttgart, in 1810, preparations for the production of his opera *Silvana* were interrupted by his arrest at rehearsal. His father was charged with having misappropriated money. To shield him, Karl Maria took the disgrace upon himself, and both were banished. He went to Mannheim and Darmstadt and completed his comic opera *Abu Hassan* (1810). Weber had no important appointment until 1813, when he was called to Prague as conductor of the Landständisches Theater. Among the singers he engaged was Caroline Brandt, whom he had heard at a performance of his *Silvana* in Frankfort and with whom he now fell in love. Upon their marriage (1817) Caroline, though in her prime, left the stage and devoted her life to him. Her influence on Weber was beneficial in the highest degree. In the same year Weber, owing to the mark he had made in Prague, was called to Dresden as conductor of the opera. His work here as conductor was of the highest importance to the cause of German opera, notwithstanding that he often was obliged to overcome the prejudices of the King, and the intrigues of the Italian party, headed by Morlacchi, the conductor at the Italian opera.

A chance discovery of Apel's *Gespensterbuch* in Dresden led him to take up the subject of the *Freischütz*, and Friedrich Kind wrote a libretto for him. The composer worked three years on the score, though not uninterruptedly, since his *Invitation à la valse* (dedicated to his wife) and other minor works, besides his *Jubilee Mass* and *Preciosa*, were written during this period. *Der Freischütz* was the first musical work brought out at the new Schauspielhaus, Berlin, where it was produced under Weber's direction, June 18, 1821, and achieved such a triumph as rarely has fallen to any stage work. Throughout Germany its success was equally great, and in London it was performed at three theatres simultaneously. His *Euryanthe*, produced in Vienna in 1823, was less successful there, but was received with acclamation in Dresden and Leipzig and especially in Berlin. But consumption began to make inroads upon his strength, and it was with a desperate desire to provide for his family that he accepted Charles Kemble's offer of £1000 to compose *Oberon* and direct its production in London. *Oberon* was produced at Covent Garden, April 12, 1826, and was received with unbounded enthusiasm. Weber survived only a few weeks, dying June 5, 1826. In 1844 his body was removed from Moorfield's Chapel to Dresden, where Wagner, who had arranged for the occasion a dirge on themes from *Euryanthe*, also pronounced a funeral oration.

Weber's *Freischütz* struck a national note, and through it he became the founder of the romantic school of German opera. His influence on Wagner was very marked. The finale of the first act and the march in the second act of *Tannhäuser*, and the first finale in *Lohengrin*, besides minor passages in both these works, show unmistakably the influence of Weber in structure. Wagner's admiration for Weber was unbounded and Weber's use of the so-called *Tomb Motive* in *Euryanthe* is believed to have had considerable influence on Wagner in shaping his system of leading motives. Weber's *Leyer und Schwert* are among the most spirited German patriotic songs, and several of his piano works, notably the *Invitation à la valse*, the E flat major *Polonaise*, and the *Concertstück* for piano and orchestra, are brilliantly effective.

Bibliography. The best biographies of Weber are Jähns, *C. M. von Weber, eine Lebensskizze* (Leipzig, 1873), and the one by his son, Max Maria von Weber, *C. M. von Weber, ein Lebensbild* (Leipzig, 1864-68). Consult also the works by Rau (Leipzig, 1865); Benedict (New York, 1881); Reissmann (Berlin, 1886); Curzon, *Musiciens du temps passé* (Paris, 1893); and Gehrmann (Berlin, 1899).

WEBER, Max Maria von (1822-81). A German civil engineer, son of the composer Karl Maria von Weber. He was born in Dresden and received his early training in the schools of that city. Part of his experience was gained under Brunel and Stephenson in England. In 1850 he entered the civil service of his native kingdom. In 1870 he went to Vienna, where he did much toward the extension of Austrian railways. In 1878 he was called in a similar capacity to Berlin. Outside of his official duties Weber found time for considerable writing, in the line of general literature as well as on technical matters. Among his works may be cited: *Schule des Eisenbahnwesens* (1857); *Karl Maria von Weber; ein Lebensbild* (1864-66); *Die Praxis des Baues und Betriebs der Sekundärbahnen* (1873); *Nationalität und Eisenbahnpolitik* (1876); and the posthumous *Vom rollenden Flügelrad* (published by M. Jähms, with biography, 1882).

WEBER, Theodor (1836—). A German Old Catholic bishop. He was born at Zülpich, studied at Bonn, Munich, and Breslau, and became a priest in 1860. He was made professor of philosophy at Breslau in 1872. He was active in the Old Catholic movement from its beginning, and in 1890 removed to Bonn and was appointed vicar-general by Bishop Reinkens. Five years later he was consecrated assistant bishop, and on Reinkens's death in 1896 he succeeded him as bishop. He has written much in relation to the Old Catholic movement and in philosophy and metaphysics.

WEBER, Wilhelm (1804-91). A German physicist. He was born at Wittenberg, and was educated at Halle. In 1825, in association with his brother, Ernst Heinrich Weber, he published *Die Wellenlehre*. He became assistant professor of physics at Halle in 1827, and professor at Göttingen in 1831. He was one of the seven professors of Göttingen who were removed in 1837 for having protested against the violation of the Constitution. He held the chair of physics at Leipzig, 1843-49, when he was restored to his former position at Göttingen. While living in that city he became acquainted with Gauss, and in 1833 they jointly devised an electro-magnetic telegraph. They also founded the Magnetic Union and made many observations on terrestrial magnetism. An important achievement of Weber's is the introduction of the absolute system of electrical units modeled on the work of Gauss, who first devised such a system of units in his experiments in magnetism. Weber determined the value of the practical units in absolute measure and at the International Electrical Congress held at Paris in 1881 his system with certain modifications was adopted and the volt, ampere, coulomb, and farad were defined. Weber's works were published by the Göttingen Academy of Science in 1892. A biographical sketch entitled *Wilhelm Weber*, by Heinrich Weber, was published at Berlin in 1893.

WEBER'S LAW. In psychology, the formula expressing the relation of sensation to intensity of stimulus. In 1834 E. H. Weber proposed the theorem that the ratio of the increment of stimulus necessary to give a noticeably different sensation to the original stimulus is constant, or, as he expressed it, $\frac{V-U}{U} = C$, where V is the comparison stimulus, U the standard stimulus, and C a constant. The principle may be briefly termed that of the constancy of the relative difference limen (see Limen); it can be more explicitly stated in other forms, e.g. (a) if sensations increase in intensity by equal amounts, their stimuli increase by relatively equal amounts; (b) the difference which is relatively the same for stimulus is absolutely the same for sensation; or (c) the intensity of the stimulus increases in geometrical ratio as the intensity of the apperceived sensation increases in arithmetical ratio. The validity of this theorem was confirmed by Gustav Fechner by the use of other psychophysical methods (Weber had used that of minimal changes; see Psychophysics); he extended its range to other sense departments and gave it the name Weber's law. Since Fechner's time the investigation of the applicability of the law has been carried on by many experimenters, and its significance is attested by its prominence in the literature of psychophysics. Wundt gives a résumé of its applicability as follows: The law has its most satisfactory application and its widest range in noise intensities; it has a less extended application in the modalities of vision, pressure, movement, taste, and smell; its validity in temperature and organic sensation is yet uncertain. In all modalities there are variations from the law at small and at great intensities. For quantitative results, see Intensity of Sensation.

When a stimulus acts upon the organism and its intensity is consciously noted, four factors may be distinguished, viz. stimulus, excitation, sensation, and apprehension, or apperception of the sensation. Now the facts of Weber's law show that somewhere in this series of steps there is an 'inertia' or lag. Accordingly, in the formulation of a theory of intensity, it is possible to assign the position of the discrepancy to one of three places—between stimulus and excitation, between excitation and sensation, or between sensation and apperception; these interpretations furnish respectively the physiological, psychophysical, and psychological interpretations of Weber's law.

(1) The psychophysical view was historically first. Fechner held that the logarithmic relation which characterizes the law prevails not between physical processes themselves, but between physical and psychical processes. We have no access to the final term of the physical series, the cortex, and hence we are compelled to state the logarithmic relation in terms of stimulus and sensation, i.e. s (sensation) $= C$ log. r (stimulus); but we have reason to suppose that, except at the upper and lower limits of intensity, the cortical excitation is directly proportional to the intensity of the stimulus, and hence we can pass from 'external' to 'internal' psychophysics, and state the relation as $s = C$ log. E (excitation).

(2) The physiological formulation is that of G. E. Müller, who considers the sensation to be directly proportional to its cortical excitation, while the 'inertia' is traceable to the behavior of nerves under excitation, to loss of energy in transmission, etc. The formula is thus $s = E = C$ log. r.

(3) The psychological interpretation has taken three forms: the theories of Wundt, Ziehen, and Meinong.

(*a*) Wundt says that there are instances (method of mean gradations) in which sensation is directly proportional to its stimulus, and a single instance of this sort is enough to controvert the physiological interpretation. For Wundt, Weber's law is only a special case of the more general psychological principle of 'relativity.' Intensities are always judged relatively; we estimate the intensity of a sensation always with reference to some other intensity. This comparison of intensities is a matter of apperception.

(*b*) Ziehen replaces 'apperception' by 'association.' A certain number of increments of intensity are added together till finally the verbal judgment, 'greater,' results by a process of association. If the original stimulus be large, it takes a relatively greater increment to call forth the judgment.

(*c*) Meinong contends that too much emphasis has been put upon 'just noticeable differences;'

such differences may not be equally great or equally noticeable. We must distinguish between difference and 'differentness' or diversity. In an arithmetical series one obtains an expression of the former category, in a geometrical series an expression of the latter. The mind takes note of diversity, not of difference; e.g. it notes not that an intensity difference of 2 less 1 equals one of 101 less 100, but rather that the relation of 2 to 1 is like that of 200 to 100.

BIBLIOGRAPHY. Delbœuf, *Examen critique de la loi psychophysique, sa base et sa signification* (Paris, 1883); *Eléments de psychophysique, générale et spéciale* (Paris, 1883); Fechner, *Elemente der Psychophysik* (1860; new ed., Leipzig, 1889); *In Sachen der Psychophysik* (Leipzig, 1877); *Revision der Hauptpunkte der Psychophysik* (Leipzig, 1882); G. E. Müller, *Grundlegung der Psychophysik* (Berlin, 1878); Fullerton and Cattell, *On the Perception of Small Differences* (Philadelphia, 1892); Külpe, *Outlines of Psychology* (London and New York, 1895); Meinong, *Zeitschrift für Psychologie* (1896, xi., 81, 230, 353); E. H. Weber, *Der Tastsinn und das Gemeingefühl*, in Wagner's *Handwörterbuch der Physiologie*, iii. (1851); *Annotationes Anatomicæ* (Leipzig, 1846); Wundt, *Grundzüge der physiologischen Psychologie* (Leipzig. 1893, i., 332); *Philosophische Studien*, ii. (1885, 1); Th. Ziehen, *Introduction to Physiological Psychology* (Eng. trans., London, 1892, 49-60): *Leitfaden der physiologischen Psychologie* (4th ed., Jena, 1898).

WEB'STER. A town, including several villages, in Worcester County, Mass., 16 miles south by west of Worcester, on the French River, and on the New York, New Haven and Hartford and the Boston and Albany railroads (Map: Massachusetts, D 3). It has a public library with more than 5400 volumes. Woolen goods are extensively manufactured. The government is administered by town meetings, held annually. The town owns and operates the water-works. Population, in 1890, 7031; in 1900, 8804. Webster was created out of parts of Oxford and Dudley, and was incorporated in 1832. Consult Ammidown, *Historical Collections* (New York, 1874).

WEBSTER, ARTHUR GORDON (1863—). An American physicist, born at Brookline, Mass., and educated at Harvard and at Berlin, Paris, and Stockholm. In 1895 he was awarded the Thompson prize (Paris) of five thousand francs for experimental research on the period of electrical oscillations. He became professor of physics at Clark University, and besides numerous papers on physics, he wrote *A Mathematical Treatise on the Theory of Electricity and Magnetism* (1897), and *Dynamics of Particles of Rigid, Elastic, and Fluid Bodies* (1903).

WEBSTER, BENJAMIN NOTTINGHAM (1797-1882). An English actor, manager, and playwright. He was born at Bath; made his début at Warwick, and after playing in the provinces for a time appeared in London in 1819. In 1820 he became a member of the company at Drury Lane; in 1829 of that at the Haymarket, which he managed from 1837 till 1853. He became lessee of the Adelphi Theatre in 1844 and controlled it till his retirement in 1874. As an actor he was noted for his versatility. He created many rôles, three of his best being those of Triplet in *Masks and Faces* (Haymarket, 1852), Penn Holder in *One Touch of Nature*, written by himself (Adelphi, August, 1859), and Robert Landry in *The Dead Heart* (Adelphi, November, 1859). Among the numerous plays which he wrote were the adaptations of the *Cricket on the Hearth* and the *Bird of Passage*. Consult: Scott, *The Drama of Yesterday and To-Day* (London, 1899); Matthews and Hutton, *Actors and Actresses of Great Britain and the United States* (New York, 1886).

WEBSTER, DANIEL (1782-1852). An American statesman, orator, and constitutional lawyer. He was born in Salisbury (now Franklin), N. H., January 18, 1782, studied for a few months at Exeter Academy in 1797, then was under the care of a private tutor for a short time, after which he entered Dartmouth College, graduating in 1801. After his graduation he began the study of law in an office at Salisbury, served for a few months as principal of the Fryeburg (Maine) Academy, then resumed his legal studies at Salisbury and in 1804 removed to Boston and entered the law office of Christopher Gore as student and clerk. In 1805 he was admitted to the bar and began practice at Boscawen, but in 1807 removed to Portsmouth, where he soon acquired distinction. Having become something of a political pamphleteer and public speaker, Webster was in 1812 elected by the party opposed to the war with England to a seat in Congress and was reëlected in 1814. He was placed on the important Committee of Foreign Relations, and while acting with the anti-war party, he did not go to the extreme lengths which some of the New England Federalists did in their opposition to the Administration. His speeches against the embargo and in favor of strengthening the navy, on the currency, the bank, and the tariff, were among the ablest delivered in Congress, but in several instances they did not exhibit the broad nationalism of which he afterwards became the foremost advocate. In 1816 Webster removed to Boston, and for nearly seven years devoted himself to the practice of law. He soon rose to the position of one of the foremost advocates of the country and appeared in many of the famous cases of the day, among them the Dartmouth College and the Girard Will cases. (See DARTMOUTH COLLEGE CASE.) In 1820 he served as a delegate to the convention called to revise the Constitution of Massachusetts and took a conspicuous part in the work of that body. In the same year he delivered the oration at Plymouth in commemoration of the landing of the Pilgrims; this was followed in 1825 by an oration on the occasion of the laying of the corner-stone of the Bunker Hill Monument and by a eulogy on Adams and Jefferson in 1826—three addresses which established his fame as one of the great orators of the time.

In the meantime, in 1822, Webster had been elected to Congress from the Boston district, and was twice reëlected by a practically unanimous vote. As chairman of the Judiciary Committee he was instrumental in securing a codification of the criminal jurisprudence of the United States. He made notable speeches on the Greek Revolution and in opposition to the protective tariff measure of 1824. In 1827 he was elected to the United States Senate. He now abandoned his opposition to protective tariffs and became a supporter of the measure of 1828 known as the tariff of 'abominations.' In 1830 his fame as an orator reached its culmination in his reply to the speech of Robert Y. Hayne (q.v.), Senator from South Carolina, on the nature of the Union and right of nullification. In this epoch-making oration Webster successfully combated the theory of nullification and ably vindicated the nationalist view of the Union. His argument was later supplemented and reënforced in debate with Calhoun. In the controversy over the renewal of the charter of the United States Bank, Webster advocated renewal and opposed Jackson's financial policy in general. Upon the organization of the Whig Party, Webster became one of its leaders, and in 1836 received the electoral vote of Massachusetts for President. In the Presidential campaign of 1840 he took an active part, and upon the election of Harrison was appointed Secretary of State, a position which he retained under Tyler. In this capacity he managed, with tact, the cases growing out of the McLeod and *Creole* affairs (qq.v.) and brought to a successful conclusion the negotiations with Lord Ashburton chiefly for the settlement of the northeast boundary dispute with Great Britain. (See WEBSTER-ASHBURTON TREATY.) He now retired from the Cabinet, chiefly on account of President Tyler's break with the Whigs, declined a reëlection to the Senate, and resumed his law practice in Boston.

In 1844 he was again suggested for the Presidency, but his following was small, and in the succeeding year he reëntered the Senate as the successor of Rufus Choate, in which capacity he opposed the annexation of Texas and the war with Mexico. Webster greatly desired the Whig nomination for the Presidency in 1848, and was sorely disappointed at the nomination of Taylor, pronouncing it as 'one not fit to be made.' He at first declined to support Taylor's candidacy, but later ably defended the Whig Administration. His last years in the Senate were devoted to efforts to preserve the Union and maintain peace between the North and the South by means of compromise. His last great speech and one of the most notable of his life was that delivered in the Senate, March 7, 1850, on the Compromise Measures of 1850, in which he rebuked the North for agitating the slavery question and for violating the Fugitive Slave Law, and advocated concessions to the South. The speech aroused indignation at the North, where it was said that he was truckling to the South in order to gain support in his candidacy for President. Upon the succession of Fillmore to the Presidency in 1850, Webster became Secretary of State. Again in 1852 he was disappointed in not receiving the Whig nomination for the Presidency, refused to support the candidacy of General Scott, and took no part in the campaign. He returned to Marshfield in September, and there, after a brief illness, he died on October 24th. His only surviving son, Fletcher, was killed at the battle of Bull Run in 1861.

Webster's private correspondence in two volumes was published at Boston in 1857. A standard *Life* is that of George T. Curtis (Boston, 1870). Other biographies were prepared by Lodge (ib., 1883), Scudder (ib., 1882), and McMaster (New York, 1902).

WEBSTER, JOHN (c.1580-c.1640). One of the greatest of English dramatists, best known for his tragedy *The Duchess of Malfi.* Of his life little has come down to us. As early as about 1601, he began to write for the stage, collaborating with the group of writers which included Drayton, Munday, and others. His alterations to Marston's play of *The Malcontent* appeared in 1604. With Dekker he collaborated in the two comedies *Westward Hoe* and *Northward Hoe*, which were produced in the winter of 1604-05, and printed in 1607. Much of his early work, however, is irrecoverably mingled with that of inferior men. His own peculiar powers were first fully revealed in the tragedy of *The White Devil,* or *Vittoria Corombona,* which was printed in 1612, having been acted some time before. This is one of his two masterpieces. *Appius and Virginia,* which was acted a few years later, is a tragedy based upon the familiar Roman story, and was well received, but is comparatively commonplace. The 'tragi-comedy' of *The Devil's Law Case* is not only in parts excessively coarse, but is inferior in construction. In the same year with this (1623) was first printed *The Duchess of Malfi,* which had been played in 1616. The accumulation of horrors which gather about the end of the unhappy lady of Amalfi produces an intensity of impression that amply justifies Charles Lamb's well-known comment: "To move a horror skillfully, to touch a soul to the quick, to lay upon fear as much as it can bear, to wean and weary a life till it is ready to drop, and then step in with mortal instruments to take its last forfeit; this only a Webster can do." Of his more recent critics, Swinburne unhesitatingly places him next to Shakespeare among English dramatists. Gosse gives him a slightly lower place. In 1624 Webster wrote a Lord Mayor's pageant. He has been identified, doubtless erroneously, with a man of the same name who afterwards wrote works of a quite different character, but this is the latest date that can be positively given in his life. His death has been variously set, from 1625 to 1652. Consult: Dyce, ed., *The Works of John Webster, now First Collected, with Some Account of the Author, and Notes* (London, 1830; new ed., rev., ib., 1859); Hazlitt, ed., *The Dramatic Works of John Webster,* with an introduction (ib., 1857); Symonds, ed., *The Best Plays of Webster and Tourneur, with an Introduction and Notes* (London, 1888); Vopel, *John Webster: Researches on His Life and Plays* (Bremen, 1887); Hazlitt, *Lectures on the Dramatic Literature of the Age of Elizabeth* (3d ed., London, 1840); Gosse, *Seventeenth Century Studies* (ib., 1883); Swinburne, *Studies in Prose and Poetry* (ib., 1894).

WEBSTER, JULIA AUGUSTA (1837-94). An English poet, known as Augusta Webster, born at Poole, in Dorsetshire. Her father, Vice-Admiral George Davies (1800-76), settled at Cambridge (1851), and she attended classes there in the school of art and read extensively. In 1863 she married Thomas Webster, Fellow of Trinity College. In 1870 they settled in London, where Mrs. Webster took an active part in educational affairs, being twice elected a member of the school board. She had wide culture and a great command of rhythmic effects. Her most important volumes of verse are: *Dramatic Studies* (1866); *Portraits* (1870); and the poetic dramas, *Disguises* (1879), *In a Day* (1882), and *The Sentence* (1887). In 1881 she published the interesting *Book of Rhyme*, in which she introduced into English verse the Italian peasant songs called *rispetti*. She also made admirable translations of the *Prometheus Bound* of Æschylus (1866), and the *Medea* of Euripides (1868). After her death appeared an incomplete sonnet sequence under the title *Mother and Daughter* (1895). Her original essays on social and literary themes, originally contributed to the *Examiner*, were collected in *A Housewife's Opinions* (1878). For a selection from her poems, consult Miles, *Poets and Poetry of the Century* (London, 1892).

WEBSTER, Noah (1758-1843). An American lexicographer. He was born in Hartford, Conn. He entered Yale in 1774, served under his father, a captain of militia, in 1777, and then returned to college and graduated in 1778. From 1779 to 1781 he taught school in Hartford and studied law, but receiving no encouragement to practice, opened, in 1782, a classical school at Goshen, N. Y., where he began the preparation of school books. In 1783 he returned to Hartford and published a spelling-book, grammar, and reader, under the title of *A Grammatical Institute of the English Language* (1783-85). He also published Governor Winthrop's *Journal;* contributed in 1783 to the *Connecticut Courant* a series of papers signed Honorius in defense of the soldiers' pay bill; published in 1784 *Sketches of American Policy*, advocating the formation of a new constitution, and in 1786 traveled in the South to procure the enactment of State copyright laws. In 1787 he became superintendent of an Episcopal academy in Philadelphia, and when the Constitutional Convention closed published a pamphlet entitled *Examination of the Leading Principles of the Federal Constitution*. In December, 1787, he established in New York *The American Magazine*, but discontinued it after a year and returned to Hartford in 1789. After some years of successful practice as a lawyer he returned to New York in 1793, where he started a daily newspaper, *The Minerva*, and a semi-weekly edition of *The Herald* for the support of the national administration. These names were afterwards changed to *The Commercial Advertiser* and *The New York Spectator*. In 1795 he wrote for *The Minerva* a series of able articles under the signature of Curtius in defense of Jay's treaty with England, concluded the previous year. In 1798 he removed to New Haven, and published *A Brief History of Epidemics and Pestilential Diseases* (1799); *Historical Notices of the Origin and State of Banking Institutions and Insurance Offices* (1802); *Rights of Neutral Nations in Time of War* (1806); *A Compendious Dictionary* (1802); and *A Philosophical and Practical Grammar of the English Language* (1807); and began the preparation of his *American Dictionary of the English Language*. After devoting ten years to the study of the English language he began his dictionary anew, spent two months in Paris in 1824 and eight at Cambridge, England, and returned to America in 1825 to complete his great work, the first edition of which was published in 1828.

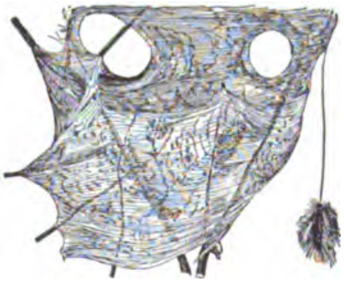
From 1812 to 1822 Webster resided at Amherst, Mass., where he aided in founding Amherst College. He was for several years president of its board of trustees, and also represented Amherst in the State Legislature. He had previously represented New Haven in the Connecticut Legislature and had been a judge of one of the State courts. He returned to New Haven in 1822, where he died, May 28, 1843. Among Webster's works, exclusive of his *Dictionary*, were: *Dissertations on the English Language* (1789); *The Revolution in France* (1794); *Letters to Dr. Priestly* (1800); *Origin, History, and Connection of the Languages of Western Asia and of Europe* (1807); *Letters to a Young Gentleman Commencing His Education* (1823); *Manual of Useful Studies* (1832); *History of the United States* (rev. ed. 1838); and *A Collection of Papers on Political, Literary, and Moral Subjects* (1843). His *Synopsis of Words in Twenty Languages*, written about 1817, has never been published. See the memoir by Goodrich prefixed to the later editions of the dictionary (last ed. 1890), and Scudder, *Noah Webster* (Boston, 1882).

WEBSTER, Sir Richard Everard, first Baron Alverstone (1842—). An English jurist. He was educated at Trinity College, was called to the bar in 1868, and became Queen's counsel in 1878. He represented the Isle of Wight in Parliament from 1885 to 1900, and was Attorney-General in 1885-86, 1886-92, and 1895-1900. In 1900 he was raised to the peerage, and in the same year was appointed Lord Chief Justice. He represented England before the Venezuelan Commission, in 1893 was associated with Sir Charles Russell in the Bering Sea Arbitration case, and also appeared on behalf of the *Times* before the Parnell Commission. In 1900 he was made Master of the Rolls.

WEBSTER-ASHBURTON TREATY, commonly called the Ashburton Treaty. A name given to the treaty concluded at Washington between the United States and Great Britain in 1842. In 1838-39 the dispute over the northeastern boundary had almost brought on a war between the two countries, but a conflict had been averted by a temporary arrangement which provided for joint occupation of the territory in dispute by both parties. In an attempt to arrive at a permanent settlement of this and other points at issue, Great Britain in 1841 sent Lord Ashburton to Washington, where, after some months spent in negotiations with Daniel Webster, then Secretary of State, the two at length, on August 9, 1842, signed an agreement, which was afterwards ratified by both governments. Ratifications were exchanged in London on October 13th, and on November 10th the treaty was formally proclaimed. The treaty provided for the free navigation of the Saint John's River by both nations; gave about seven-twelfths of the 12,000 square miles of territory in dispute, as well as Rouse's Point, N. Y., and some other doubtful territory in New Hampshire, to the United States; and contained a stipulation that, in consideration of the losses sustained by Maine and Massachusetts, the Federal Government should pay these States the sum of $300,000. The treaty further provided for the mutual extradition of criminals, and contained a 'cruising-convention' clause, which bound each nation to keep a squadron off the coast of Africa for the suppression of the slave trade. Other questions, such as the Oregon boundary, the *Caroline* affair, and the *Creole* case, were passed over in silence. A curious feature of the negotiations leading up to the treaty was that each nation secretly had in its possession a map that was unfavorable to its own claims. The Americans withheld one that had recently been discovered in the Paris archives and that was supposed to have been marked by Franklin in 1782; the British withheld one made by Oswald, one of the commissioners who had negotiated the peace which had given the United States its independence. Later each Government made use of the unfavorable map in its possession to convince its people that it had secured a good bargain. The text of the treaty is given in Macdonald, *Select Documents Illustrative of the History of the United States, 1776-1861* (New York, 1898). Consult: Curtis, *Life of Daniel Webster* (2 vols., New York, 1870); and Schouler, *History of the United States* (6 vols., New York, new ed. 1899). See NORTHEAST BOUNDARY DISPUTE.

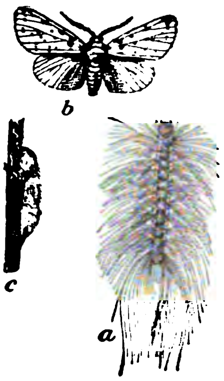
WEBSTER CITY. The county-seat of Hamilton County, Iowa, 72 miles north by west of Des Moines, on the Illinois Central, the Chicago and Northwestern, and the Crooked Creek railroads (Map: Iowa, D 2). It has the Kendall Young Library with about 4000 volumes, the Jacob Funk Hospital, and a handsome courthouse. The city is the commercial centre of a region engaged in farming and dairying and having stone quarries and deposits of coal. There are shops of the Crooked Creek Railroad, and manufactories of canned goods, rugs, cigars, bricks and tiles, brooms, iron products, stock food, and felt shoes. The government is vested in a mayor, chosen biennially, and a unicameral council. The water-works and the electric light plant are owned and operated by the municipality. Webster City was settled in 1857. Population, in 1890, 2829; in 1900, 4613.

WEBWORM (*web*, AS. *web*, OHG. *weppi*, *wappi*, dialectic Ger. *Webb*, Ger. *Gewebe*, web, from AS. *wefan*, OHG. *weban*, Ger. *weben*, to weave; connected with Gk. ὕφος, *hyphos*, web, Skt. *ūrṇavābhi*, wool-spinner, spider + *worm*). Any one of several lepidopterous larvæ which spin webs, and either live gregariously in large colonies or occupy single webs. The commonest of the webworms is the 'fall' webworm, the larva of *Hyphantria textor*. The adult is a rather small, pure white moth, sometimes spotted with black. It lays its eggs in clusters of four to five hundred upon the leaves of many kinds of trees. The caterpillars on hatching live together, each colony spinning a web which grows with the growth of the larvæ, and which may eventually include all the leaves of a good-sized limb. Upon reaching full growth the larvæ leave the web and crawl down the trunk to spin their cocoons. There are two generations each year, and the insect hibernates in the pupal condition. When numerous it is abundantly parasitized, many ichneumon flies and chalcis flies laying their eggs in the growing caterpillars. Burning the webs at nightfall or in dark weather, when the caterpillars are close together, is often practiced, a torch being used. Compare TENT CATERPILLARS.



WEB OF FALL WEBWORM.
With one of the suspended caterpillars.

The sugar-beet webworm is the green and black striped larva of a pyralid moth (*Loxostege sticticalis*). It feeds upon the leaves of the sugar beet, transforming to a pupa in May after passing the winter underground in a long silken tube. The imported cabbage webworm is the larva of another pyralid moth (*Hellula undalis*), which occurs throughout the Gulf region in the United States, and which is also found in the Mediterranean, Ethiopian, and Oriental regions. The moths lay their eggs in small batches on the leaves upon the under sides of which the larvæ feed, concealing themselves with a silken web to which their excrement is attached. There are two generations each year. Cabbages and turnips are the favorite food, but radishes and beets are also attacked. An early trap-crop of collards or radishes is recommended to be planted and sprayed with an arsenical poison.



FALL WEBWORM.
a, Caterpillar of *Hyphantria cunea*; *b*, spotted form of moth; *c*, cocoon.

WECKHERLIN, vĕk'hĕr-lēn, GEORG RUDOLPH (1584-1653). A German poet. He was born at Stuttgart, studied jurisprudence at the University of Tübingen, and entered the diplomatic service of Württemberg. After serving as secretary to Duke John Frederick (1614-c.20) he removed to England, where he served (1624-41) as an Under-Secretary of State. At the outbreak of the Civil War he chose the side of Parliament and from 1644 to 1649 held the position of 'secretary for foreign tongues.' Upon his retirement he was succeeded by John Milton, and in 1652 was appointed assistant to the latter, but continued in office only a few months and died in London the following year. Weckherlin's German poems are for the most part imitated from the works of the French Pleiade, especially from Ronsard, or from English writers like Samuel Daniel. He ranks as foremost of the poets before Opitz who tried to introduce Renaissance forms and feelings into German verse. His lyrics are poetic in tone, though hard and unwieldly in form. His chief English poems are "Triumphal Shows Set

Forth Lately at Stuttgart" (1616) and "Panegyricke to Lord Hay, Viscount of Doncaster" (1619). His collected poems were edited by H. Fischer (Stuttgart, 1893-95). Consult: Fischer, as above; Cong, *Nachrichten von dem Leben und den Schriften R. Weckherlins* (Ludwicksburg, 1803); Höpfner, *Weckherlins Oden und Gesänge* (Berlin, 1865); and Bohm, *Englands Einfluss auf Weckherlin* (Göttingen, 1893).

WECKERLIN, *Ger. pron.* věk'ĕr-lên, *Fr. pron.* vȧ'kȧr'lăN', JEAN BAPTISTE THÉODORE (1821—). A French musician, born at Gebweiler, Alsace. In 1844 he began his musical career, studying singing with Ponchard and composition with Halévy at the Paris Conservatory. In 1847 he brought out his heroic symphony *Roland*. In 1853 Weckerlin was most successful in the production of a one-act comic opera, *L'Organiste dans l'embarras*. In 1869 he was appointed assistant librarian to the Conservatory. In 1863 he produced his comic opera *Die dreifach Hochzeit im Bäsethal;* and, in 1879 *Der verhäxt Herbst*. These were both in Alsatian dialect. In 1877 he brought out the one-act opera *Après Fontenoy*. In 1876 he became Félicien David's successor as librarian at the Conservatory and published in 1885 a biographical catalogue. Later he became librarian of the 'Société des Compositeurs.' Among his works are: an oratorio, *Le jugement dernier;* the cantatas, *L'Aurore* and *Paix, charité, grandeur* (1866); the 'ode-symphonie' *Les poèmes de la mer*, for solo, chorus, and orchestra (1860); *L'Inde* (1873); and *La fête d'Alexandre*, in the same year. His *Histoire de l'instrumentation depuis le seizième siècle jusqu'à l'époque actuelle* won the gold medal of the Académie in 1875. He has gained great renown as a composer of choral works.

WED'DERBURN, JAMES (1495?-1553). A Scottish poet. He was born in Dundee, studied at Saint Andrews University, and became a merchant. He was active in the Scottish Reformation, and in 1539 fled to France to escape prosecution as a heretic, and died there. With his brothers, John (1500?-56) and Robert (1510?-57?), he wrote a work entitled *Ane Compendious Buike of Godly and Spirituall Sangs with Augmentation of sundrie gude and godlie Ballates not contenit in the first Editioun*, which appeared in 1567. The first edition referred to is unknown and it is thought that the poems may have originally appeared in broad sheets. The *Complaynt of Scotland* (1548), said to be the only classic work in old Scottish prose, has been attributed to one of the Wedderburns. The *Compendious Book* has been edited by David Laing (Edinburgh, 1868), and by Mitchell (ib., 1897); consult also the latter's *The Wedderburns and Their Work* (London, 1867).

WEDDING ANNIVERSARIES. The names given to the several anniversaries of a marriage are said to be of quite ancient origin, and arose from the gift which was regarded as the most suitable offering from the husband to the wife. The names commonly given to such anniversaries are for the first, paper; second, straw; third, candy; fourth, leather; fifth, wooden; seventh, floral; tenth, tin; twelfth, linen; fifteenth, crystal; twentieth, china; twenty-fifth, silver; thirtieth, pearl: thirty-fifth, coral; fortieth, emerald; forty-fifth, ruby; fiftieth, gold; seventy-fifth, diamond. The diamond wedding, however, is often celebrated at sixty years of married life. The others that are most frequently celebrated are the paper, wooden, tin, crystal, silver, and golden.

WEDGE (AS. *wecg*, OHG. *wekki*, *weggi*, Ger. *Wecke*, *Weck*, wedge-shaped loaf; probably connected with Lith. *vagis*, wedge). The wedge is in principle a modification of the inclined plane. A force is applied by pressure, or more generally by percussion to the back, thus forcing the edge forward. The wedge is employed for such purposes as the splitting of wood, the fastening firmly of the handle of an axe, the raising of a ship in a dry dock, etc. The investigation on statical principles of the mechanical advantage of the wedge is extremely unsatisfactory, the enormous friction on the sides of the wedge being generally neglected; the theoretical result thus incorrectly arrived at is that the force applied at the back ÷ the resistance = ½ width of back of wedge ÷ length of side. In the application of the wedge to the splitting of wood in the direction of the fibres, the split generally extends some distance in advance of the edge of the wedge, and the action of the latter is then a combination of the action of the wedge with that of the lever; in fact, this compound action is found more or less in all applications of the wedge as a cutting or splitting weapon, and tends further to complicate the statical investigation of its mechanical properties. The best and simplest illustrations of the single wedge are axes, nails, plugs, planes, chisels, needles, and all sharp-pointed instruments.

WEDGE-TAILED EAGLE. See EAGLE.

WEDG'WOOD, HENSLEIGH (1803-91). An English philologist, grandson of Josiah Wedgwood. He was born at Gunville, in Dorset, and was educated at Rugby School and Cambridge University. He is best known for his work in philology. He was one of the original members of the English Philological Society, and, in spite of his imperfect preparation, a scholar of wide learning and much natural balance. He published *The Principles of Geometrical Demonstration* (1844); *On the Development of the Understanding* (1848); *A Dictionary of English Etymology* (1857); and *Contested Etymologies* (1882). His dictionary, which attracted much attention when it was published, is not now valued.

WEDGWOOD, JOSIAH (1730-1795). An English potter, born in Staffordshire. Owing to the death of his father, who was a potter before him, his school career closed with his ninth year, and he worked at the potter's trade as apprentice to his brother until his association with Thomas Whieldon, of Fenton, a prominent potter. In 1759 he started works of his own in Burslem, himself supplying the models and mixing the clay for his workmen. His interest turned especially to the Greek or Etruscan vases, from which he copied his designs. (For his improvements in pottery, see WEDGWOOD WARE.) In partnership with Thomas Bentley, of Liverpool, he opened, in 1769, very extensive potteries at Etruria (Staffordshire), a village he had built for his workmen. After the death of Bentley Wedgwood became sole owner of the establishment. He took some part in public life, being a successful advocate of road improvement and canal extension in the pottery district. He published valuable pamphlets on pottery, was elected a Fellow of the Royal Society in 1783, and of the Society of Antiquaries in 1786. Consult: Jewett, *The Wedgwoods* (London, 1865); *Wedgwood's Memoirs* (ib., 1875); and his *Life* by Mefeyard (ib., 1875), Church (ib., 1894), and Smile (ib., 1895).

WEDGWOOD, Thomas (1771-1805). An English physicist and philanthropist, son of Josiah Wedgwood. He was born at Etruria Hall, Staffordshire, and was educated at home with the exception of a few terms at Edinburgh University. It is said that Wedgwood was the first photographer, as he was the first to discover that a silhouette of any object might be obtained when its shadow was thrown on a surface moistened with nitrate of silver. He did not, however, discover any way of fixing the images, and so was obliged to keep them in the dark. When his father died, leaving considerable property, the son aided several men, among whom was Coleridge.

WEDGWOOD WARE. The name given to various kinds of pottery, invented by Josiah Wedgwood, of Staffordshire, England. A cream-colored ware was made in the English potteries as early as 1725, which had been improved by Aaron Wedgwood and Enoch Booth, of Tunstall, and afterwards by a firm of skillful potters named Warburton. It finally fell into the hands of Josiah Wedgwood, through whom it became the recipient of the enameler's best art, and was considered worthy of the tables of the royalty. Black ware had been made in England from time immemorial, but Wedgwood's improvement was so marvelous as to amount to a creation. Wedgwood was assisted by John Flaxman, who designed their most characteristic ware. It consisted of delicately tinted ornaments of blue, brown, and various colors, on which small cameo reliefs in white paste were applied while they were soft, and were then fired. The figures are very beautiful and classical and the microscopic delicacy of the detail is astonishing. Toward the end of the eighteenth century many imitations of the Wedgwood cameo ware were made by different English manufacturers and it was copied at Sèvres, but with French designs. The numerous devices for turning out imitations of such ware cheaply and rapidly have destroyed its true art and beauty. The famous Barberini or Portland vase, reproduced from the original antique, is probably the most famous of the Wedgwood porcelain. Consult: *Wedgwood Art* (London, 1878); *The Wedgwood Handbook*, a manual for collectors (ib., 1875); and *Masterpieces of Wedgwood Ware* (ib., 1892-93).

WED′MORE, Frederick (1844—). An English art critic and miscellaneous writer, born at Clifton, near Bristol. He was educated at Lausanne and Paris. At the age of nineteen he took up journalism at Bristol, and afterwards settled in London, where he became art critic of the *Standard.* In 1885 he visited the United States to deliver art lectures at Harvard and Johns Hopkins universities. Among his many books on art are: *Studies in English Art* (two series, 1876, 1880); *Masters of Genre Painting* (1877); *Etching in England* (1895); *Fine Prints* (1896); *On Books and Art* (1899); and *Turner and Ruskin* (1900). He is perhaps more generally known for his short stories and other imaginative pieces in *Pastorals of France* (1877); *Renunciations* (1893); *English Episodes* (1894); and *Orgeas and Miradou* (1896). In 1890 he published a *Life of Balzac.*

WEDMORE, Peace of. See Chippenham.

WEDNESBURY, wĕnz′bĕr-ĭ. A municipal borough in Staffordshire, England, near the source of the Tame, 7½ miles northwest of Birmingham (Map: England, E 4). Wednesbury is the centre of a busy coal and iron mining district. Its chief industry is the manufacture of heavy iron and steel goods. The city is named after the Saxon God Woden. The site of the ancient temple dedicated to pagan worship is now occupied by a fine Perpendicular church. Population, in 1891, 25,347; in 1901, 26,544.

WEED (AS. *wīod*, *wēod*, of uncertain origin). A plant which grows wild in cultivated grounds, choking crops and exhausting the soil. Annual and biennial weeds such as charlock, pigweed, burdock, and melilot, may be destroyed by clean cultivation, as may also perennial weeds, such as couch grass, Canada thistle, ox-eye daisy, and sorrel, but by more persistent fighting. For this purpose crops which require much hoeing are advantageously planted, and recourse may be made to summer fallowing in fields and frequent weeding in gardens. Thistles and other large weeds are frequently pulled in grain fields before the ripening of the crop, and, to prevent their seeding, they are cut in pastures. Sedges and rushes, which spring up in damp grounds, disappear on thorough draining. Leafy crops, which thickly cover the soil, prevent the growth of many weeds by the exclusion of air and light. Weeds which appear in fallow grounds serve as green manure when they are plowed under. Some weeds while young can be destroyed in growing grain without injury to the crop by spraying the fields with a solution of copper sulphate or iron sulphate. (See Herbicide.) Most weeds are introduced into cultivated fields by sowing impure seed. This is one of the principal reasons for the examination and testing of seed before sowing. Clover and grass seeds are especially liable to contain weed seeds. See Seed-Testing.

WEED, Stephen Hinsdale (1834-63). An American soldier, born in New York City. He graduated at West Point in 1854, entered the artillery, and served during the second Seminole War. He was stationed at Fort Leavenworth during the border troubles in Kansas, and in 1858-60 took part in an Indian expedition, during which he participated in the skirmishes in Egan Cañon (August 11, 1860) and Deep Creek (September 6, 1860). He was promoted to be captain in the Fourth Artillery on the outbreak of the Civil War, and after serving as a recruiting officer until March, 1862, he took part in the Peninsular campaign, and later in the northern Virginia and Maryland campaigns. He was appointed chief of the artillery corps at Falmouth, Va., in December, 1862, and the next spring he participated in the Rappahannock campaign, during the latter part of which he commanded the artillery brigade of the Fifth Army

Corps. On June 6, 1863, he was promoted to be brigadier-general of volunteers, and took part in the Pennsylvania campaign until the battle of Gettysburg (q.v.) in which he was killed on July 2d, while holding a position on Little Round Top now known as Weed's Hill.

WEED, Thurlow (1797-1882). An American journalist and political leader, born at Cairo, Greene County, N. Y., November 15, 1797. At the age of fourteen years he was an apprentice in a printing office at Onondaga Hollow, N. Y.; and in the War of 1812 he served for a time as a volunteer on the northern frontier. In 1815 he went to New York City, and after a brief career in printing establishments there he engaged in several journalistic ventures in western New York, founding successively the *Agriculturist* at Norwich, and the *Onondaga County Republican* at Manlius, N. Y. He became editor of the Rochester daily *Telegraph* in 1822, of which three years later he also became the proprietor. In 1826 he retired from the management of this paper and established the *Anti-Masonic Enquirer*, and became prominently identified with the Anti-Masonic Party. He was for several years a member of the State Legislature, where he was noted for his remarkable adroitness as a political manager. In 1830 Weed removed to Albany and established the Albany *Evening Journal*, an anti-Jackson organ, which he edited with singular ability for thirty-three years, almost immediately attracting attention by his vigorous attacks upon the 'Albany Regency.' He had a wide acquaintance with public men and for many years his influence in political affairs, first as a Whig and later as a Republican, was in some respects unsurpassed by that of any man in the country. Declining to accept any offices for himself, except the profitable one of State printer, he dictated the nomination and appointment of others. It was to his management more than that of any other man that Harrison and Taylor were nominated for the Presidency in 1840 and 1848 respectively, while he took a leading part in bringing about the nomination of Clay in 1844, of Scott in 1852, and of Frémont in 1856. Throughout his long career he was an intimate friend of Seward, and for a long time was an influential member of the powerful 'political firm of Seward, Weed and Greeley,' which controlled the politics of New York State. During the Civil War he spent some months in Europe as a member of a commission charged with securing the neutrality of foreign governments. For a brief period after the war he served on the editorial staff of the New York *Times*, and from 1867-78 was editor of the *Commercial Advertiser*. In 1866 he published *Letters from Europe and the West Indies*. He died in New York City, November 22, 1882. His *Autobiography*, a useful contribution to the historical and political literature of the country, was published in 1884 (Boston), and a *Memoir* by his grandson, Thurlow Weed Barnes, appeared the same year (Boston).

WEED, Walter Harvey (1862—). An American geologist, born in Saint Louis, Mo. He graduated at the Columbia School of Mines in 1883, became a geologist on the United States Geological Survey in the same year, and from 1883 to 1889 was engaged on the geological survey of Yellowstone Park. From 1889 to 1898 he was engaged in the geological exploration of Montana, and subsequently devoted his attention chiefly to the study of economic geology, particularly of ore deposits. In 1899 he announced the theory of the secondary enrichment of ore deposits. His publications include: *Formation of Hot Springs Deposits; Glaciation of Yellowstone Valley* (1893); *Geology of Castle Mountain District; Geology and Ore Deposits of Little Belt Mountains;* and *Secondary Enrichment of Mineral Veins* (1899). He was also part author of a work on the *Geology of Yellowstone Park.*

WEE'DEN, William Babcock (1843—). An American economist and historian. He was born at Bristol, R. I., and was educated at Brown University. In 1851 he entered upon the business of woolen manufacture at Providence. He served as a soldier during the Civil War, entering the army in 1861 as lieutenant and resigning in 1862 as captain, and on his return went back to his business. He is well known for his publications in economic history: *Morality of Prohibitory Liquor Laws* (1875); *Social Law of Labor* (1882); and *Economic and Social History of New England* (1890).

WEEK (AS. *wucu*, *wicu*, Goth. *wikō*, OHG. *wohha*, *wehha*, Ger. *Woche*, week; connected with Lat. *vices*, changes, Gk. εἴκειν, *eikein*, AS. *wican*, OHG. *wihhan*, Ger. *weichen*, to yield, Eng. *weak*). A subdivision of the month, usually consisting of seven days. The origin of the week is somewhat obscure, although it may be based on the phases of the moon which are approximately seven days apart, since each quarter of the lunar month exceeds the seven-day week only by three-eighths of a day. Such was the basis of the Chinese and of the ancient Peruvian week. If, however, the week of seven days came first from Babylonia, as seems on the whole most probable, the number seven may be derived from the sun and moon with the five planets, in the order Ninib (Saturn), Marduk (Jupiter), Nergal (Mars), Shamash (Sun), Ishtar (Venus), Nabu (Mercury), and Sin (Moon). It is probable that with this astronomical basis, the influence of the wide-spread belief in the sacred prime number seven also coöperated. Furthermore, in Babylonia every seventh day of the month was an 'evil' day, on which certain things were taboo, and certain offerings were incumbent. The names of the intervening days are unknown, and the date and frequency of celebration of the day *shabattu*, devoted to the 'contentment of the heart (of the gods),' are also uncertain. Among the Jews, on the other hand, the week of seven days prevailed from the earliest times. There is here no trace of planetary influence. The names of the Hebrew days of the week are unknown, although from the analogy of the New Testament and Rabbinical usage they would seem to have been numbered from the Sabbath, so that 'four after the Sabbath' would be Wednesday. Like the Semites, the Egyptians had a week of seven days, and these were named according to the seven planets. Over each hour of the Egyptian day a planet presided, in the order of its distance from the earth according to the geocentric system, thus giving the succession Saturn, Jupiter, Mars, Sun, Venus, Mercury, Moon. If then Saturn presides over the first hour of the first day (Saturday), the twenty-fifth hour will fall to the sun, the forty-ninth hour to the moon, and so for the rest. From Alexandria this week with its system of nomenclature came to the Greeks and Romans. The Greeks had previously divided each month into three decades, while the Romans had had eight-day periods, the eight days or *nundinæ* being primarily market-days and based on the changes of the moon. The week of seven days was not officially adopted, however, until the time of Constantine. In Greece the week had been introduced by Greek-speaking Jews from Alexandria, in Rome by Chaldæan astrologers about the beginning of our era. From Rome this system spread to the Teutonic and Celtic peoples conquered by the Latins, and the names of the days of the week were translated, so that the *Dies Jovis* (French *jeudi*, Italian *giovedì*), 'day of Jupiter,' became the Icelandic *þōrsdagr*, 'day of Thor,' the English *Thursday*. From the Greeks the week was imported to India, along with much other astronomical science, so that, since Brihaspati is the Sanskrit name for the planet Jupiter, *Bṛhaspativāra* corresponds to Thursday. In India, however, the week is of little importance. Among the Iranians the month of thirty days was divided into quasi-weeks of 7, 7, 8, and 8 days each, although no special sanctity attached to the dividing days. The Islamitic peoples borrowed the week from the Jews, and like them number the days, as do also the Greeks, Slavs, Finns, and as did the French revolutionists, instead of naming them like the Latins (except the Portuguese, who retain the ecclesiastical enumeration, as *quinta feria*, 'fifth day, Thursday'), Teutons, Celts, and Albanians. In the French Revolutionary calendar, officially decreed October 3, 1793, and suppressed December 31, 1805, the months, of thirty days each, were divided into three decades each, the tenth day of each decade being a holiday. Consult: Ideler, *Handbuch der Chronologie* (2d ed., Berlin, 1883); Roesler, *Ueber die Namen der Wochentage* (Vienna, 1865); Schrader, *Reallexikon der indogermanischen Altertumskunde* (Strassburg, 1901).

WEEKS, Feast of. A name commonly given among the Jews to the second of their great festivals, from its being the culminating point of the seven weeks after the Passover, the same idea being expressed by the Greek word Pentecost (fifty). Its observance was connected with the supplication for divine blessing on the harvest, and the day was in later times supposed to commemorate the giving of the law on Mount Sinai. When the day of Pentecost became one of the earliest of the Christian festivals, an analogy was easily traced between this event and the formal organization of the Christian Church on that day.

WEEKS, Edwin Lord (1849-1903). An American painter. He was born in Boston, Mass., and studied in Paris under Gérôme and Bonnat. Early in his career he began a series of journeys to Egypt and Asia which led him to take the subjects of most of his paintings from the Orient. He received numerous French and German medals, the grand diploma of honor at Berlin in 1891, and a special medal and prize at the Empire of India Exhibition in London (1896). He was made chevalier of the Legion of Honor of France in 1896, and two years afterwards officer of the Order of Saint Michael of Bavaria. His work is represented in the Corcoran Gallery, Washington, and in the Philadelphia Academy of Fine Arts. He will be remembered especially for the brilliancy and the purity of color which characterize his genre studies of the Orient. He published *From the Black Sea Through Persia and India* (1895), and *Episodes of Mountaineering* (1897).

WEEMS, Mason Locke (c.1760-1825). An American preacher and writer, the author of a famous biography of George Washington. He was a native of Maryland, was educated for the Protestant Episcopal ministry in London, and in 1784, there being no bishop of the Church of England in America, applied, but without success, to various bishops in England for admission to holy orders. An account of his difficulties in this respect may be found in McMaster's *History of the People of the United States*, vol. i. (New York, 1900). The incident has received considerable attention from historians, as it was an important factor in the establishment in the United States of the Episcopal Church, distinct in organization from the Church of England. After Weems's return, he preached at various places, though he never seems to have had a regular rectorship, and about 1790 he became a book agent for Matthew Carey (q.v.). In order to ingratiate himself with the people, he called into requisition his powers as a mimic and comedian, and his facility as a fiddler. Thus he frequently furnished the music at country dances and weddings, and sold a small book, written by himself, entitled *The Drunkard's Looking Glass, Reflecting a Faithful Likeness of the Drunkard in sundry very interesting Attitudes with Lively Representations of the Many Strange Capers which he cuts in different Stages of his Disease* (6th ed. 1818). Weems is remembered, however, chiefly for his *Life of Washington*, one of the most popular and widely read books ever published in America, which has been largely responsible for the creation of the 'traditional Washington.' It was first published in 1800, and up to 1891 more than seventy editions had been issued. In the fifth edition (1806) first appeared various familiar anecdotes concerning Washington's youth, including that of the cherry tree and the hatchet, which have long been generally discredited by historians. He was not, as he claimed, rector of Mount Vernon Parish, as there was no such parish, but he probably preached occasionally in Pohick Church, though not until long after Washington had ceased attendance there. In addition to the works already mentioned, his publications include: *Life of Gen. Francis Marion* (1805); *The Philanthropist, or Political Peacemaker Between All Honest Men of Both Parties* (10th ed. 1809); *God's Revenge Against Gambling* (3d ed. 1816); *Life of Benjamin Franklin with Essays* (1817); *Life of William Penn* (1819); *Hymen's Recruiting Sergeant, or the New Matrimonial Tat-too for the Old Bachelors* (7th ed. 1821); and *The Bad Wife's Looking Glass, or God's Revenge Against Cruelty to Husbands* (2d ed. 1823), all of which are characterized by a stilted, turgid style, by a profusion of anecdotes, by inaccuracy of statement, and by an abundance of cheap moralizing.

WEENIX, vā'nĭks, Jan (1640-1719). A Dutch animal painter, born at Amsterdam. He was the son and pupil of Jan Baptiste Weenix

(1621-60), and his first pictures of subjects in the Roman Campagna and seaports are in the manner of his father. Under the influence of his uncle, Hondecoeter, he became an animal painter, making a specialty of dead game. He is especially celebrated for his painting of dead hares, but his pictures often contain birds and sumptuous vases, with landscape backgrounds. From 1702 to 1712 he was Court painter to the Elector at Düsseldorf, for whom he decorated the Castle of Bensberg with paintings of this character, most of which are now in the Munich Gallery. He was a very prolific painter, and nearly all the chief galleries of Europe possess his pictures, which are characterized by delicate brush work and fine color.

WEEPING PHILOSOPHER, THE. An appellation occasionally given to the Ephesian philosopher Heraclitus.

WEEPING TREE. Any one of several kinds of trees upon which leaf-hoppers (especially *Proconia undata*) and their kin congregate, usually in the early summer, and copiously discharge honeydew (q.v.).

WEEVER (variant of *weaver*), or STING-FISH. A fish of the genus Trachinus, of the spiny-rayed fishes of the family Trachinidæ, interesting because of the sharp dorsal and opercular spine by which these fishes can inflict an unpleasant wound. Two species inhabit the sandy bottoms of the European coasts, both excellent for the table. There is no evidence that their sting is poisonous.

WEEVER, JOHN (1576-1632). An English poet and antiquary. He was born in Lancashire and was educated as a sizar at Queen's College, Cambridge. In 1599 he published *Epigrammes in the Oldest Cut and Newest Fashion*, a worthless piece of work except that the references to Shakespeare, Daniel, Drayton, Ben Jonson, Marston, Middleton, and others throw light on contemporary opinion of those poets. In 1601 Weever published *The Mirror of Martyrs*, which relates to Sir John Oldcastle and enables us to date *Julius Cæsar*. His antiquarian researches, which are of great value despite their occasional inaccuracies, were embodied in a folio entitled *Ancient Funerall Monuments within the United Monarchie of Great Britaine, Ireland, and the Islands adjacent* (1631). Consult: Fuller, *History of the Worthies of England* (ed. Nuttall, London, 1840), and Lee, "John Weever," in the *Dictionary of National Biography*.

WEEVIL (AS. *wifel*, OHG. *wibal*, Ger. *Wiebel*, weevil; connected with AS. *wefan*, OHG. *weban*, Ger. *weben*, to weave, Gk. ὕφος, *hyphos*, wet, Skt. *ūrṇavābhi*, wool-spinner, spider). A name applied to many of the snout-beetles of the suborder or series Rhynchophora, and also to species of the family Bruchidæ of the series Phytophaga. The heads of the beetles of the former group, which it is said includes 25,000 species, are prolonged into a beak which in some species exceeds the length of the body. The jaws are placed at the tip of the snout, by means of which holes are drilled, and in some species the eggs pushed into place. According to Sharp only four families of snout-beetles can be accepted with certainty. Other authors subdivide the order into more than twice as many families. The commoner North American species belong to Otiorhynchidæ, Curculionidæ, Calandridæ, and Scolytidæ, the first including over 100 North American species, which are commonly known as scarred snout-beetles, because the appendage borne on the mandible of the pupa, or even of the young adult, later falls off and leaves a scar. *Aramigus Fulleri*, which is destructive to roses (see ROSE INSECTS), belongs to this family. *Epicærus imbricatus* (see IMBRICATED SNOUT-BEETLE) is destructive to trees, shrubs, fruits, and vegetables. Certain weevils of the Rhynchitidæ which in the larval stage roll the leaves of plants are the only true leaf-rollers (q.v.) among the beetles. The family Curculionidæ includes 20,000 species, among which are some of the most destructive of beetles. In this family the mandible is not scarred. The antennæ are frequently elbowed. The maggot-like larvæ are especially injurious to fruits, seeds, and nuts. Two species (*Balaninus quercus* and *Balaninus rectus*) breed in acorns; *Balaninus nasicus* in hickory nuts and *Balaninus caryatrypes* in chestnuts. *Conotrachelus nenuphar* is the cause of 'wormy' plums and cherries. See PLUM INSECTS.

To this group belong certain destructive species of the genus Anthonomus. The strawberry weevil (*Anthonomus signatus*) destroys the buds of strawberry. (See STRAWBERRY INSECTS.) The most destructive, perhaps, of the whole series, however, is the 'sharpshooter,' 'picudo,' an insect most widely known as the Mexican cotton-boll weevil (*Anthonomus grandis*), one of the largest species of its genus. This insect, whose normal habitat is Central America and the West Indies, and whose ravages stopped the cultivation of cotton in the Monclova district of the State of Coahuila, Mexico, in 1863, made its appearance in the vicinity of Matamoras about 1888, spread across the river to Brownsville, Texas, and at the close of 1902 ranged over practically all of the best cotton-growing region of Texas, where in 1901 and 1902 its ravages were estimated at about $10,000,000. The adult insect is a small, long-snouted grayish weevil less than one-quarter of an inch long. Throughout the season it punctures and lays its eggs in the squares and bolls. The larva is a fat, white maggot a little over three-eighths of an inch long when full-grown, and lives upon the internal tissues of the buds and bolls. When the square is attacked it usually drops, but most of the damaged bolls remain upon the plant and become stunted or dwarfed except late in the season, when they either dry or rot. The larva pupates within the boll, which may contain several larvæ. The adult weevils hibernate in grass, in late cornstalks, in old bolls on the cotton plants, and in piles of seed about the cotton gins, etc. They appear when the cotton begins to blossom, or earlier, and feed upon the young twigs and leaves. There are four or more generations each summer, the larvæ being found as late as December. No food-plant other than cotton is known. The infestation of a field is evident from the dropping of the blossoms. The Department of Agriculture recommends as the best remedies early planting, thorough cultivation, the planting of wide rows in order to admit the sun, and the destruction of the plants by fall plowing and fire in the autumn.

The rice-weevil (*Calandra oryza*) is economically a very important beetle, which infects stored rice. (See RICE INSECTS.) *Calandra pal-*

marum or *Rhyncophorus palmarum* is the 'palm' weevil, and does great damage to cocoa palms. Its larvæ are roasted and eaten by the natives of tropical America. (See Gru Gru.) To this group belong the bill-bugs of the genus Sphenophorus, whose larvæ live on the roots of corn and other grains and grasses. One species (*Sphenophorus obscurus*) infests sugar cane in the Pacific Islands. The Scolytidæ are the 'bark' or 'engraver' beetles, which burrow between the bark and wood of trees, or even in the wood, leaving the visible tunnels. When numerous enough they kill trees or else greatly damage the wood for commercial purposes. See Bark-Beetle; Ambrosia Beetle.

The Bruchidæ, of which there are about 700 species, are not snout-beetles, although they are commonly called 'weevils.' They are small, usually dull-colored stout beetles. The legless larvæ are fat maggots which live in the seeds of plants, mainly of the family Leguminosæ. One species (*Bruchus pisi*), which is the largest pea and bean feeding weevil found in North America, has caused the abandonment of pea cultivation in some sections of the United States. Since it does not thrive in cold countries, Canadian peas find a ready market in the United States. The eggs are laid on the very young pea-pod. The larvæ, on hatching, bore through the pod and into the pea, from which the beetle emerges in the spring. *Bruchus obtectus*, a very formidable enemy of bean culture, not only breeds in the young pod, but also in stored beans. Infested beans will float in water; they should not be planted.

Certain other beetles inhabiting flour (e.g. *Silvanus Surinamensis* of the family Cucujidæ, *Tribolium confusum* of the family Tenebrionidæ, and *Trogosita Mauritanica* of the family Trogositidæ) and stored grain have erroneously been called weevils. Even a lepidopterous insect, the Angoumois grain-moth (*Sitotraga cerealella*), is known in the Southern United States as the 'fly-weevil.' See Grain Insects.

Consult: Sharp, *Cambridge Natural History*, vol. vi. (London, 1901); Comstock, *Manual for the Study of Insects;* Chittenden, *Year Book of the Department of Agriculture* (Washington, 1898); Howard, *Circulars 6, 14, 27, 33, Division of Entomology, United States Department of Agriculture* (Washington, 1895); Hunter, *Farmers' Bulletin 163, United States Department of Agriculture* (Washington, 1903).

WEGG, Silas. A wooden-legged rascal, in Dickens's *Our Mutual Friend.* He is charitably engaged by Mr. Boffin, and attempts to rob his benefactor by a scheme of pitiless blackmail.

WEGSCHEIDER, vāG'shī-dẽr, Julius August Ludwig (1771-1849). A German theologian. He was born at Kübbelingen, Brunswick, studied at Helmstedt, became professor at Rinteln in Hesse in 1806 and at Halle in 1810. His *Institutiones Theologiæ Christianæ Dogmaticæ* (1815, 8th ed., 1844) was considered the standard exposition of German rationalism.

WEIDNER, Revere Franklin (1851—). An American theologian, born at Centre Valley, Pa. He graduated at Muhlenberg College in 1869, and at the Lutheran Theological Seminary, Philadelphia, in 1873, and became a Lutheran minister. From 1882 till 1891 he was professor of dogmatics and exegesis in Augustana Theological Seminary at Rock Island, Ill., and in 1891 was made professor of theology and chairman of the faculty in the Chicago Lutheran Theological Seminary. His publications include: *Theological Encyclopedia* (1885-91); *Biblical Theology of the Old Testament* (1886); *System of Dogmatic Theology* (1888); *Historical Theology; Christian Ethics* (1891); *Biblical Theology of the New Testament* (1891); and commentaries on the *General Epistles, Revelation,* and other books of the Bible.

WEIERSTRASS, vī'ẽr-sträs, Karl (1815-97). A German mathematician, born at Ostenfelde, in Westphalia. In 1834 he went to Bonn for the purpose of studying law and finance, but four years later he took up the study of mathematics at Münster. In 1842 he became a teacher in the Gymnasium at Münster, and in 1848 was appointed to a similar position at Braunsberg. In 1856 he became instructor in the Industrial Institute at Berlin, and in 1864 professor of mathematics at the university in that city. His works relate chiefly to Abelian integrals and differential equations, and to the general theory of functions, the modern treatment of which he may be said to have introduced. His *Abhandlungen aus der Funktionenlehre* was published in Berlin in 1886. His other works, including *Zur Theorie der Abel'schen Integrale* (1849), *Formeln u. s. w. der elliptischen Funktionen* (ed. by Schwarz, 1885), and his numerous memoirs, appear in his *Mathematische Werke,* now being published under the patronage of the Prussian Academy of Sciences (Berlin, 1894—). He also edited Jacobi's (1881-91) and Steiner's (1881-82) works.

WEIGEL, vī'gel, Valentin (1533-88). A German mystic. He was born at Grossenhain, near Dresden; studied at Leipzig and at Wittenberg, and from 1567 to his death was preacher at Zschopau, near Chemnitz. He emphasized the necessity of internal unction and illumination. His main thesis as a psychologist was that knowledge does not come from without, but from 'the eye' of the cognitive subject. In cosmology he stands near Paracelsus. Of his writings only an unimportant funeral sermon appeared before his death. His productions were published from 1604 to 1618 in various places, and Weigelianism became widely spread. His opponents represented him as a dangerous revolutionary, who aimed at the overthrow of all political and social order. Weigel's most prominent writings are: *Libellus de Vita Beata* (1609); *Ein schön Gebetüchlein* (1612); *Philosophia Theologica* (1614); *Principal und Haupttractat von der Gelassenheit* (1618); *Soli Deo Gloria* (1618). Consult: Opel, *Valentin Weigel* (Leipzig, 1864); Pünjer, *History of Christian Philosophy of Religion* (Edinburgh, 1887).

WEIGELA (Neo-Lat., named in honor of Christian Ehrenfried von *Weigel,* a Swedish physician of the early nineteenth century). A common name for certain species of Diervilla, one of which (*Diervilla florida*) was introduced into cultivation from China as Weigela rosea. There are two American species known as bush honeysuckle. The Northern species, *Diervilla trifida,* is common in the Middle and Northern States, extending to Hudson Bay and to the Rocky Mountains. It grows from 1 to 4 feet high, bears oblong-ovate petioled leaves, and pale yellow axillary flowers, usually three on a stalk. The Southern species, *Diervilla sessilifolia,* grows along the Southern Alleghanies, and has sessile leaves. The list of varieties of the foreign species, all of which are Asiatic, number only 6 or 8, but the colors of the flowers vary from white to deep rose. Among the best known are *Diervilla japonica* and *Diervilla coracensis.* All are grown in the United States, but require winter protection in the North.

WEIGHING MACHINE. A contrivance for ascertaining the weight of objects. The most common form of weighing machine is the platform scale, in which a small known weight at one end of multiplying beams is made to balance a heavy unknown weight at the other end. The principle of the unequal beam balance is simply the principle of the lever (see LEVER; BALANCE), and as applied to scales it may be illustrated by the accompanying diagram. Here we have the beam hinged at *l* and *m* and attached by a rod *no* to the scale beam *oq*. At *jkrs* is a U-shaped lever hinged to fixed pivots at *j* and *k* and to the lever *lnm* at *r* and *s*. If now we let the broken lines *a, b, c, d* represent a stiff platform, which is carried on the two levers by means of standards at *e, f, g,* and *h,* we have represented all the principal operating parts of the ordinary platform scale. To understand the mode of operation, assume that a load is placed upon the platform *a, b, c, d*. This load is conveyed to the system of levers by the standards *e, f, g,* and *h,* and depresses them so that they exert a pull downward on the rod *no* and the short arm of the lever *op*. This pull is balanced by sliding the weight *w* along the lever or scale beam *oq*, which is so graduated into pounds and fractions that the weight of the article on the platform is read at a glance. It is now plain that we have only to vary the number of levers and relative lengths of the arms of these levers to secure almost any multiplication of the weight that we please. In ordinary platform scales a weight *w* of 1 pound balances a load of 100 pounds on the platform. But this ratio is increased to 1 to 500 or to 1 to 1000 in scales for weighing loaded wagons and cars. The arrangement of levers shown in the accompanying diagram is a common one, but there are many others in use, each of which is adapted to some particular direction or use of the scale.

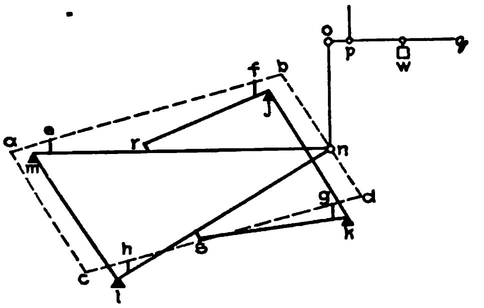


DIAGRAM OF PLATFORM SCALE.

Some scales work automatically, taking material from a large hopper, weighing out a certain amount and discharging it and then repeating the operation. Such contrivances are used for bagging sugar, coffee, etc., and for weighing out coal for sale. Scales are built which have a capacity for weighing very heavy loads; examples of these are railway car and locomotive scales, cattle scales with a capacity of weighing from 20 to 200 head of cattle, and grain scales of 500 bushels capacity and more. A scale designed for weighing heavy guns at the Watervliet Arsenal. Troy, N. Y., has a capacity for weighing 300,000 pounds on a platform 12 × 15 feet, or a capacity of nearly 1700 pounds per square foot. Besides scales operating on the principle of the balance, there are weighing machines which operate by compressing a coiled spring or by twisting a bar of metal. The spring scale is a very common device, and in the form of a dynamometer for registering the pull of locomotives is made with very large capacities. For the most part, however, spring scales are of small capacity. They are not as accurate as balance scales. See SPRING BALANCE.

WEIGHT. See MATTER.

WEIGHTS AND MEASURES. Standards of magnitude, of weight, and of value are essential for commercial and scientific purposes, and the facility with which national and international intercourse is carried on depends largely upon the uniformity of these standards. Naturally the units of measure adopted by primitive peoples were varied and imperfect, but as civilization advanced, trade increased, science developed, and more accurate standards became necessary. Their selection, whether by government action or by common consent, was left almost to chance, so that they have differed from nation to nation, from county to county, from town to town, and even from one trade or guild to another. The last two centuries, however, have witnessed a great advance in favor of uniformity. England, the United States, France, and several other nations have established uniformity in their respective territories, and the Latin nations have practically all adopted the metric system. The same advantage accruing from uniformity for one or several countries would evidently obtain if a universal system were adopted by the whole world.

The setting up of a system of measures is fraught with many difficulties. The selection, determination, construction, and copying of the standard furnish peculiar problems. The chief considerations affecting the selection of a standard are its relation to a recognized physical constant and the relative ease with which these standards may be determined. In the case of the unit of length, two constants have been favored, a fractional part of a terrestrial meridian, and the length of a seconds pendulum in a given locality. The nautical mile of 6080.27 feet or of 6080 feet is an example of the former and the seconds pendulum of 39.13+ inches an example of the latter. It is quite remarkable that the French meter, based upon the length of a meridian arc, should approximate so closely the length of the seconds pendulum. There need be no difficulty in establishing units of capacity, since these can be based upon the unit of length as exemplified in the metric system (q.v.).

In the case of the unit of weight it is necessary to select a quantity of some substance easily obtainable, and easily standardized as to quantity, purity, and density. Water is a substance which meets these requirements fairly well, and although the British system declares the weight of one cubic inch of distilled water at 62° F. to be 252.458 grains, and the metric system (q.v.) fixes the kilogram as the weight of one cubic decimeter of water at maximum density, the Anglo-Saxon still uses the troy pound and the avoirdupois pound (see below).

Although a fortunate selection be made, the determination and construction of a standard are difficult matters. The French engineers spent seven years in determining a kilometer, and even then failed to obtain 0.0001 of the earth's quadrant. The difficulties of establishing a standard pendulum and of computing the lengths of others vibrating in given times are many and great. In the first place, the experiments are made in air, and the buoyancy of the air lessens the actual weight of the pendulum. Then, since the earth has a diurnal motion on its axis, every object placed on it has a centrifugal tendency which modifies what otherwise would be its gravitation. This centrifugal tendency produces the earth's oblateness and causes a variation in the intensity of gravitation from one latitude to another. Thus a stone is actually heavier in Boston than in New York. This change in gravitation cannot be measured by a balance because the weights at each end of the balance are changed alike, but it is apparent in the motion of a clock; for a pendulum regulated to beat seconds in Washington is found to go too fast when taken to a higher latitude, and to lose time when carried nearer to the equator; and again the attraction which the earth exerts upon bodies placed near it diminishes with their distances from its centre, being inversely proportional to the squares of the distances, so that a clock carried from the bottom to the top of a hill loses time perceptibly. In addition to these niceties, there are others connected with the manipulation, such as the parallelism of the knife-edges, their bluntness, the amplitude of the oscillation, and the stability of the support, so that altogether the exact measurement of the length of the seconds pendulum is a matter of very great difficulty. (See PENDULUM.) But granted that a length be chosen and be expressed as a distance between two lines on a metal bar, the tendency to oxidize in air, to change with temperature, and to wear with handling, all combat the preservation of the standard and interfere with the process of copying.

The principles of metrology summarized above, however, are modern compared to weights and measures themselves. Before man had developed beyond the savage state he felt the need of some methods of measurement. So old is the idea that there is found in Josephus the statement that Cain invented weights and measures. Upon the idea of numbers followed closely those of time, distance, and quantity. Measurement of time has been simplified by nature, which furnished the aboriginal, as well as the modern, standard, the diurnal rotation of the earth upon its axis. A measure of distance was easily furnished in the day's journey, as the Indian of the West indicates distance by the number of repetitions of the sign meaning from sunrise to sunset. As a smaller unit became necessary, the stride, or pace, came into use, and finally, as a still smaller unit, the dimensions of parts of the body appear. Although reference is made in Deuteronomy (ii. 5) to the 'foot breadth' and the foot came into very general use in Greek, Roman, and subsequent times, nevertheless the common unit in Asia Minor and Egypt was the cubit, derived from the length of the forearm, from the point of the elbow to the end of the middle finger. In the inscriptions and records of these countries continual reference is made to this unit and its subdivisions. Among the Greeks and Romans the pace and foot came into almost universal use, and by them were handed down to subsequent Western nations. The passus became the 'pace,' the mille (passuum) the 'mile,' and the pondus the 'pound,' which appear in most European nations until the present day. Under the Roman Empire the standards were preserved in a Roman temple, and were the standards for the civilized world. With the fall of the Empire and the rise of small principalities, a chaotic condition as to standards developed which extended through the Middle Ages and thereafter, until in Italy alone, as late as the end of the eighteenth century, there were over two hundred lengths called the foot. Every little dukedom and principality had its own standards of weight and measure, and the insignificant intercourse between these small towns did not suffer from these conditions, but the maritime leagues felt the need of common standards.

An example of the method of deriving the standards in the sixteenth century in Germany is given by the following quotation from Koebel's work on surveying:

"To find the length of a rood in the right and lawful way, and according to scientific usage, you shall do as follows: Stand at the door of a church on a Sunday, and bid sixteen men to stop, tall ones and small ones, as they happen to pass out when the service is finished; then make them put their left feet one behind the other and the length thus obtained shall be a right and lawful rood to measure and survey the land with, and the sixteenth part of it shall be a right and lawful foot."

In England, we find Henry I. establishing the yard as the distance from the point of his nose to the end of his thumb, and Parliament seriously establishing standards of length and weight according to grains of wheat or barley. Doubtless, few people realize that shoes are still numbered according to the length of a grain of barley, in a system of numeration by thirteens. We have, as example of other units from the dimensions of the body, the 'fathom' (*faethm*, the embrace), the length of the two arms from tip to tip; the 'hand,' 4 inches; the 'span,' 9 inches; the 'finger,' ⅛ of a yard; the 'nail,' 2¼ inches, from the tip of the thumb nail to the base joint. Yard is derived from the word (*gyrdan*) meaning the girth of the body.

It might appear surprising that the length of the cubit should have remained rather constant so long in Egypt, but where such important buildings were constructed and such continuity of dynasties was maintained, it should not be surprising that the unit or standard of length should have remained constant, inasmuch as the standards would naturally be handed down from dynasty to dynasty, and indeed, if destroyed, could easily be recovered from the dimensions of existing buildings, just as to-day it would be possible to restore the foot from the dimensions and descriptions of existing structures. Just as a carpenter to-day might lose a two-foot rule in the wall of a house, so 3000 years ago an Egyptian stone mason lost his two-cubit rule in the wall of a temple at Karnak. Subsequent ruin and excavation brought it to light, and allowed a direct comparison with the temple dimensions. At the present day, in some parts of China, the first step toward building a house is making a measuring stick, according to which all materials are purchased and the dimensions determined. This method suffices for simple exchange.

Standards of quantity or weight seem to have developed in a still more arbitrary manner. The cuneiform tablets of Babylon tell of 'vessels' of oil and 'skins' of wine, the volume being as arbitrary as the 'jar' or 'amphora' of the Romans. For dry produce the term often means simply a heap, large or small. With the introduction of the balance, weighing became possible, and *pondus* appears, designating essentially 'a weight.' Many 'steel yards' and balances (see BALANCE) were unearthed amid the ruins of Pompeii. As the *pondus* seems to be a haphazard unit, so also is the stone (14 pounds), still used in England, and the base of such units as the hundredweight (cwt.) or 112 pounds (8 stone), and the ton of 2240 pounds or 160 stone, also the bushel of 56 pounds (4 stone), etc.

The earliest systems of linear units seem to be based upon either the cubit (20.62 inches = 52.4 centimeters) or the digit (0.73 inch, or 1.85 cm.), probably derived from the breadth of the finger. The cubit appears first in Egypt in the Fourth Dynasty, and the great pyramid yields the value above given. Nevertheless, as might be expected, considerable variation occurs, even in Egypt (20.5 inches to 20.7 inches). The cubit was divided into hundredths, but as incommensurate, approximate subdivisions the one-seventh, 'palm,' and one-twenty-eighth, 'digit,' were used. Several extant cubit rods give an average of 20.65 inches. At the Nilometers it is 20.75. As multiples of the cubit (*mahi*) the *xylon*, 3 cubits, walking staff, the *neut*, 4 cubits, and the *khet* of 40 cubits, are found along with the *schoenus* of 12,000 cubits. About the same time a similar unit appears in Babylon, especially as the half of 20.89 inches or span of 10.44 inches, or 16 digits of 0.653 inches. A cubit of 20.5 inches is derivable from various buildings in Assyria and Babylonia, where a sexagesimal system existed. In Asia Minor the cubit derived from temples appears as 20.55 inches at Ephesus, 20.62 inches at Samos, while the stadium at Laodicea gives 20.94 inches. Three-fifths of the cubit of 20.75 inches, a combination of the Egyptian decimal and the Assyrian sexary system, is the commonest of Greek derivatives (12.44 inches) occurring in the Propylæa, the Temple of Ægina, the Olympian course, etc. Other and less important derivations from the cubit occur in restricted localities or periods. The digit appeared about simultaneously with the cubit, and some confusion arose from the belief that it was one twenty-eighth of a cubit; in reality they appear to be incommensurate, although 10 digits were often indicated on cubit sticks as the 'lesser span.' Practically the same unit appears in Assyria, Persia, and Asia Minor. The common Egyptian small unit of volume was the *hon* = about 29 cubic inches. The *artaba* was the practical equivalent of the Attic metretes. The Egyptian unit of weight was the *kat* = 146 grains; 100 *kat* = 10 *uten** = 1 *tema*. In Babylonia the talent = 360 stone = 3600 shekels = 66.4 pounds. The stadion appears very early as equal to one-thirtieth of a parasang, or about 148 meters, or 485 feet, the parasang being 14,550 feet, or 2.76 miles. This is the old itinerary stadion, used in measuring distances from place to place. As examples of Greek measures of length the following may be given:

1 stadion = 6 plethra or length of a furrow.

1 plethron = 16⅔ orguia, similar to the fathom, the distance from tip to tip of the outstretched arms.

1 orguion = 4 pecheis, or cubits.

1 pechus = 1½ pous (foot).

1 pous = 1⅓ spithame (span) from tip to tip of outstretched thumb and finger.

1 spithame = 3 palaisté or handbreadth.

1 palaisté = 4 dactyloi or finger-breadth.

2 stadia = a diaulos, 4 a hippikon, and 12 a dolichos. This Attic or Olympian stadion = 184.97 meters or 606 feet.

The common Greek measure of area was the plethron or square, on the unit of length = 0.095 hectare or 0.235 acre.

Greek units of volume, Attic, were as follows for liquids:

1 metretes = 12 chous = 72 xestes = 144 kotulé = 288 tetarton = 576 oxybaphon = 864 kyathos.

1 metretes = 39.39 liters or 43.33 quarts. For dry materials.

1 medimnos = 6 hecteus (modios) = 12 hemihectons = 48 choinix = 96 xestes = 192 kotulé = 1152 kyathos; 1 medimnos = 52.53 liters or 57.9 quarts.

The Greek units of mass or weight were 1 talent. = 60 mnaè = 6000 drachmai = 36,000 oboloi = 288,000 chalkia = 26.2 kilograms = 57.7 pounds.

In the Roman system we find the foot of 29.57 centimeters or 11.64 inches, duodecimally subdivided with special names as quincunx = $\frac{5}{12}$ foot, etc., also 1 pes (foot) = 4 palmi = 16 digiti = ⅘ palmines = ⅔ cubitus, used in building: for geodetic work we have 1 actus = 12 decempeda (pertica, perch) = 24 passus = 48 gradus = 120 pedas. In traveling the following were used: A Roman mile (mille passuum) = 8 stadia = 1000 passus = 5000 pedes. The Romans used the jugerum (as) as the fundamental unit of area = 0.252 hectare or 0.623 acre. As multiples we have 1 saltus = 4 centuriæ = 400 heredia = 800 jugera; 1 jugerum = 2 actus = 8 clīma = 288 scripula (decempeda quadrata) = 28,800 pedes quadrati.

Roman units of capacity were for liquids: 576 cyathus = 384 acetabulum = 192 quartarius = 96 hemina = 48 sextarius = 8 congius = 2 urna = 1 amphora = 26.26 liters = 28.9 quarts. For dry materials 192 cyathus = 128 acetabulum = 64 quartarius = 32 hemina = 16 sextarius = 2 semodius = 1 modius = 8.754 liter = 9.62 quarts. The Roman unit of weight, the pound, was subdivided duodecimally with special names as semis ½, bes ⅔, etc., into 12 unciæ each equal to 4 sicilici = 24 scripula = 48 oboli = 144 siliquæ = 27.29 grams = 1.04 ounces.

Passing over the details of mediæval European units, it appears that in England, up to 1400, an old building foot existed, about 13.22 inches, and the mile = 79,200 inches, subdivided into 10 furlongs (100 chains) or 1000 fathoms. This fathom is half the Belgian pertica or perch, equals two yards or six feet. Unfortunately, this system was legally suppressed and gradually driven out in favor of the foot of 12 inches, which had been legally enforced as early as the tenth century. The league is a Gallic unit, and lasted in Wales = 1.56 miles, till the seventeenth century.

Prior to A.D. 950 the Saxon standards were kept at Winchester, where copies were compared and stamped. "The measure at Winchester shall be the standard," was the decree of King Edgar. Under the Normans the standards were transferred to Westminster and placed in the care of the chamberlains of the exchequer, but their dimensions were not changed. These came later to be known as 'The Standards of the Exchequer.' In 1224 the rule is laid down that: 3 barley corns = 1 inch; 12 inches = 1 foot; 3 feet = 1 ell (*ulna*); 5½ ulne = 1 perch; 40 perches long and 4 in breadth = 1 acre. The barley corns are to be dry, laid end to end, and taken from the middle of the ear. Under Henry VI., Richard II., and Anne an extra inch or 'thumb's breadth' was added to the yard for stretching, of cloth. Richard II. decreed uniformity for the kingdom "except in Lancaster, which always had larger measures."

A yard of Henry VII., dated 1490, and one of Elizabeth, 1588, are undoubtedly the oldest British standards of length, and they differ only about one hundredth of an inch from the present Imperial British yard. Still extant are also the Guild Hall yard of 1660, 'Rowley's Tower standard' of 1720, etc. In 1742 the Royal Society had an accurate yard made, called 'Graham's yard.' A committee of Parliament in 1758 had two very accurate yards made by John Bird, who made another in 1760. These were 39.73 inches long and near each end was inserted a gold plug upon which the mark was made; they were of brass rods a trifle over an inch square in cross section.

In 1797 Sir George Schuckburgh Evelyn first used a comparator by Troughton for the accurate comparison of standards. The results obtained by him are as follows:

	Year	Inches
Henry VII. standard	1490	35.924
Elizabeth standard	1588	36.015
Guildhall standard	1660	36.032
Clockmaker's Co. standard	1671	35.972
Graham's scale, by Sisson	1742	36.0013
Graham's scale, by Sisson in the Exchequer	....	35.9933
General Roy's scale, by Bird	1745–60	36.00036
Mr. Aubert's scale, by Bird	1745–60	35.99880
Royal Society's scale, by Bird	1745–60	35.99955
Bird's Parliamentary standard	1758	36.00023
Bird's Parliamentary standard	1760	36.00002

The Clerk of the House of Commons took charge of the Bird standards until they were finally adopted by Parliament under George IV. on June 17, 1824, after another exhaustive investigation by Capt. Henry Kater. The legalization went into effect January 1, 1826. The act made elaborate provision for the restoration of this standard yard from its relation to the seconds pendulum, but when the Houses of Parliament burned down in 1834, destroying these standards, a royal commission decided against the recovery of the standard from the pendulum, and proceeded to derive a new standard from the extant standards. This new standard was adopted June 30, 1855. In 1870 it was recommended that mural fixed standards be established in populous towns for easy public comparison. Bronze blocks were inserted in the granite on the north side of Trafalgar Square, London, every ten feet to one hundred, and for the chain of 66 feet, and these standards were legalized in June, 1876, by act of the Council. Frequent committees have recommended to Parliament the adoption of the metric system, but with no success as yet. England and America will adopt the metric system at nearly the same time; neither alone can get along without it.

Early in the thirteenth century it was enacted under Henry III. that there should be uniformity in the weights and measures throughout the realm, and a little later it was determined that measures of capacity should be based upon weights. Soon afterwards weights were established upon the weight of grains of wheat, as follows: 32 wheat grains = 1 penny (pennyweight); 20 pence = 1 ounce; 12 ounces = 1 pound; 8 pounds = 1 gallon; 8 gallons = 1 London bushel; 8 bushels = 1 quarter. This was known as the 'Tower pound' and was in use until the middle of the fifteenth century.

As early as the thirteenth century, the gallon appears as eight pounds of wine, and the bushel as eight gallons; also in 1452 the gallon was defined as eight troy pounds of wheat, which in Elizabeth's time had become eight pounds avoirdupois. A statute of 1689 defines the wine gallon as 231 cubic inches, a unit still legal in the United States. The Imperial gallon of Great Britain contains 277.274 cubic inches and is used for the measurement of all liquid and dry substances. The Imperial British bushel contains 2218.192 cubic inches, and the Winchester bushel, the legal standard of the United States, contains 2150.42 cubic inches.

In England as well as elsewhere in Europe two pound-units have prevailed from mediæval times, a light pound for weighing articles of high value and a heavy pound for weighing articles of low value. Many of the lighter pounds used in the Latin States are variations of the old Roman standards, others are of Saxon origin, and still others of more recent date. The Italian pounds have varied from 300 to 350 grams, the average being about the weight of the old Roman pound of 325.8 grams. The Spanish, Portuguese, and Prussian light pounds have varied from 459 to 470 grams. The English light pound is the troy pound of 12 ounces, named from the city of Troyes, and declared a legal-standard by Great Britain (1497) for weighing gold, silver, silk, and other valuable commodities. The troy pound of Elizabeth (1588) served as a standard for such articles until 1824 (still legal in the United States), and the Imperial standard troy pound (1758) was the only legal standard in Great Britain until 1856. The present standard troy pound is defined as 5760 grains, the troy pound used in the United States.

Of the heavy or so-called commercial pounds there have likewise been a great number. Their range is practically from 15 to 24 ounces, but heavy pounds of 28 and 36 ounces are said to have been used in Milan and Valencia. The standards of France, Germany, Denmark, and

Holland range mostly from 488 to 500 grams. The avoirdupois pound was recognized as a standard in England during the reign of Edward III., and the Elizabethan standard (1588) of 7002 grains was derived from that of Edward. The Imperial pound avoirdupois of 7000 grains has been the English standard since 1856 and is generally copied by the United States. At the time it was legalized it was provided that in case the standards were destroyed they were to be recovered by the fact that 1 cubic inch of water at 62° F. and a barometric pressure of 30 inches of mercury, against brass weights in air, weighs 252.458 grains. When this standard perished in 1834 with the yard, it was not recovered by this method, but from other standards.

The development of the standards of France was essentially similar to that in other countries, except that the Revolution at the close of the eighteenth century precipitated the new conditions and resulted in the metric system (q.v.).

In the early colonial days in America the standards of the colonists were naturally those of the mother country, and in most cases copies of the home standards were brought over and intrusted to the care of special officers of the Commonwealth. In the English colonies it was usually the yard of 1588 that was employed. At the time of the Revolution the new country naturally continued with its existing English standards, and although the Constitution empowered Congress to "fix the standard of weights and measures," nothing was done for a very long time. Thomas Jefferson in 1790, at the suggestion of Washington, brought in to Congress a proposition for a decimal system based upon a natural standard. He was not satisfied with proposed standards and urged the establishment of the 'Leslie pendulum,' a straight bar vibrating mean seconds when suspended at one end = 38.72368 inches.

In 1813 the Coast Survey imported a Troughton scale of 82 inches similar to the one used by Shuckburgh, and Superintendent Hassler made a very complete investigation of this as well as all the other standards which he could get, and finally recommended that the distance from the twenty-seventh to the sixty-third mark on the Troughton scale be adopted as the yard, at 62° F. This was adopted by the Treasury Department. In 1817 Hassler compared this American yard with the meter and toise, with the following result: 1 meter = 39.38024749 inches and 1 toise = 76.74+ inches.

On March 3, 1817, the Senate called upon the Secretary of State for an elaborate report relative to weights and measures of this and other countries. John Quincy Adams presented a very complete and exhaustive report, but practically advised that nothing be done at that time. The appendices of this report are very rich in early legal enactments. The matter was taken up again by the Senate in 1830, and again Mr. Hassler undertook a complete investigation of the standards. The Troughton scale of 1813 was taken as the standard, with the following results:

	Inches
The old Exchequer yard of 1820	35.987497
The old Exchequer ell of 1820	45.026101
Latter reduced to yard	36.020881
Copy of Exchequer yard, by Jones	35.9990285
Copy of Exchequer ell, by Jones	45.0389644
Reduced to yard	36.031171
Brass yard of Jones	35.993836
Brass ell of Jones	45.03348
Brass ell reduced to yard	36.026744
Troughton yard, mean of 52-inch scale	36.0002465
The scale of the University of Virginia	35.9952318
Iron yard of the Engineering Department	35.998776
The New York brass yard	36.01545

Gallatin in 1821 brought over to this country a standard platinum meter and kilogram. In 1827 he brought a troy pound of brass which was made the standard of mass in 1828 and has been the Mint standard ever since. The Treasury Department in 1830 adopted 231 cubic inches as the gallon and 2150.42 cubic inches as the bushel.

In 1856 the English Government sent to the United States two certified copies of the standard of length, and these are now known as 'bronze standard No. 11' and 'Low Moor iron standard No. 57.' In the same year, in order to encourage uniformity among the States, the Treasury Department sent to the Governor of each State a set of weights and measures complete. On July 28, 1866, the metric system of weights and measures was legalized by act of Congress. In 1875 the United States joined with a number of others in the establishment of the International Bureau of Weights and Measures at Paris, and as a result thereof received in 1889 Standard International Meters No. 21 and No. 27 and International Standard Kilograms No. 4 and No. 20. These are made of an alloy of platinum with 10 per cent. of iridium. April 5, 1893, the Treasury Department adopted meter No. 27 and kilogram No. 20 as the standards of the country, and since that time all measures are standardized against these, following the law of 1866 which defined the ratio of the yard to the meter as 3600 to 3937, and the ratio of the pound to the kilogram as 1 to 2.2046. For the history and derivation of the meter and kilogram, see METRIC SYSTEM.

THE NATIONAL BUREAU OF STANDARDS of the United States was established July 1, 1901, and was made a bureau of the Department of Commerce and Labor by the act establishing that department. The bureau is the repository of the national standards of the Government already described. Its functions include the production of copies, multiples, and subdivisions of the fundamental standards; the construction of the derived standards used in measuring volume, capacity, velocity, pressure, energy, electricity, high and low temperature, and illumination; the comparison of the standards and measuring instruments used in scientific work, manufacturing, and commerce with those of the Government; the determination of physical constants; the development of methods of measurement; scientific research connected with metrology; and the dissemination of knowledge concerning these subjects as applied in the arts, sciences, and industries. Provision was made for scientific work and testing of the highest order of accuracy. Congress has provided for the work of the bureau new laboratories, a corps of specialists in the various lines of scientific work involved, and a full equipment of measuring apparatus and other accessory instruments.

FALSE WEIGHTS AND MEASURES. The necessity for prescribing and establishing a uniform system of weights and measures was early recognized by the English law. Before the Conquest there were Anglo-Saxon laws regulating the sizes of measures used in market places, and since then Parliament has enacted many statutes upon the subject, the present English law being incorporated in the Weights and Measures Act. In the United States the power of regulating weights and measures was vested in Congress, but as that body has not attempted to exercise its authority, except in regard to standards for the collection of customs and internal revenue, the several States have been obliged to fix their own standards and prescribe penalties for the violation of their statutory provisions on this subject. Inspectors are usually appointed with power to visit places of business where either weights or measures are used, in order to detect and prosecute violations of the law. Besides forfeiture of the false instruments, a penalty of fine or imprisonment is usually imposed upon the offender. Such laws have been held to be a legitimate exercise of the police power.

BIBLIOGRAPHY. Clark, "Standards of Linear Measures," *School of Mines Quarterly* (New York, 1893); J. Q. Adams, *Report on Weights and Measures* (Philadelphia, 1821); Woolhouse, *Measures, Weights, and Moneys of All Nations* (London, 1881); Hultsch, *Griechische und Romische Metrologie* (Berlin, 1862); Giessler, *Journal of the Franklin-Institute*, vol. 126, p. 122 (Philadelphia); Böckh, *Metrologische Untersuchungen über Gewichte u. s. w. des Altertums* (Berlin, 1838); Chisholm, *On the Science of Weighing and Measuring* (London, 1877); Clarke, *Weights, Measures, and Money of All Nations* (New York, 1875); Kelly, *Universal Cambist* (London, 1835), on English weights and measures; Alexander, *Universal Dictionary of Weights and Measures, Ancient and Modern* (Baltimore, 1850); Cavalli, *Tableaux comparatifs des mesures, poids, etc., de tous les états du monde* (Paris, 1874); Harkness, "The Progress of Science as Exemplified in the Art of Weighing and Measuring," *Bulletin of the Philosophical Society of Washington* (Washington, 1888); Hilliger, "Studien zu mittelalterlichen Massen und Gewichten," *Historische Vierteljahrschrift* (Leipzig, 1900); Hultsch, "Die Gewichte des Altertums," in the *Abhandlungen d. Kön. sächs. Gesellsch. d. Wissenschaften*, vol. 18 (Leipzig, 1898); Jackson, *Modern Metrology* (London, 1882); Lepsius, *Die Längenmasse der Alten* (Berlin, 1884); Mendenhall, "Fundamental Units of Measure," *Smithsonian Report* (Washington, 1893); Noel, *Science of Metrology* (London, 1889). See also the *Proceedings of the American Metrological Society* (New York) and various bulletins and circulars of United States Bureau of Standards (Washington, 1901 et seq.). See METRIC SYSTEM; MILE; C. G. S. SYSTEM.

The following table exhibits the chief units of extension, volume, and weight in use among the leading nations of the world. Their equivalents are expressed in the English system.

FOREIGN WEIGHTS AND MEASURES.

Denomination	Where used	American equivalents
Almude	Portugal	4.422 gallons.
Arratel or libra	do	1.011 pounds.
Arroba (dry)	Argentine Republic	25.3175 pounds.
Do	Brazil	32.38 pounds.
Do	Cuba	25.3664 pounds.
Do	Portugal	32.38 pounds.
Do	Spain	25.36 pounds.
Do	Venezuela	25.4024 pounds.
Arroba (liquid)	Cuba, Spain, Venezuela	4.263 gallons.
Arshine	Russia	28 inches.
Arshine (square)	Russia	5.44 square feet.
Baril	Argentine Republic and Mexico	20.0787 gallons.
Batman or tabriz	Persia	6.49 pounds.
Berkovets	Russia	301.12 pounds.
Bongkal	India	832 grains.
Bu	Japan	0.1 inch.
Butt (wine)	Spain	140 gallons.
Candy	India (Bombay)	529 pounds.
Do	do (Madras)	500 pounds.
Carga, or kin	Mexico and Salvador	300 pounds.
Catty	China	1.333⅓ (1⅓) pounds.
Do	Japan	1.31 pounds.
Centaro	Central America	4.2631 gallons.
Centner	Bremen and Brunswick	117.5 pounds.
Do	Denmark and Norway	110.11 pounds.
Do	Prussia	113.44 pounds.
Do	Sweden	93.7 pounds.
Do	Vienna	123.5 pounds.
Chetvert	Russia	5 7748 bushels.
Chih	China	14 inches.
Cuadra	Argentine Republic	4.2 acres.
Cwt. (hundredweight)	British	112 pounds.
Dessiatine	Russia	2.6997 acres.
Do	Spain	1.599 bushels.
Fanega (dry)	Central America	1.5745 bushels.
Do	Chile	2.575 bushels.
Do	Cuba	1.599 bushels.
Do	Mexico	1.54728 bushels.
Fanega (liquid)	Spain	16 gallons.
Frail (raisins)	do	50 pounds.
Frasco	Argentine Republic	2.5096 quarts.
Do	Mexico	2.5 quarts.
Funt	Russia	0.9028 pound.
Garnice	Russian Poland	0.88 gallon.
Joch	Austria-Hungary	1.422 acres.
Ken	Japan	6 feet.
Klafter	Russia	216 cubic feet.
Koku	Japan	4.9629 bushels.
Korree	Russia	3.5 bushels.
Kwan	Japan	8.28 pounds.
Last	Belgium and Holland	85.134 bushels.
Do	England (dry malt)	82.52 bushels.
Do	Germany	2 metric tons (4,480 pounds).
Do	Prussia	112.29 bushels.
Do	Russian Poland	11⅝ bushels.
Do	Spain (salt)	4,760 pounds.
Li	China	2,115 feet.
Libra (pound)	Argentine Republic	1.0127 pounds.
Do	Central America	1 043 pounds.
Do	Chile	1.014 pounds.
Do	Cuba	1.0161 pounds.
Do	Mexico	1.01465 pounds.
Do	Peru	1.0143 pounds.
Do	Portugal	1.011 pounds.
Do	Spain	1.0144 pounds.
Do	Venezuela	1.0161 pounds.
Livre (pound)	Greece	1.1 pounds.
Load	England (timber)	Square, 50 cubic ft.; unhewn, 40 cubic ft.; inch planks, 600 superficial ft.
Marc	Bolivia	0.507 pounds.
Maund	India	82 2/7 pounds.
Mil	Denmark	4.68 miles.
Morgen	Prussia	0.63 acre.
Oke	Egypt	2.7225 pounds
Do	Greece	2.84 pounds.
Do	Hungary	3.0817 pounds
Do	Turkey	2.82838 pounds.
Do	Hungary and Wallachia	2.5 pints.
Do	China, Japan, and Sumatra	133⅓ pounds.
Do	Philippine Islands	137.9 pounds.
Pie	Argentine Republic	0.9478 foot.
Do	Spain	0.91407 foot.
Pik	Turkey	27.9 inches.
Pood	Russia	36.112 pounds.
Pund (pound)	Denmark and Sweden	1.102 pounds.
Quarter	Great Britain	8.252 bushels.
Do	London (coal)	36 bushels.
Quintal	Argentine Republic	101.42 pounds.
Do	Brazil	130.06 pounds.
Do	Castile, Mexico, Chile, and Peru	101 41 pounds.
Do	Greece	123.3 pounds.
Sagene	Russia	7 feet.
Se	Japan	0.02451 acres.
Seer	India	1 pound 13 oz.
Shaku	Japan	11.9305 inches.
Sho	do	1.6 quarts.

FOREIGN WEIGHTS AND MEASURES—*Concluded.*

Denomination	Where used	American equivalents
Standard (St. Petersburg)	Lumber measure	165 cubic feet.
Stone	British	14 pounds.
Sun	Japan	1.193 inches.
Tan	do	0.25 acre.
To	do	2 pecks.
Tondeland	do	1.36 acres,
Tsubo	do	6 feet square.
Tsun	China	1.41 inches.
Tunnland	Sweden	1.22 acres.
Vara	Argentina	34.1208 inches.
Do	Central America	34.87 inches.
Do	Chili and Peru	33.367 inches.
Do	Cuba	33.384 inches.
Do	Mexico	33 inches.
Do	Spain	0.914 yard.
Do	Venezuela	33.384 inches.
Vedro	Russia	2.707 gallons.
Verst	do	0.663 mile.
Vlocka	Russian Poland	41.98 acres.

WEIGL, vī′g'l, JOSEPH (1766-1846). An Austrian composer, born at Eisenstadt, Hungary. He studied with Albrechtsberger and Salieri, and when but sixteen years of age wrote an opera, *Die unnütze Vorsicht.* His first opera produced, however, was *Il pazzo per forza,* which appeared in 1788 and was very successful. Encouraged by this, he brought out—between that year and 1825—thirty more operas, both Italian and German, besides a number of ballets. He also wrote two oratorios and many German and Italian cantatas. Upon the death of Salieri, in 1825, he received the position of second Court conductor and devoted his entire time to masses, offertories, and graduals. His opera *Die Schweizer Familie,* produced at Vienna in 1809, became popular.

WEI-HAI-WEI, wā′hī′wā′. A port on the north coast of the promontory of Shan-tung, China, about 40 miles east of Chi-fu (q.v.), and about the same distance west of Yung-ching-hien, near the extreme end of the promontory (Map: China, F 4). It is situated on a moderately large bay with a small island in its mouth which protects the harbor from all sides except one. It was fortified by the Chinese in 1883-85, was made a naval station, and an arsenal was established. In 1895 the Japanese captured it from the landward side. It was evacuated in 1898, and shortly thereafter leased by Great Britain to be held by her so long as Russia should hold Port Arthur, on the opposite coast. With the concession went a strip of land ten miles wide, lying east of 121° 40′ E., and covering an area of about 285 square miles. Population, about 125,000, all under British rule. Only Chinese and British war vessels may enter the harbor.

WEIL, vīl, GUSTAV (1808-89). A German Semitic scholar. He was born at Sulzburg, Baden, studied at Heidelberg and Paris, and, after a five years' residence in the East, became connected with the library at Heidelberg. He was made professor of Oriental languages in the university in 1848. His more important publications include: *Die poetische Litteratur der Araber* (1837); the translation of the *Thousand and One Nights* (1837-41); *Mohammed der Prophet* (1843); *Historisch-kritische Einleitung in den Koran* (1844); *Geschichte der Chalifen* (1846-51); *Geschichte des Abbassidenchalifats in Aegypten* (1860-62); *Das Leben Mohammeds nach Mohammed Ibn Ishak bearbeitet von Abd el Malik Ibn Hischam* (1864); *Geschichte der islamitischen Völker von Mohammed bis zur Zeit des Sultans Selim* (1866).

WEIL, HENRI (1818—). A German-French classical scholar, born at Frankfort-on-the-Main. He studied at Bonn, Berlin, and Leipzig, and in 1847 was an associate professor at Strassburg, whence he was called two years later to Besançon. In 1876 he went to Paris as professor of Greek at the Ecole Normale Supérieure and the Ecole des Hautes-Etudes. Among his works are *De l'ordre des mots dans les langues anciennes, comparées aux langues modernes* (1844; 3d ed. 1879), his masterpiece; and editions of *Æschylus,* with a Latin commentary (2 vols., 1861-67; 2d ed. 1884); seven tragedies of *Euripides,* with a French commentary (1868; 2d ed. 1879); *Les harangues de Demosthène* (1873; 2d ed. 1881); *Les plaidoyers politiques de Demosthène* (1877-86); *Etudes sur le drame antique* (1897); and *Etudes de littérature et de rhythmique grecques* (1902).

WEIMAR, vī′mär. The capital of the Grand Duchy of Saxe-Weimar, Germany, situated 50 miles west-southwest of Leipzig (Map: Germany, D 3). The quaint old town lies in agreeable surroundings on the Ilm. The Stadtkirche, dating from 1488, rises in the middle of Weimar. It contains Cranach the Elder's valuable "Crucifixion," in which are to be discerned the faces of Luther and Melanchthon.

On the east side of the town looms the grand ducal palace, an interesting edifice, begun in 1790, and constructed under Goethe's supervision. Near the palace is the modern building completed in 1896, and devoted to the preservation of the precious and extensive Goethe and Schiller archives. South of the palace is the fine library, with over 200,000 volumes and more than 8000 maps. Southwest of the palace, in the market place, rises the striking Gothic town hall, with the remarkable house of the two Cranachs close at hand. Not far distant is the Schiller house, owned by the municipality since 1847. In front of the Court theatre, which bears such high repute, is the great bronze Goethe-Schiller monument, by Rietschel. It was unveiled in 1857. Toward the southern part of the town is the famous Goethe home, where the poet lived. It is open to the public as the Goethe National Museum. In the cemetery on the southern edge of Weimar are buried Goethe and Schiller. To the east lies the beautiful park through which the Ilm flows. Weimar has among its many public and special schools a good art school, dating from 1860. With it are connected several names prominent in the German art world. The valuable new museum is housed in a striking yellow and red stone Renaissance structure. The finest of the contents is the cycle of frescoes by Preller on subjects from the *Odyssey.* There are also a natural history museum, with ethnological and antiquarian collections, the Liszt museum, a geographical institute, large orphanages, etc. Weimar has manufactures of iron, wood, straw, cloth, leather, and stoves, and is an important seat of the book trade. The population in 1900 was 28,509, nearly all Protestants. Weimar dates from the ninth century. It passed to the Ernestine line of Saxony about 1500. Owing to the enlightened patronage of Duke Charles Augustus (q.v.), it is famous for literary associations pertaining to the classic epoch of German literature. Goethe resided here more than fifty years of his life; Schiller, Wieland, and Herder also lived here; and it was for decades a pilgrimage town for those famed or interested in letters.

WEINBERGE, vīn'bĕr-ge, or Königliche Weinberge. The capital of a district in Bohemia, Austria, on the Moldau River, near Prague, of which it is an important suburb. Population, in 1900, 52,483.

WEINGARTNER, vīn'gärt-nĕr, Felix (1863—). An Austrian musical conductor, born at Zara, Dalmatia. He studied two years at the Leipzig Conservatory, where he won the Mozart Prize, made a short stay with Liszt at Weimar, and in 1884 produced his opera *Sakuntala* there. He was conductor of the theatres at Königsberg, Danzig, and Hamburg and for two years at Mannheim. In 1891 he was appointed kapellmeister at the Berlin Court Opera, but, owing to poor health, resigned. In 1898 he settled at Munich as conductor of the Kaim concerts. Among his works are: *Serenade for String Orchestra; Malawika,* an opera (1886); and *Genesius,* a three-act opera (1892). He also wrote *Die Lehre von der Wiedergeburt und das musikalische Drama* (1895); *Ueber das Dirigieren* (1896); and *Bayreuth 1876 bis 1896* (1897).

WEINHEIM, vīn'hīm. A town in the Grand Duchy of Baden, Germany, 11 miles northeast of Mannheim. Leather, machinery, weapons, dye stuffs, chairs, and soap are manufactured. Population, in 1900, 11,168.

WEINHOLD, vīn'hōlt, Karl (1823-1901). A German philologist and student of Germanic culture. He was born at Reichenbach, in Silesia, and studied at Breslau and Berlin. He became privat-docent at Halle in 1847, removed to Breslau in 1849, and became professor of German language and literature at Cracow in the following year, at Gratz in 1851, at Kiel in 1861, at Breslau in 1876, and at Berlin in 1889. His services to Germanic grammar and anthropology were valuable. The more important of his publications include: *Die deutschen Frauen im Mittelalter* (1851; 2d ed. 1897); *Altnordisches Leben* (1856); *Die Riesen des germanischen Mythus* (1859); *Heidnische Totenbestattung in Deutschland* (1859); *Alemannische Grammatik* (1863); *Bairische Grammatik* (1867); editions of the Old High German *Isidorfragment* (1874), and *Pilatusfragment* (1877); *Mittelhochdeutsche Grammatik* (1877; 2d ed. 1883); *Mittelhochdeutsches Lesebuch* (1850; 4th ed. 1891); *Verbreitung und Herkunft der Deutschen in Schlesien* (1887); *Ueber den Mythus vom Wanenkrieg* (1890); *Zur Geschichte des heidnischen Ritus* (1896); *Mythische Neunzahl* (1897); *Die Verehrung der Quellen in Deutschland* (1898). He was editor of *Germanistische Abhandlungen* in 1882-91, and in the latter year founded and edited the *Zeitschrift des Vereins für Volkskunde.*

WEIPERT, vī'pĕrt. A town in the Austrian Crownland of Bohemia, on the slope of the Hartz Mountains, near the Saxon frontier, 68 miles northwest of Prague. The manufactures include firearms, silks, laces, and paper. Population, in 1900, 10,037.

WEIR (AS. *wer,* Ger. *Wehr,* weir, dam, dike; connected with AS. *werian,* Goth. *warjan,* OHG. *werjan,* Ger. *wehren,* to guard, protect, Skt. *var,* to protect, prevent, cover). A barrier or dam thrown across a stream to facilitate the measurement of its flow, to raise its level, or to direct the water for any useful or ornamental purpose. The word is also used to denote several varieties of fish traps. (See Fisheries.) In the United States the term is but little employed except for meausuring weirs and waste weirs or spillways; but in Great Britain, Egypt, India, and Australia it is quite commonly applied to such dams as have water flowing over their tops, either continuously or in floods. For ordinary dams for waste weirs or spillways, see Dams and Reservoirs.

Measuring Weirs are generally restricted to gauging the flow of comparatively small natural streams, sewers, and the like, and to serve as checks on other methods of measuring flows, such as meters, or the displacement of pump. As a rule they are temporary structures and therefore are more commonly built of wood. Sometimes metal is employed, but such is rarely the case, except for the crest of the weir. Ordinary flow dams may be used as weirs, either by changing their crests to make them conform to the accepted types, or by making allowances in computations. The standard measuring weir has a perfectly horizontal knife-edge, with vertical ends, and its back, or up-stream face, a vertical plane surface. This is known as a sharp-crested rectangular weir. If the ends of the weir proper do not extend the full width of the stream, allowance must be made for what are called end-contractions. When the two ends of the weir are inclined to the crest the weir is known as trapezoidal. If two such inclined ends join in a common point, so there is no horizontal crest, the weir is called triangular. In determining the flow of water over weirs, the observer merely determines the depth of the water on the weir, taking care that the measurement is made far enough above the weir to avoid the curved surface which is formed as the water pitches over. The readings are taken at sufficient intervals to include all marked variations in the depth of the water, or automatic recording gauges may be employed. The actual volumes are finally determined from the tables giving the discharge for various lengths of overflow, depths on the weir, and the character of the weir. See Irrigation.

Bibliography. For further details, with accounts of various experiments, formulas, tables, etc., and extended bibliography, consult pp. 218-225 of Turneaure, *Water Supply Engineering* (New York, 1901), and papers in *Transactions American Society of Civil Engineers* (New York, March and May, 1900). Both are technical. The latter gives the results of important experiments at the hydraulic laboratory of Cornell University.

WEIR, wēr, Harrison William (1824—). An English illustrator and author, born at Lewes, Sussex. He first exhibited at the British Institution a picture of "Wild Duck" in 1843 and in 1849 was elected a member of the New Society of Painters in Water Colours. He soon turned himself to the work of an illustrator and was on the original staffs of the *Illustrated London News, Field, Graphic,* and *Black and White.* He also illustrated a large number of books, for some few of which dealing with animals he also supplied the letterpress. His principal work, however, is *Our Poultry and All About Them* (1903), which occupied his attention for twenty years. He is recognized as an authority in the delineation of animals, particularly those which are domestic or semi-domestic.

WEIR, John Ferguson (1841—). An American artist, the son of Robert Walter Weir (q.v.), born at West Point, N. Y. He received his early training from his father, and in 1861 opened a studio in New York City. In 1864 he was elected an associate of the National Academy of Design and two years afterwards an academician. In 1868-69 he was abroad and upon his return became director of the School of Fine Arts at Yale University. Among his best-known paintings are "Forging the Shaft," "Tapping the Furnace," "Returning from Work," "Venice," and portraits of Admiral Farragut, President Dwight of Yale, and Wells Williams. In sculpture his statues of President Woolsey and the elder Professor Silliman are well known. He wrote *The Way, the Nature, and the Means of Revelation* (1889); *John Trumbull and His Works* (1902); and *Human Destiny in the Light of Revelation* (1903).

WEIR, Julian Alden (1852—). An American portrait, genre, and landscape painter. He was born at West Point, August 30, 1852, and received his first instruction from his father, Robert Walter Weir (q.v.). He studied at Paris under Gérome in 1873-76, and during his first student days was closely associated with Bastien-Lepage, who much influenced his art. After his return to America he was one of the founders of the Society of American Artists (1877), and at one time its president, but seceded as one of the 'Ten American Artists' in 1898. He became National Academician in 1886. He received the $2000 prize of the American Art Association in 1886 with the "Idle Hours" (Metropolitan Museum, New York City), and a second-class medal at the Paris Exposition in 1889 with a "Breton Interior." His works are always artistic and highly personal; the earlier ones are sombre in tone, but after 1887 he followed impressionistic methods, achieving his results in the treatment of light and air in landscape. He shows himself equally at home in genre and portrait.

WEIR, Robert Walter (1803-89). An American historical and genre painter, born in New Rochelle, N. Y. He studied under Jarvis in New York City, and from 1824 to 1828 under Benvenuti at Florence. He was elected to the National Academy in 1829, and somewhat later was appointed professor of drawing at the United States Military Academy at West Point, holding the position for forty-two years. Weir was among the first of American painters to devote himself to historical subjects, in which branch of art he is best known. Among his paintings are the "Embarkment of the Pilgrims" (1845), in the rotunda of the Capitol at Washington; the "Landing of Hendrik Hudson" (1842); the "Church of the Holy Innocents" (1847, Corcoran Gallery, Washington); and "Columbus Before the Council of Salamanca" (1884). His finest production is probably the large allegorical work, "Peace and War," executed for the chapel at West Point. He also designed the stained glass windows of Trinity Chapel and Calvary Church, New York City. Some good portraits by him are at the West Point Academy.

WEISBACH, vīs'bäG, Julius (1806-71). A German mathematician and mining engineer, born near Annaberg. He studied at Freiburg, Göttingen, and Vienna, and became professor in the school of mines at Freiburg (1833). He is principally known for his work in hydraulics and mechanics, his introduction and development of the surveying of mines, and the extension of axonometry. He wrote: *Handbuch der Bergmaschinenmechanik* (1836); *Experimentalhydraulik* (1855); *Lehrbuch der Ingenieur- und Maschinenmechanik* (1845-60, and subsequent editions); *Der Ingenieur* (1848; 7th ed. by Reuleaux, 1896); *Die neue Mürkscheidekunst* (1851-59); *Anleitung zum axonometrischen Zeichnen* (1857).

WEISHAUPT, vīs'houpt, Adam (1748-1830). A German mystic and religious leader. He was born at Ingolstadt, studied law in his native city, and after 1772 was professor of canon law in the university there. In 1776 he declared himself an open enemy of the Jesuits, whose pupil he had been, and on May 1st of that year founded the Order of the Illuminati, or, as it was at first called, *Gesellschaft der Perfectabilisten*, the members of which were entirely subservient to their superiors, though theoretically vowed to the propagation of liberty. Weishaupt attracted great numbers of young men, especially those of good family, by his teaching, and made Ingolstadt a cosmopolitan centre till 1785, when his lecture hall was burned by his enemies. He then removed to Gotha, where he died. Among his writings were the following: *Apologie der Illuminaten* (1786); *Geschichte der Verfolgung der Illuminaten* (1786); and *Das verbesserte System der Illuminaten* (1787). See Illuminati.

WEISMANN, vīs'män, August (1834—). A distinguished German zoölogist. He was born January 17, 1834, at Frankfort-on-the-Main, studied medicine at Göttingen, was clinical assistant at Rostock in 1856-57, went to Vienna in 1858, to Italy in 1859, and in 1860 to Paris. In 1863 he studied zoölogy as a pupil of Leuckart at Giessen, began to lecture at the University of Freiburg in Baden in the same year, and became in 1866 extraordinary, and in 1871 full professor of zoölogy. Weismann's epoch-making work on the embryology of the flies appeared in 1864. He first revealed the real nature of the internal changes wrought during the process of metamorphosis of insects. His discovery of the germs of the perfect insect (imaginal buds) in the larva, and his theory of 'histolysis,' or of the complete destruction of the larval organs by a gradual process, led to the final and complete overthrow of the earlier theory of incasement (*emboîtement*) or preformation (q.v.). These investigations were succeeded by his studies on the formation of the egg and the embryology of the little crustaceans Daphnidæ (1876-79), and the origin of the sexual cells of the Hydromedusæ (1883). Another and most fruitful line of investigation were his researches on the seasonal dimorphism of butterflies, and the origin of the markings of caterpillars, as embodied in his "Studies on the Theory of Descent" (1875). As the result of impaired eyesight Weismann was obliged to abandon microscopic work, and devoted himself to philosophical and speculative studies connected with the theory of descent and the problems of heredity. From being a moderate Lamarckian and selectionist he went to the extreme of asserting the "all-sufficiency of natural selection," holding that changes in the physical environment only afford the initial stimulus.

Although Jäger first (1876) proposed the term 'continuity of the germ-plasm,' Weismann greatly expanded the idea, and added many new and original suggestions, establishing the present theory that heredity (q.v.) has a physical basis. He was also led to deny what is known as use-inheritance (q.v.), or the Lamarckian doctrine that characters acquired during the lifetime of an animal may be transmitted to its posterity. Subsequently he proposed a theory of germinal selection. He also called in question the existence of the influence of a previous sire on the progeny of a subsequent one by the same female, giving the name 'telegony' (q.v.) to the phenomenon. Weismann is an admirable investigator, a strong thinker, and the leader of the Neo-Darwinian or Weismannian school of evolutionists. His theories, which are bold, original, and suggestive, have been criticised as superscientific speculations and assumptions, especially that related to the architecture or mechanical arrangement of his hypothetical elements or 'determinants' of the germ-plasm (q.v.), but it will be acknowledged by all that he has been a powerful agent in placing modern biological studies on a higher plane, and rendering the theory of descent of practical value in psychological and philosophical studies. His principal works are: *Die Entwickelung der Dipteren* (1864); *Studien zur Descendenztheorie* (1875-76; Eng. trans., London, 1882); *Beiträge zur Naturgeschichte der Daphnoiden* (1876-79); *Ueber die Zahl der Richtungskörper und über ihre Bedeutung auf die Vererbung* (1887); *Essays upon Heredity and Kindred Biological Problems* (English trans., Oxford, 1889); *Amphimixis oder Die Vermischung der Individuen* (1891); *Aufsätze über Vererbung* (1892); *The Germ-Plasm, A Theory of Heredity* (German, Jena, 1892; English, New York, 1893); "The All-Sufficiency of Natural Selection" (*Contemporary Review*, February, March, and May, 1893); *The Effect of External Influences upon Development* (the Romanes Lecture, 1894); *Neue Gedanken zur Vererbungsfrage. Eine Antwort an Herbert Spencer* (1895); *New Experiments on the Seasonal Dimorphism of Lepidoptera* (English trans., *Entomologist*, January-August, 1896); *Ueber Germinalselektion* (1896); *Vorträge über Descendenztheorie* (1902).

WEISMANNISM. The essence of the doctrines taught by August Weismann, and in which they differ from the more moderate views of Darwin, Romanes, and others, is the 'all-sufficiency' of natural selection; the sweeping denial that use-inheritance (q.v.) operates at all; the view that variation is mainly due to sexual reproduction, or 'amphimixis;' and the elaborate and complicated relations of the ultimate elements or determinants (biophores) of the germ-plasm. He thus states his theory as to the nature of the nuclear substance: "The germ-plasm, or hereditary substance of the Metazoa and Metaphyta, therefore, consists of a larger or smaller number of idants, which in turn are composed of ids; each id has a definite and special architecture, as it is composed of determinants, each of which plays a perfectly definite part in development" (*The Germ-Plasm*, p. 453). He admits that the primary cause of variation is always the effect of external influences, but when these changes of conditions only affect the body in general their effects are limited to the simple life of the individual, and are not transmitted by heredity; but when they occur in the germ-plasm they are transmitted to the next generation, and cause corresponding hereditary variations in the body. The opponents of this view hold that whatever external changes affect the body in general must necessarily affect the reproductive cells and the chromosomes of the nucleus of such cells. Indeed, the Weismannians treat the germ-plasm as if it were a parasite, getting shelter and food from the body containing it.

In maintaining the 'all-sufficiency' of natural selection Weismann argues that external influences act only as stimuli by which latent powers in the germ are called forth. Hence the changes in external conditions which appear to determine characters are not in any sense a true *causa efficiens*, but merely a necessary condition for the appearance of that which is inherent in the organism at some stage of development. His critics assert that in taking such extreme ground as this he overlooks the thoroughgoing effects of past geological changes, and their persistent effects as seen in the different lines of development of series of extinct animals. Weismannism, they say, also overlooks the fact that in the beginning natural selection had no materials to operate with, the earliest types having been originated by the action of the primary factors of organic evolution. Accounting for the disappearance of a typical organ, Weismann says it is "always due to variations of the primary constituents of the germ," whereas Darwin and Lamarck attribute the loss of or reduction in the number of digits or other parts to simple disuse.

Another phase of Weismannism is the principle of intra-selection. Taking the hint from Roux's principle of selection, or the struggle for existence between the parts of the organism, Weismann has greatly extended it, claiming that the selective process must take place not only in cells and tissues, but also in the smallest conceivable particles of the germ-plasm, which he calls 'biophores.' This process he calls intra-selection. Here as elsewhere his opponents argue that Weismann minimizes, or sets aside even in the case of plants, the effects of the action of the primary factors, such as gravity, light, heat, moisture, and chemical stimuli, and asserts that all the various adaptations of the parts of plants "must likewise be referred to the process of intra-selection." In the same manner Weismann, in the words of a friendly critic, 'driven back from acquired characters as a cause of phylogenetic variation, came to regard the mingling of germ characters in amphimixis as the source of all variation, though he does allow that in the lowest organisms variation is due to the direct influence of changes in the environment.

Although Weismann struck a death blow at the ancient preformation theory, his speculations have led him and his followers to a modern phase of preformation. He denies that epigenetic development exists, and claims that individual development (ontogenesis) "can be explained only by evolution, and not by epigenesis." In his view the germ "is an exceedingly complicated living being, a microcosm in the truest sense, in which every independently variable part that ever appear throughout the whole life is represented by a living particle" (Hertwig). It should be said that Weismann from time to time modified his views.

For bibliography, see under Weismann; for criticisms of Weismannism, consult Romanes, *An Examination of Weismannism* (Chicago, 1893); O. Hertwig, *The Biological Problem of To-day* (New York, 1894).

WEISS, vīs, Bernhard (1827—). A German theologian. He was born at Königsberg, and studied there and at Halle and Berlin. In 1857 he became professor at Königsberg, in 1863 at Kiel, and in 1877 at Berlin. He took a deep interest in the "Inner Mission" (q.v.), and held positions at Berlin as official adviser concerning matters of religious education. The most important of his publications are *Lehrbuch der biblischen Theologie des Neuen Testaments* (1868; Eng. trans., Edinburgh, 1882-83); *Leben Jesu* (1882; Eng. trans., Edinburgh, 1883-84); *Einleitung in das Neue Testament* (1886; Eng. trans., London, 1889); *Das Neue Testament: Textkritische Untersuchungen und Textherstellung* (4 parts, 1894-1900). For the new edition of Meyer's commentary he prepared the volumes on the Gospels of Matthew and John, the Epistles to the Romans, Timothy, Titus, and the Hebrews, and the Epistles of John, and with his son Johannes (professor at Marburg) that upon the Gospels of Mark and Luke.

WEISS, Hermann (1822—). A German painter and writer on art, born in Hamburg. He studied painting under Johann Samuel Otto, then in Düsseldorf under Theodor Hildebrandt, but gave himself chiefly to researches in the history of art and civilization, returned to Berlin in 1845, became instructor at the academy in 1854, and professor in 1856, and was appointed director of the arsenal in 1879. He wrote *Geschichte des Kostüms* (1853); and *Kostümkunde Geschichte der Tracht, des Baues und des Geräts von den frühesten Zeiten bis auf die Gegenwart* (1856-72; 2d ed. 1881-83), an important contribution to the history of civilization.

WEISS, John (1818-79). An American author and clergyman, born in Boston. He was educated at Harvard (1837) and graduated at the Divinity School there in 1843. He then preached at Watertown and New Bedford, Mass., till failing health compelled him to devote several years to travel. In 1859 he returned to Watertown, where he remained till 1870 in charge of the Unitarian Church. He was a zealous Abolitionist and transcendentalist, and an advocate of women's rights and of rationalism in religion. His publications included a *Life and Correspondence of Theodore Parker* (1864), *American Religion* (1871), and a translation of Schiller's *Philosophical and Æsthetic Letters and Essays* (1845).

WEISSE, vī'*se*, Christian Felix (1726-1804). A German poet. He was born at Annaberg, in Saxony, and was educated at the University of Leipzig. In 1761 he became receiver of taxes in Leipzig. Weisse was a popular playwright in his day. *Die Liebe auf dem Lande* (1768) and *Die Jagd* (1770), together with many other plays, were long favorites on the German stage. His best known tragedies were adaptations from Shakespeare (*Richard III.*, 1759, and *Romeo und Juliet*, 1767). He also wrote many lyrics and books for children. Consult Minor, *Christian Felix Weisse und seine Beziehungen zur deutschen Litteratur* (Innsbruck, 1880).

WEISSE, Christian Hermann (1801-66). A German philosopher. He was born at Leipzig. During his study at the university of his native city he deserted law for philosophy. After taking his degree in 1823 he taught in the University of Leipzig till 1837, when he retired to his estate near the city, but was recalled to academic activity in 1845 by an appointment as professor. Weisse was with Fichte one of the founders of the system of speculative theism which opposed the pantheistic idealism of Hegel. His most important writings were: *System der Aesthetik als Wissenschaft von der Idee der Schönheit* (1830); *Die Idee der Gottheit* (1833); *Grundzüge der Metaphysik* (1835); *Kritik und Erläuterung des Goetheschen Faust* (1837); *Die Christologie Luthers* (1852); *Philosophische Dogmatik oder Philosophie des Christenthums* (1855-62); and *Psychologie und Unsterblichkeitslehre* (1869). Consult Seydel, *Christian Hermann Weisse* (Leipzig, 1866).

WEISSENBURG, vīs'*sen*-bōōrk. A town of Lower Alsace, on the Lauter River, about 20 miles west of Karlsruhe. It has manufactories of stockings, paper, leather, and matches. Population, in 1900, 6294. It is noted as the scene of the first important battle of the Franco-German War, August 4, 1870, in which the French under Douay were defeated by the advance guard of the German Army under the Crown Prince of Prussia. The lines of Weissenburg were fortifications extending from Weissenburg along the right bank of the Lauter for a distance of about thirteen miles to its confluence with the Rhine. They were built in 1706 and played an important part in the war of the Austrian Succession and in the wars of the French Revolution. Their demolition was begun in 1873.

WEISSENFELS, vī'*sen*-fĕls. A town in Saxony, Prussia, 23 miles southwest of Leipzig on the Saale (Map: Prussia, E 3). It has important industries, including the manufacture of shoes, paper, nails and chains, machinery, sugar, electrical appliances, and organs. Population, in 1900, 28,201.

WEISSNICHTWO, vīs'nĭkt-vō (Ger., know not where). In Carlyle's *Sartor Resartus*, a city in which Herr Teufelsdröckh (q.v.) was a university professor.

WEITLING, vīt'lĭng, Wilhelm (1808-71). A German socialist, born in Magdeburg. He was a tailor by trade, but traveled through his native country preaching communism and other radical doctrines. After taking part in the revolutionary movement of 1848 he settled in America, which he had previously visited, and formed a socialist society in New York City called the Arbeiterbund. He was identified with a socialistic colony in Wisconsin, but lived in New York, where he had a clerkship. The ideal society of Weitling was to be fashioned on the old ethnic lines, a federation of the families of the world, with leaders chosen by acclamation, who should divide the products of labor, giving to every one a fixed share. He wrote *Die Menschheit wie sie ist und sein soll* (1838), *Garantien der Harmonie* *und Freiheit* (1842), and *Das Evangelium eines armen Sünders.*

WEITZEL, vīt′sel, GODFREY (1835-84). An American soldier, born in Cincinnati, Ohio. He graduated at West Point in 1855, and was assigned to the corps of engineers. In April, 1861, on the outbreak of the Civil War, he was sent to aid in the defense of Fort Pickens, Florida. In February, 1862, he became chief engineer on the staff of General Butler, with whom he was stationed for some time at New Orleans. In August, 1862, he was raised to the rank of brigadier-general of volunteers, and from October, 1862, to April, 1863, he commanded in the Lafourche campaign. In April and May, 1863, he commanded General Banks's advance guard, and later commanded a division at the siege of Port Hudson, where his gallantry earned him the brevet of lieutenant-colonel in the Regular Army. During May, 1864, he commanded a division before Richmond, was then appointed chief engineer of the Army of the James, and constructed the fortifications at Bermuda Hundred, James River, and Deep Bottom. From September to December, 1864, he commanded the Eighteenth Army Corps. He was second in command of the first Fort Fisher expedition, and was then given command of all the troops north of the Appomattox River. On April 3, 1865, he occupied Richmond. On March 13, 1865, he was brevetted brigadier-general and major-general in the Regular Army, and soon afterwards he was assigned to the command of the Rio Grande District in Texas. On March 1, 1866, he was mustered out of the volunteer service and was commissioned major of engineers. From that time until his death he was employed in the construction of fortifications and in river and harbor improvements. He was promoted to the rank of lieutenant-colonel of engineers in 1882.

WEIZSÄCKER, vīts′ĕk-ẽr, KARL (1822-99). A German theologian. He was born at Oehringen, Württemberg, and studied theology at Tübingen and Berlin. In 1851 he became Court preacher at Stuttgart, and four years afterwards he was appointed superior consistorial counselor there. In 1861 he was called to the chair of theology at Tübingen and in 1894 he became councilor of State. His publications include *Untersuchungen über die evangelische Geschichte* (1864), *Das apostolische zeitalter der christlichen Kirche* (1886-93), and *Das neue Testament übersetzt* (1875). He was also editor of the *Jahrbücher für deutsche Theologie* from 1855 to 1878.

WEKA. A native (Maori) name for the peculiar New Zealand rails of the genus Ocydromus, which, although provided with wings, are unable to make any effective use of them, on account of the wide-angled relation between the scapula and coracoid. They are brown, rail-like birds; one species frequents the seashore and feeds on shellfish and the like found among the kelp, while the other inhabits the interior of the South Island. These birds are rapidly disappearing. Consult Buller, *Birds of New Zealand* (London, 2d ed., 1888). See FLIGHTLESS BIRDS; and Plate of RAILS, ETC.

WEKERLE, vā′kẽr-le, ALEXANDER (1848—). An Hungarian political leader, born at Moor, in the County of Stuhlweissenburg. After pursuing the study of law he received a post in the Ministry of Finance in 1870, holding at the same time the position of privat-docent in financial and administrative law at the University of Budapest. He became Ministerial councilor in 1884 and two years later was made Under Secretary of State in the Ministry of Finance and was elected to the Lower House of the Diet. In 1889 he was summoned by Koloman Tisza to the office of Minister of Finance, to the duties of which he devoted himself with such success that in the following year he was able to submit to the national legislature a budget minus the classic deficit. This he was enabled to effect through a skillful reconversion of the public debt. He also dealt successfully with the problems of excise. Government monopolies, and the regulation of the coinage. In November, 1892, he succeeded Szapáry as president of the ministerial council and made the chief feature of his programme the enactments of legislation looking toward the establishment of a more liberal régime in religious affairs. Laws providing, among other things, for the recognition of the Jewish religion, making civil marriage compulsory, and leaving the religious education of children of mixed marriages to the decision of the parents were passed by large majorities in the Lower House, but met with the most determined opposition in the Table of Magnates. After a protracted struggle, in the course of which Wekerle enlisted on his side the support of the Crown, the Magnates were compelled to give their assent to the greater part of the Ministerial programme. Recognition of the Jewish faith, however, was refused. In spite of his victory, Wekerle found his position untenable, owing to the hostility of the Court, and resigned in December, 1894, but remained in office till the following January, when he was succeeded by Banffy. In 1897 he was made president of the Hungarian Court of Administration.

WELCH, ASHBEL (1809-82). An American civil engineer. He was born in Nelson, Madison County, N. Y. In 1835 he became chief engineer of the Delaware and Raritan Canal. During the thirty-nine years that he had charge of this important waterway and the railroads laid in connection with it, he devised for the New York and Philadelphia Railway a system of safety signaling (1865), doubled the capacity of the canal locks by fitting them with steam (1868), built the Chesapeake and Delaware Canal, and was elected to the presidency of the United Railroads and Canals of New Jersey (1867). After the acquisition of this system by the Pennsylvania Railroad (1871) he became consulting engineer to many important enterprises.

WELCH, PHILIP HENRY (1849-89). An American humorist, born at Angelica, N. Y. In 1882 he joined the staff of the Rochester *Post-Express,* and in 1884 removed to New York City, where he was connected with the *Sun.* His publications, such as *The Tailor-Made Girl* (1888), *Said in Fun* (1889), and his miscellaneous writings placed him among the foremost of the younger American humorists. His humor, though it often verged on satire, was usually amiable, and much of his caricaturing of society life in New York City was exceedingly clever.

WELCH, WILLIAM HENRY (1850—). An American pathologist, born at Norfolk, Conn.

He was graduated at Yale College in 1870 and took his medical degree from the College of Physicians and Surgeons, New York City, in 1875. Afterwards he studied pathology at the universities of Strassburg, Leipzig, Breslau, and Vienna, and in 1878 was appointed demonstrator of anatomy, and later professor of pathological anatomy, in the Bellevue Hospital Medical College, New York City. In 1884 he was called to Baltimore, where he became professor in the Johns Hopkins University, and pathologist to the Johns Hopkins Hospital. He was subsequently dean of the medical schools. He became eminent as an authority in bacteriology and pathology, and was elected to the Philadelphia College of Physicians, to the Pathological Societies of Philadelphia and London, to the National Academy of Sciences, and to the American Academy of Arts and Sciences. A *General Pathology of Fever* is from the pen of Dr. Welch, but his publications are for the most part incorporated in the works of others. Articles in Flint's *Practice of Medicine* (5th and 6th eds.), in Pepper's *System of Medicine*, in Dennis's *System of Surgery*, in Allbut's *System of Medicine*, and in *A Textbook of Medicine by American Teachers* are by him, as well as numerous papers on pathological and bacteriological subjects.

WELCKER, vĕl′kĕr, FRIEDRICH GOTTLIEB (1784-1868). A German classical archæologist and philologist. He was born at Grünberg, in Hesse-Darmstadt; studied at Giessen; was appointed teacher at the gymnasium there in 1803; and in the year 1806 went to Rome, where he remained two years as tutor in the family of Wilhelm von Humboldt, who became his warm friend. On his return from Italy, he was appointed to a professorship of ancient literature in Giessen. In 1814 he served in the War of Liberation. For political reasons he left Giessen, went the following year to Copenhagen, to edit the posthumous works of the Danish archæologist Zoëga, and accepted a chair at Göttingen in 1816. Thence he was called in 1819 to Bonn, where he remained until his death, though he resigned his chair in 1859. Welcker's studies covered a wide range, but his chief influence was exerted in the fields of Greek literature, art, and mythology. He belonged, like Böckh and his pupil K. O. Müller, to that school of German philologists who took as their aim the complete reconstruction of the ancient life, in distinction from the school of G. Hermann, who were disposed to limit the field to the language and text of the Greek and Roman writers. Welcker was thoroughly imbued with the harmony of the whole Greek conception, whether expressed in art, literature, or religion, and it was to the presentation of this as a complete whole that he devoted his efforts. Among his editions of Greek texts are the collection of the fragments of Hipponax (1817), Theognis (1826), Philostratus (1825), and the Theogony of Hesiod (1865). Of his other works may be mentioned *Der epische Cyklus* (1835, 1849; reprinted 1865, 1882); *Die Æschyleische Trilogie Prometheus, und Nachtrag* (1824, 1826); *Die griechischen Tragödien mit Rücksicht auf den epischen Cyklus geordnet* (1839-41); *Griechische Götterlehre* (1857-62). Shorter essays were collected in *Alte Denkmäler* (1849-64) and *Kleine Schriften* (1844-67). Consult Kekulé, *Das Leben Friedrich Gottlieb Welckers* (Leipzig, 1880).

WELD (Dutch *wouw*, Swed., Dan. *vau*, Ger. *Wau*, weld; of unknown etymology), WOOLD, DYER'S ROCKET, DYER'S WEED, or YELLOW WEED (*Reseda Luteola*). A plant of the natural order Resedaceæ and of the same genus as mignonette (q.v.), a native of waste places in many parts of Europe and introduced in some places in the Eastern United States. It is cultivated to some extent for dyeing. Good weld must have flowers of a beautiful yellow or greenish color, and abound in leaves; that which is small, thin-stemmed, and yellow is better than that which is large, thick-stemmed, and green; that which grows on dry, sandy soils is better than that produced on rich and moist soils. For the greatest production of coloring matter the plant should be cut before the fruits show much development, otherwise the pigment diminishes. Though in part supplanted by chemical dyes, weld is still a valuable dyestuff. It serves equally for linen, woolen, and silk, dyeing with proper management all shades of yellow, and producing a bright and beautiful color. Large quantities of weld are exported from France.

WELD, ANGELINA EMILY (GRIMKÉ). See GRIMKÉ SISTERS, THE.

WELD, ISAAC (1774-1856). An Irish topographical writer, born in Dublin, and educated in England. In 1795-97 he traveled through the United States and Canada, visiting not only the long settled Eastern seaboard, but also the still unbroken wildernesses of the West; and after his return to Europe published *Travels Through the States of North America and the Provinces of Upper and Lower Canada During the Years 1795, 1796, and 1797* (1799). Several editions were issued, and translations were made into French, German, and Dutch. Among his other publications were a paper by which he sought to divert Irish emigration from the United States to Canada (1801); *Illustrations of the Scenery of Killarney and the Surrounding Country* (1807, 2d ed. 1812); and a *Statistical Survey of the County of Roscommon* (1838). Consult *The Dublin University Magazine*, vol. xlix. (1857).

WELD, THEODORE DWIGHT (1803-95). An American reformer and abolitionist, born at Hampton, Conn. In 1833 he entered the Lane Theological Seminary in Cincinnati, where, during the famous anti-slavery debate, he took the lead among the students by his eloquence. On the suppression of the anti-slavery society by the trustees of the seminary, he was one of the students who withdrew, and during the next three years he devoted himself to lecturing on slavery and its evils. In 1836, however, he lost his voice, and was thenceforth compelled to earn his living by his pen and by teaching school. He edited the publications of the American Anti-Slavery Society, and in 1854 he opened a school at Perth Amboy, N. J., where he received boys and girls of both races. In 1864 he removed his school to Hyde Park, Mass., where he passed the remainder of his life. In 1838 he married Angelina Grimké. (See GRIMKÉ SISTERS.) His publications include: *The Power of Congress Over the District of Columbia* (1837); *The Bible Against Slavery* (1837); *American Slavery as It Is; or, the Testimony of a Thousand Wit-*

nesses (1839), a book composed of extracts from Southern papers, which had a great influence; and *Slavery and the Internal Slave Trade in the United States* (1841).

WELDE, WELD, or **WELLS,** Thomas (c.1590-1662). A Puritan divine. He was born in England, and graduated at Cambridge in 1613. He was minister at Terling, Essex, in 1624-31, when he was deprived for non-conformity and went to America. He was the first pastor of the church at Roxbury, and opposed the religious views of Anne Hutchinson (q.v.) at her trial, 1637; he aided John Eliot and Richard Mather in the preparation of the *Bay Psalm Book* (q.v.). He went to England with Hugh Peters as agent for the colony (1641), but did not return; was pastor of a church at Gateshead (1649), but was ejected for non-conformity, 1662. He published *A Short Story of the Rise, Reign, and Ruin of the Antinomians, Familists, and Libertines that Infected the Churches of New England* (1644); and *A Further Discovery of That Generation . . . Called Quakers* (1654).

WELDING (from *weld*, variant of *well*, influenced by Dan. *vælde*, to boil, from AS. *weallan*, OHG. *wallan*, to boil, well up). The process by which certain substances, such as iron and platinum, horn and tortoise-shell, are united when in a softened state due to being heated. The welding of iron consists in heating the two pieces until they attain a plastic and slightly viscous condition, placing them in contact with each other, and hammering or pressing the soft parts together. The process with other substances is essentially the same. In recent years use has been made of the electric arc for welding iron, and more particularly for welding street railway rails after they are laid in the track. For this latter purpose the electric welding equipment, consisting usually of four cars, is run out on the track to be welded. The first car carries an air compressor and sand blast, by which the rails at the joints are thoroughly cleaned after removing the splice-plates. The second car carries the 'welder,' which is simply a large transformer with jaws that can be clamped upon the rail. By means of these jaws a bar of steel is clamped to the rail on each side with a pressure of about 1400 pounds. Current is then turned on and continued about two minutes. This heats the splice bars and rails sufficiently to cause the metals to flow and the bars and rails to unite firmly. Current is then turned off and the clamping pressure is increased to about 35 tons and continued until the joint cools. This process is repeated twice for each joint. The third and fourth cars contain apparatus for steadying the voltage of the current taken from the trolley wire and for transforming it from about 500 volts direct to the welder transformer, which in turn transforms it to from two to four volts and 30,000 to 50,000 amperes.

WEL'DON, Walter (1832-85). An English chemist, celebrated for his discoveries and improvements in the commercial branch of the science. He was born at Loughborough. He was for a time engaged in his father's manufacturing business. In 1860 he founded a monthly entitled *Weldon's Register of Facts and Occurrences Relating to Literature, the Sciences, and the Arts*, which lived four years. From that time dated a scientific career the more remarkable as the inventor had never performed an experiment when he took out the first patents for his manganese regeneration process. By the time manganese process (patented in 1867, after the magnesia-manganese process, but not applied commercially till 1869) the price of bleaching powder was reduced £6 a ton, while paper, calico, and the like became much cheaper in consequence. A third, the magnesia-chlorine or Péchiney-Weldon process, was patented, in 1870, but did not prove commercially successful.

WELHAVEN, vĕl'hä'ven, Johan Sebastian Cammermejer (1807-73). A Norwegian poet, born at Bergen, and educated at the University of Christiania. In 1825, while yet a student, he opposed himself to the patriotic but wild and tasteless first attempts of Wergeland to form a national literature. In 1832 he attacked the latter's poetry in a bitter pamphlet which raised a great storm and made Welhaven the champion of the cultivated and conservative classes. He followed this up by the publication of a cycle of satirical sonnets and ultimately won over Wergeland as well as Norwegian writers generally to his literary standard. In 1840 he became lecturer and in 1846 professor of philosophy in the University of Christiania. Welhaven's poetry by its perfection of form and delicate feeling for nature holds a permanent place in Norwegian literature. He published volumes of poems in 1839, 1845, 1848, 1851, and 1860, as well as two literary studies, *Holberg* (1854), and *Evald and Norwegian Poetry* (1863). His collected works were published in 1867-69. Consult: Halvorsen, *Norsk Forfatterlesikon* (Christiania, 1885-90); and Jaeger, *Illusteret Norsk Literaturhistorie*, vol. ii. (Christiania, 1896).

WEL'LAND CANAL. An important Canadian ship canal, 27 miles long, between Lake Erie and Lake Ontario, begun in 1824 and completed in 1833. Its original dimensions have been greatly enlarged and there is now a depth of 14 feet.

WEL'LER, Sam. A witty and faithful cockney engaged by Mr. Pickwick, at the opening of Dickens's *Pickwick Papers*, as a body servant. He is the son of a portly and rubicund London coachman whose reverence for his offspring is second only to his fear of 'widders.' The character is modeled on a comic actor, Sam Vale, who was well known in London for his wit and repartee, and whose sayings were familiar quotations in the mouths of the people. The portrait was soon recognized and saved the book.

WELLES, wĕlz, Gideon (1802-78). An American statesman. He was born in Glastonbury, Conn., and was a student for a time, without graduating, at Norwich University. He early entered politics and, as editor and part owner of the Hartford *Times* from 1826 to 1836, he exerted a powerful influence in his State in favor of the Democratic Party. He was an enthusiastic adherent of Andrew Jackson, and was said to have been the first to advocate his election to the Presidency. From 1827 to 1835 he was a member of the State Legislature, where he advocated the abolition of imprisonment for debt and opposed a proposed measure for excluding from the courts such witnesses as did not believe in 'a future state of rewards and punishments.' He was Comptroller of the State in 1835 and again in 1842 and 1843, was postmaster at Hartford from 1835 to 1842, and from 1846 to 1849 was chief of the Bureau of Provisions and Clothing in the Navy Department. Joining the Republican Party soon after its organization, he was a delegate to the National Convention at Chicago in 1860, and in 1861 became Secretary of the Navy in President Lincoln's Cabinet. In this position, though utterly ignorant of navigation and ship construction, he evinced great executive ability, managing the navy with the greatest efficiency during the Civil War, and was besides a valuable adviser of the President on matters of general policy. Being reappointed by President Lincoln in 1865, he was retained by President Johnson, and served throughout the latter's administration. Subsequently, in 1872, he joined the Liberal Republicans, and in 1876, as an adherent of Samuel J. Tilden, took an active and somewhat acrimonious part in the Tilden-Hayes controversy. He published a volume entitled *Lincoln and Seward* (1874).

WELLESLEY, wĕlz′lĭ. A town, including several villages, in Norfolk County, Mass., 15 miles west of Boston, on the Boston and Albany Railroad (Map: Massachusetts, E 3). It is attractively situated and has well-shaded streets and many handsome residences. The chief feature of the town is Wellesley College (q.v.), one of the most important educational institutions for women in the United States. There are also here Dana Hall, a school for girls, Wellesley School and Rockridge Hall, schools for boys, and a public library with more than 11,600 volumes. The government is administered by town meetings. The water-works are owned and operated by the town. Population, in 1890, 3600; in 1900, 5072.

WELLESLEY, Arthur, first Duke of Wellington. See Wellington.

WELLESLEY, Richard Colley Wellesley, Marquis (1760-1842). A British administrator of India. He was the eldest son of Garret Wellesley, first Earl of Mornington, and brother of the Duke of Wellington. He was born at Dangan Castle, Ireland, and was educated at Harrow, Eton, and Christ Church, Oxford, but never took a degree, on account of his father's death in 1781, which compelled him to end his studies. In 1784 he entered the English House of Commons, and in 1793 became a member of the Board of Control of Indian Affairs. On the resignation of Lord Cornwallis in 1797, Wellesley was appointed Governor-General of India. He immediately concluded several treaties with the powerful native rulers, which assured either their alliance or neutrality in the impending struggle with France. In 1799 Mysore, the country of the hostile Tipu Sahib, son of Hyder Ali (q.v.), was invaded by a British force, and in a very short time the dreaded Sultan was overthrown. Wellesley now established several dependent principalities, a procedure which became for a long time the British policy in dealing with the native States. As a reward for his services he was created Marquis Wellesley in the Irish peerage. He extended British rule in many directions, and also paid much attention to the internal affairs of the British provinces. The Mahratta War of 1803-05 was marked by the victories of Arthur Wellesley, Lake, and others. The administration of the Marquis of Wellesley terminated in 1805. In 1809 he was sent as envoy to Spain, and in the same year he became Secretary of State for Foreign Affairs under Perceval. He acquitted himself well in the many important negotiations that required his attention. After Perceval's assassination in 1812 he tried to form an administration of his own, but in vain. Until 1821 Wellesley remained out of office, and was usually in opposition, believing that it would have been better to allow Napoleon to continue to rule, though with restricted power. In 1821 he accepted the position of Lord Lieutenant of Ireland, and was at first well received by all parties, but when he sought to reconcile Catholics and Protestants, he aroused the opposition of the Orangemen. He resigned in 1828, but held the same office again in 1833-34. He retired to private life, and died September 26, 1842. He was one of the greatest colonial administrators Great Britain has ever had, and together with Dalhousie and Hastings firmly established the British power in India. Consult: Martin, *Despatches, Minutes, and Correspondence of the Marquis Wellesley During His Administration in India* (5 vols., London, 1836); Hutton, *The Marquis Wellesley* (Oxford, 1893). See India.

WELLESLEY COLLEGE. An undenominational institution for the higher education of women at Wellesley, Mass., founded in 1875 by Henry Fowle Durant, of Boston. Students are admitted either by examination or by certificate from approved schools. The courses are largely elective and lead to the degrees of B.A. and M.A. The college is a contributor to the American schools of classical study at Rome and Athens, to the Marine Biological Laboratory at Woods Hole, Mass., and to the Zoölogical Station at Naples. The attendance in 1904 was 981, the force of instructors numbered 90, and the library contained 55,543 volumes. In the same year the endowment was $838,936 and the gross income $314,133.

WELLESLEY PROVINCE. A province of Penang (q.v.), the most northerly of the British Straits Settlements (q.v.), on the western coast of the Malay Peninsula (Map: Burma, D 6). Area, 288 square miles; population, over 100,000. Tapioca, rice, sugar, and pepper are produced.

WELLHAUSEN, vĕl′hou-zen, Julius (1844—). A German Oriental and biblical scholar. He was born at Hameln, and studied under Ewald at Göttingen. He became professor at Greifswald in 1872, but resigned because of theological disagreement with his conservative colleagues. He then became professor at Halle (1882), at Marburg (1885), and at Göttingen (1892). As an Old Testament scholar Wellhausen holds a unique position for his work in literary criticism and historical reconstruction. One of his earliest books, *Pharisäer und Sadducäer* (1874), is the classic treatise upon that subject. The most important of his other biblical writings are: *Text der Bücher Samuels* (1871); *Geschichte Israels* (1878), expanded into *Prolegomena zur Geschichte Israels* (1883; 3d ed. 1886; Eng. trans., Edinburgh, 1883, 1891); *Israelitische und jüdische Geschichte* (1894; 4th ed. 1901); *Die Composition des Hexateuchs und der historischen Bücher des Alten Testaments* (1885, 1889); *Die* *kleinen Propheten* (1902), a remarkably fruitful critical brochure; *The Book of Psalms* (in *Sacred Books of the Old Testament*, Leipzig, 1895; Eng. trans., 1898). In his later career Wellhausen has devoted himself especially to early Arabic literature, where he has achieved fundamental results, most of which are contained in *Skizzen und Vorarbeiten*, including *Reste des arabischen Heidenthums* (last ed. 1897); *Medina vor dem Islam* (1889); *Prolegomena zur ältesten Geschichte des Islams* (1899); he has also published *Muhammed in Medina* (1882), a translation of Wakidi; *Das arabische Reich und sein Sturz* (1902). His latest work is in the New Testament field, *Das Evangelium Marci* (1903).

WEL'LINGBOROUGH. A town in Northamptonshire, England, 10½ miles east-northeast of Northampton (Map: England, F 4). It has manufactures of boots and shoes, and there are iron ore mines, blast furnaces, and chalybeate springs. Population, in 1901, 18,412.

WEL'LINGTON. The capital of New Zealand, beautifully situated on a bay of Port Nicholson, an inlet of Cook's Strait, on the southern coast of North Island (Map: New Zealand, E 4). The harbor is a fine expanse of water six miles long and five miles broad, and has excellent wharf accommodations. Since the removal of the seat of government hither from Auckland, in 1865, the town has made rapid progress; it possesses a number of good public buildings, including a handsome structure for the use of the House of Representatives and the Legislative Council. The streets are generally spacious. Wellington has two cathedrals, together with numerous other denominational places of worship, Freemasons' Hall, public library, fine botanical gardens, a public park, and extensive water-works. Victoria College is affiliated with the University of New Zealand. The industrial establishments include flour and saw mills, tanneries, foundries, meat-preserving factories, soap and candle works, brick kilns, breweries, etc. Founded by Colonel Wakefield in 1840, Wellington was the first settlement of the New Zealand Company. Population, in 1891, 31,000; in 1901, 43,586.

WELLINGTON. The county-seat of Sumner County, Kan., 30 miles south of Wichita, on Slate Creek, and on the Chicago, Rock Island and Pacific and the Atchison, Topeka and Santa Fe railroads (Map: Kansas, E 4). It is an important shipping centre for the grain, live stock, and farm produce of the surrounding district, and has large flouring mills, grain elevators, and a plow factory. There are extensive salt deposits. The water-works and the electric light plant are owned and operated by the municipality. Population, in 1890, 4391; in 1901, 4245.

WELLINGTON, Arthur Mellen (1847-95). An American civil engineer, born in Waltham, Mass. From 1878 to 1881 he was chief assistant in the engineering department of the New York, Pennsylvania and Ohio Railway, and afterwards he held positions with the Mexican Central and the Mexican National Railway. In 1884 he became connected with the *Railway Gazette*, and in 1887 with the *Engineering News*. The various enterprises with which he was concerned included the abolition of grade crossings at Buffalo, the improvement of railway terminals and erection of the Board of Trade building at Toronto, and the plans for the Boston subway. He published: *Computation of Railway Earthworks from Diagrams* (2 vols., 1874); *The Economic Theory of Railway Location* (1877 and 1887); *Car Builders' Dictionary* (1884); *Field Work of Railway Location and Laying Out of Works* (1889).

WELLINGTON, Arthur Wellesley, first Duke of (1769-1852). A British general and statesman. He was the fourth son of Garret Wellesley, first Earl of Mornington, and was born in 1769, probably on the 29th of April, at Dublin, though both the date and the place are doubtful. His education was begun at a private school at Chelsea, whence he was sent to Eton, where he remained until the death of his father in 1781. He was an unpromising boy, and his mother, deciding that her "ugly boy Arthur" was "fit food for powder and nothing else," sent him to a military academy at Angers, France, for one year. He entered the army in 1787, and rose rapidly, receiving his commission as colonel in 1796. At first he saw but little of military service, but in 1794-95 he served with conspicuous gallantry in Holland against Pichegru. In 1796 Wellesley was ordered to India, and arrived at Calcutta with his regiment in the following year. His brother, the Earl of Mornington, afterwards the Marquis of Wellesley, was named Governor-General, and landed at Calcutta in May, 1798. In August Wellesley was transferred to the Madras establishment. In 1799 the campaign of the English against Tipu Sahib, ruler of Mysore, was undertaken. Wellesley commanded the English left at Malavelly, but remained with the reserves when Seringapatam was stormed. Nevertheless, he was named Governor of the conquered State, and until the beginning of 1803, save for brief intervals, was in control of both the military forces and the civil administration. In 1800 he pursued and defeated Dhundiah Waugh, a freebooter who had collected an army of 40,000 and was invading Mahratta territory. In the Mahratta War of 1803-05, Wellesley commanded the English forces in the south. After capturing the fortress of Ahmednagar, he unexpectedly found himself at Assaye in the presence of about 40,000 Mahratta troops with 100 guns, while he had only 4500 men and 17 guns, together with about 5000 auxiliary troops. He assumed the offensive, and by means of daring but hazardous movements, won a complete victory (September 23d). The battle of Argaum and the storming of Gawilgarh completed the discomfiture of the Mahratta chiefs. Wellesley received the thanks of Parliament and was made K.C.B. In 1805 he sailed for England.

During the three years from Wellesley's landing in England until his departure for Portugal, he held various minor military offices. In 1806 he entered Parliament. He was returned again in 1807, and in the same year was named Privy Councilor and Chief Secretary for Ireland, holding the latter office for two years. He distinguished himself in the expedition against Copenhagen in 1807, and in the following year was commissioned lieutenant-general. In July, 1808, Wellesley sailed from Cork with the first English contingent destined to aid the Portuguese and Spanish in their revolt against Napoleon. It was intended that he should be fourth in command, the superior officers following with reënforcements. He landed at Mondego Bay and gained the victory of Vimeiro (August 21st), which resulted in the Convention of Cintra, providing for the peaceful withdrawal of the French troops in English vessels from Lisbon. Wellesley was superseded on the day following the battle, and, finding his advice disregarded, retired to England. Both he and his two superiors were brought before a cou t of inquiry to justify the Convention of Cintra, which was unpopular in England. The English army, however, which had been under the command of Sir John Moore (q.v.) having been forced to embark at Corunna owing to the overwhelming numbers of the French, Wellesley was sent to Portugal with a new force, landing at Lisbon April 22, 1809.

Throughout the Peninsular campaigns, Wellesley was hampered by the lack of supplies and men, and by the incompetence of his Spanish allies. He had, moreover, to cope with overwhelming numbers of the enemy. There were nearly or quite 300,000 French soldiers in the Peninsula during the greater part of the time. The necessity of keeping down an insurgent population involved their wide dispersal, however, and gave Wellesley his opportunity to attack them in detail, relying on the badness of the Spanish roads to prevent their rapid concentration. On May 12, 1809, Wellesley drove Soult from Oporto, and on July 27-28th defeated an army nearly twice as large as his own under Victor at Talavera, not far from Madrid. But he had insufficient forces to maintain the position gained, and retreated to Portugal. For these victories he was made Baron Douro of Wellesley and Viscount Wellington of Talavera (September 4th). Early in 1810 Napoleon sent 150,000 reinforcements into Spain, and formed an army of 80,000 under Masséna to drive the English into the sea. Wellington retired stubbornly before the superior forces of the enemy, devastating the country as he went, until he reached the lines of Torres Vedras (q.v.), barring the way to Lisbon. Masséna remained helpless before the English position from October 12, 1810, to March 11, 1811, when scarcity of supplies forced him to retreat, stubbornly followed by Wellington. On April 5th Masséna recrossed the Portuguese frontier, having lost 30,000 men. This marks the turning-point in the Peninsular War. Parliament no longer wavered in its support, and Napoleon was already withdrawing troops for the Russian campaign. Wellington captured the frontier fortresses of Ciudad Rodrigo (January 19, 1812) and Badajoz (April 6th), and the way was open into Spain. On July 22d he utterly defeated a superior force under Marmont at Salamanca, and entered Madrid amid great enthusiasm. The French completely abandoned Southern Spain and gathered in such numbers that Wellington, after besieging Burgos in vain, retreated to Portugal. For this campaign he was made Marquis of Wellington. The campaigns of 1813 and 1814 were fought with the fortunes of Napoleon in full decline. On June 21, 1813, Wellington defeated King Joseph at Vitoria. The fortresses of San Sebastián and Pamplona fell into his hands and the French forces under Soult were driven across the Pyrenees. In 1814 Wellesley was already in possession of Bordeaux, and after an engagement with Soult in April he was on the point of entering Toulouse when news of peace put an end to further hostilities. For these closing campaigns Wellington was made Marquis of Douro and Duke of Wellington, and received a grant of £400,000. In July, 1814, he was sent as Ambassador Extraordinary to France, but in February, 1815, was transferred to the Congress of Vienna. Upon the return of Napoleon from Elba, he was summoned to command the forces of the English and Allies in Belgium, in coöperation with a Prussian army under Blücher. The battles of Ligny (q.v.) and Quatre Bras (q.v.) were followed on June 18, 1815, by the great battle of Waterloo (q.v.), which finally shattered the power of Napoleon. From 1815 to 1818 Wellington commanded the army of occupation in France.

On his return to England, he was made master-general of the ordnance, with a seat in the Cabinet. He represented England in the Congress of Verona (1822), where he advocated the policy of non-interference in Spanish affairs. In 1826 he went to Russia to negotiate a treaty providing for the partial independence of Greece. He was an extreme Tory, contending for the political influence of wealth and the supremacy of the landed aristocracy. He distrusted and disliked popular movements and was inclined to regard them as the result of artificial and unscrupulous agitation. He advocated the supremacy of the English settlers in Ireland, deprecated political concessions to the Irish people, and opposed Catholic emancipation and the reform of Parliament. He was a member of the Cabinet until the retirement of Lord Liverpool, February, 1827, but he refused to serve during the short Premiership of Canning. After the brief administration of Goderich, Wellington was Prime Minister from January, 1828, to November, 1830. His previous military career unfitted him in many ways for the office, and there was much dissension in the Ministry. In 1829 Wellington forced through Parliament the Catholic Emancipation Act, having become convinced that it was the only way to avert a war with the Irish nation. In 1830 he declined to consider proposals for the reform of Parliamentary representation, and his Ministry was outvoted in the House of Commons. Wellington incurred intense unpopularity by his stubborn resistance to the Reform Bill in 1831-32. His house was mobbed and he was hooted in the streets. In the end he persuaded the Lords to give way in order to avert the creation of new peers. In 1834 he was elected chancellor of the University of Oxford. From December, 1834, to April, 1835, he was Secretary of State for Foreign Affairs under Peel. He took a less active part in subsequent political events, yet the prestige of his name was so great and his advice so prized that he was made a member of Peel's second Cabinet without a portfolio (1841-46). In 1842 he was named commander-in-chief for life, a post which he had previously occupied for short periods. From 1845 to 1856 he was president of the Privy Council. In his last years he regained his popularity, and was the idol of the English nation. He died September 14, 1852, and was buried in Saint Paul's Cathedral.

Consult *Wellington's Despatches, 1779-1815*, ed. by Colonel Gurwood (London, 1834-39). Colonel Gurwood has also edited *Speeches in*

Parliament (ib., 1854). There is a very extensive biographical literature. Consult the *Lives* by Gleig (London, 1858-60); Brialmont (Paris and Brussels, 1856-57); Hamley (Edinburgh, 1860); Browne (London, 1888), made up of extracts from the records; Hooper (London and New York, 1889); Sir Herbert Maxwell (London and Boston, 1899). Consult also Lord Roberts, *Rise of Wellington* (London and New York, 1895). See PENINSULAR WAR.

WELLMAN, WALTER (1858—). An American journalist and explorer, born in Mentor, Ohio. He received a common-school education. In 1869 he founded the Cincinnati *Evening Post*, and after 1884 he was the Washington correspondent successively of the Chicago *Herald* and the Chicago *Times-Herald*. In 1892 he attempted to locate the first landfall of Columbus, and built a monument on Watling Island, in the Bahamas, on the spot which he regarded as answering the description; and in 1894 he led an expedition to the Arctic regions and reached a point on the eighty-first degree of latitude, northeast of Spitzbergen. In 1898-99 he led another expedition to the Arctic regions, making Cape Tegethoff in Franz Josef Land his base of operations, and spending the winter of 1898-99 there. He established an outpost at Cape Heller, near the eighty-first parallel, and from this place in the early spring of 1899 started on a 'dash for the pole,' but at the end of March, by which time the party had reached a point off the coast of Rudolf Land, near the eighty-second parallel, he was compelled by an accident to retreat. Later a party under Baldwin, a member of the expedition, first definitely marked the eastern limits of Franz Josef Land. Wellman also reported the discovery of some twenty new lands or islands. Accounts of the second polar expedition were published by Wellman in *McClure's Magazine*, vol. xiv. (New York, 1900), in the *Century Magazine*, vol. xxxv. (n. s.) (New York, 1899), and the *National Geographical Magazine*, vol. x. (Washington, 1899).

WELLS. A city in Somersetshire, England, pleasantly situated at the foot of the Mendip Hills, 15 miles southwest of Bath (Map: England, D 5). The cathedral dates from the first half of the thirteenth century, and is for the most part in Early English; its west front, one of the noblest façades in the kingdom, enriched with 300 statues, is in Gothic. One of the most important of Wessex towns in Saxon times, Wells was created a see in 905. Population, in 1891, 4822; in 1901, 4849.

WELLS. See WELL-SINKING; WATER SUPPLY; ARTESIAN WELLS.

WELLS, BENJAMIN WILLIS (1856—). An American teacher, journalist, and author, born at Walpole, N. H. He graduated in 1877 at Harvard, and received the degree of Ph.D. in 1880. Later he studied for a time at Berlin, held a fellowship at Johns Hopkins University, was an instructor in the Friends' School, Providence, R. I., from 1882 to 1887, and from 1891 to 1899 was professor of modern languages in the University of the South at Sewanee, Tenn. In 1899 he joined the editorial staff of *The Churchman* in New York City. Besides writing numerous magazine articles, he edited a number of school texts in French and German, contributed to the *New International Encyclopædia*, and published: *Modern German Literature* (1895); *Modern French Literature* (1897); and *A Century of French Fiction* (1898). With W. P. Trent, he edited *Colonial Prose and Poetry, 1607-1775* (1901).

WELLS, CHARLES (1838—). An English Orientalist, born in London and educated at King's College, London, where he won the Turkish prize in 1860. He was professor of English at the Imperial Naval College at Constantinople from 1870 to 1874, and became professor of Turkish in King's College, London, in 1889 and Oriental translator to the Foreign Office in 1892. His publications are: *Ilm Tedbir-i-Mulk*, an essay on Turkish political economy (1860); *Mehemet, the Kurd, and Other Tales from Eastern Sources* (1865); *A Practical Grammar of the Turkish Language* (1880); and *The Literature of the Turks* (1890). He also published a revised and enlarged edition of Reahouse's *Turkish Dictionary* (1880).

WELLS, CHARLES J. (c.1799-1879). An English poet, born probably in London. He was a friend of Keats, who dedicated a sonnet to him. Under the name of H. L. Howard, Wells published a volume called *Stories After Nature* (prose) in 1822, and in 1824 *Joseph and His Brethren, a Scriptural Drama.* These having met with no success, he abandoned literature, removed to Brittany, and practiced law. Within the last twenty years the drama has been lavishly praised by critics of the Swinburnian school, and in 1876 a revision of it was published with a critical introduction by Mr. Swinburne. It is distinguished by brilliant character-study and extreme richness of diction.

WELLS, DAVID AMES (1828-98). An American economist, born at Springfield, Mass. He graduated at Williams College in 1847 and at the Lawrence Scientific School (Harvard) in 1851. His early interests were in the natural sciences and he published text-books on physics, chemistry, and geology. In 1866 he won a considerable reputation in politics through an essay *Our Burden and Our Strength.* In 1865 he was made chairman of a commission to inquire into methods of raising Federal revenues, and in 1866 was appointed special commissioner of the revenue. After his term of office expired he was appointed to membership on several commissions, State and Federal, and he rendered distinguished service in private enterprises, notably in the reorganization of the Alabama and Chattanooga Railway and of the Erie Railway. He was a prolific writer on economics and finance, at first defending the protectionist policy, later becoming an extreme advocate of free trade. His principal works are: *Our Merchant Marine* (1882); *A Primer of Tariff Reform* (1884); *Practical Economics* (1885); *The Relation of the Tariff to Wages* (1888); *Recent Economic Changes* (1898).

WELLS, HENRY TANWORTH (1828—). An English painter, born in London. He at first painted miniatures, but in 1861 exhibited at the Royal Academy a full-length portrait of Lord Ranelagh. During Lord Leighton's absence from England on account of ill health, Wells acted as deputy president of the Academy. His works include: "Group of Portraits at Table" (1862); "Tableau Vivant," a portrait of three sisters

(1865); "Mr. Robert Jardine with Greyhounds" (1876); "Victoria Regina" (1880), picturing the Queen receiving the news of William IV.'s death; and "The Queen and Her Judges" (1887), which was his largest canvas.

WELLS, Herbert George (1866—). An English novelist, born at Bromley, in Kent. He was educated at the Midhurst grammar school and the Royal College of Science, taking his degree in 1888. From 1894 to 1896 he was on the staff of the *Saturday Review.* His scientific training, first shown in the publication of a *Text-Book on Biology* (2 vols., 1892-93), prepared him for a remarkable series of romances in which Swift's circumstantial method is applied to the hints of modern science. The series includes: *The Time Machine* (1895); *The Stolen Bacillus and Other Stories* (1895); *The Wonderful Visit* (1895); *The Island of Doctor Moreau* (1896); *The Wheels of Chance* (1896); *The Plattner Story and Others* (1897); *The Invisible Man* (1897); *The War of the Worlds* (1898); *When the Sleeper Wakes* (1899); *Tales of Space and Time* (1899); *Love and Mr. Lewisham* (1900); *The First Men in the Moon* (1901); *Anticipations* (1901); *The Lady of the Sea* (1902); and *Mankind in the Making* (1903). We owe to him also a volume of essays entitled *Certain Personal Matters* (1897).

WELLS, Horace (1815-48). An American dentist, born in Hartford, Vt. He studied dentistry in Boston, and practiced it for a time there till 1836, when he removed to Hartford, Conn. He had already conceived the idea that some anæsthetic might be used in dentistry to prevent pain, and had thought of the employment of nitrous oxide gas as early as 1840. In 1844 he used it successfully in several cases. Early in 1845 he communicated his discovery to Drs. Hayward, Warren, W. T. G. Morton, C. T. Jackson, and others in Boston. In 1846 Dr. Morton and Dr. Jackson obtained a patent for anæsthetics against the remonstrance of Wells. After a visit to Paris, where he communicated his discovery to the French medical societies, and on his return to America, he published *A History of the Discovery of the Application of Nitrous Oxide Gas, Ether, and Other Vapors to Surgical Operations* (1847). The dispute as to his discovery and constant experiments upon himself with chloroform produced mental alienation. While in New York, where he was urging his claims before the medical profession he was arrested and committed suicide. Wells was certainly the first to carry to a successful issue the use of an anæsthetic in surgical operations, with the possible exception of Crawford W. Long (q.v.), whose success was not known till 1849. To Morton is due the credit of having made the discovery widely known and having put it within the reach of the surgical world. See Anæsthesia; Morton, W. T. G. Consult *Dr. Wells, the Discoverer of Anæsthesia* (New York, 1860).

WELLS, Sir Thomas Spencer (1818-97). An English surgeon and ovariotomist, born at Saint Albans (Hertfordshire), and educated at Trinity College, Dublin, and at Saint Thomas's Hospital, London. In 1841 he was admitted to the Royal College of Surgeons, and in that institution subsequently held all the principal offices. After serving in the Naval Hospital at Malta, he studied under Magendie in Paris, and in 1853 established himself as an ophthalmic surgeon in London. He was chosen surgeon at the Samaritan Free Hospital for Women and Children (1854). At the Samaritan Hospital he began the work in abdominal surgery which made his name famous. In 1858 he first performed the discredited operation of ovariotomy. In spite of much opposition, the method was finally accepted by the profession in 1864, and by 1880 Wells had performed his thousandth operation. For his achievements Wells was elected to the King's and Queen's College of Ireland, and to the Irish Royal College of Surgeons, and received many other honors. He was one of the first advocates of cremation in England and was largely instrumental in obtaining countenance for that system. He published: *Practical Observations on Gout and Its Complications* (1854); *Cancer Cures and Cancer Curers* (1860); *Diseases of the Ovaries: Their Diagnosis and Treatment* (1865-72; also Leipzig, 1866-74; and U. S. A.); *On Ovarian and Uterine Tumors: Their Diagnosis and Treatment* (1882; also Milan, 1882); *Diagnosis and Surgical Treatment of Abdominal Tumors* (1885; also Paris, 1886).

WELLS, Webster (1851—). An American mathematician, born in Boston, Mass. He graduated in 1873 at the Massachusetts Institute of Technology, where he was an instructor from 1873 to 1880, and later became successively an assistant professor (1883), an associate professor (1885), and a full professor (1893) of mathematics. He is chiefly known as the author of a series of mathematical text-books, which are used in many schools and colleges in the United States. His publications include: *Logarithms* (1878); *University Algebra* (1878); *Plane and Spherical Trigonometry* (1884); *Plane and Solid Geometry* (1887); *Higher Algebra* (1889); *College Algebra* (1890); *Academic Arithmetic* (1893); and *Complete Trigonometry* (1900).

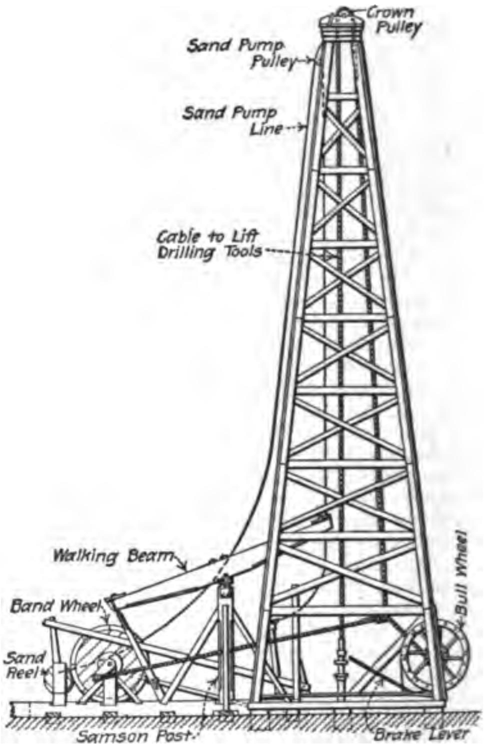
WELLS, William Charles (1757-1817). An American scientist, born in Charleston, S. C. He graduated at Edinburgh in 1780, and subsequently at Charleston was printer, book-seller, and merchant. In 1782 he accompanied the Loyalist troops to Saint Augustine, Fla., where he was editor of the first weekly newspaper in the province. In 1784 he went to London, and in 1800 became a physician of Saint Thomas's Hospital. His scientific reputation is based upon his *Essay on Dew* (1814; new ed. 1866). In a paper read by him in 1813 before the Royal Society, he recognized, according to the statement of Charles Darwin, the principle of natural selection. He also published *Single Vision with Two Eyes* (1792). His essays were published with an autobiography in 1818.

WELLS COLLEGE. An undenominational academic institution for women at Aurora, N. Y., founded in 1868 by Henry Wells. The courses of instruction are partially elective and lead to the degrees of bachelor and master of arts. There were in 1903 123 students and 22 instructors. The library contained 12,000 volumes. The grounds and buildings were valued at $150,000, the total value of the college property being $425,000, the endowment $200,000, and the income $68,000.

WELL-SINKING (AS. *well*, *wel*, well, spring, OHG. *wella*, Ger. *Welle*, wave, billow, from AS. *weallan*, OHG. *wallan*, Ger. *wallen*, to well, boil up; connected with Lith. *vilnìs*, OChurch Slav. *vlŭna*, wave, billow, Lat. *volvere*, Gk. *ειλύειν*, *eilyein*, to turn, Skt. *ūrmi*, wave). The digging, boring, or drilling of holes in the earth for the development of supplies of water, petroleum, natural gas, or salt. The process is generally accompanied or immediately followed by the curbing or casing of the well to prevent it being choked by the material penetrated, or to shut out all liquids except the yield of the stratum which the well is designed to tap. Besides the development of subterranean liquids, wells or their equivalent in construction are also used in prospecting for solid minerals and in determining the character of soil and rock, foundations, and other engineering structures. Wells vary in diameter from 1 inch to 100 feet and in depth from 5 feet to 6000 feet. The methods of sinking employed depend upon the character and depth of the material penetrated, rather than the object for which they are sunk. Wells are classified according to the methods of sinking, as dug, drilled, bored, driven, and jet; by the lining employed, as curb, tube, and case; as open, in the case of relatively large, shallow wells; as shallow or deep; and as artesian, flowing, non-flowing, or pumping, as the case may be.

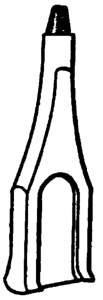
Wells from a few feet to a hundred or so in diameter and depth are generally sunk by means of picks and shovels, or by digging. The sides frequently require to be supported while the sinking is under way, particularly if quicksand or large quantities of water are encountered. Sheet-piling or planks driven into the ground at the outer edge of the excavation may be employed, with proper cross-bracing where necessary, or a wooden or metal crib or caisson provided with a shoe or cutting edge may be used. The latter generally sinks of its own weight if the material within the well is removed. The sinking process may be and generally is aided by building the curb or lining wall directly on the shoe, the increasing weight gradually forcing the shoe and curb downward. More or less water is likely to be encountered. It may be removed by a centrifugal pump, a pulsometer, or a direct-acting steam pump. Small wells of no great depth, provided with a metal tubing or casing, are often driven by hammer blows, whence the name driven or tubular wells. The tubes thus driven may have solid, pointed ends or drive points, or their lower ends may be open. In any case the lower sections must be perforated. Both round holes and slotted holes are employed, and where very fine material is encountered gauze wire strainers may be necessary. If the well-casing is open at the bottom the material pierced must be removed by sand pumps or buckets, or by a hydraulic or steam jet. Artesian wells and most other deep wells penetrate more or less rock. Some shallow wells also go through or into rock, particularly in prospecting for coal and the like, or in exploring for foundations. In all such cases resort is had to drilling. For relatively small and shallow holes ordinary hand drills and diamond drills may be used. (See DRILL.) But in most operations for water, gas, and oil wells, a regular drilling rig is necessary after rock is struck. So long as the sinking is through sand or other easily worked material, wrought-iron or steel tubing may be driven down with mauls, either by hand, horse, or steam power; by means of a jet; or by the sand pump or bucket method, combined with rotation of the tube or casing. The hydraulic jet is simply a stream of water under pressure introduced at the bottom of the well through a supply pipe, or through a hollow drill. The force of the water aids in loosening the material and also brings it to the surface. The sand pump or bucket is a simple form of pump, lowered into the well hole, filled, raised, and emptied.

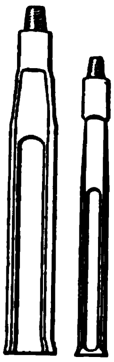
In drilling wells for gas, oil, or water the most common outfit employed is the familiar derrick rig of the oil regions, combined with a boiler, engine, drill, and accessories, and the necessary hoisting apparatus for raising and lowering the drills and the sand pumps. In the case of oil wells the derrick and power plant may be left in place to operate a pump, the latter being substituted for the drill. Derricks for drilling wells are some 20 feet square at the base, 70 feet to 100 feet high, built up of either timber or steel. The engine drives a band wheel to which a pitman is attached. The pitman works a walking beam, supported by a Samson post. To the other end of the beam the string of tools is attached. The tools include a drill, above which there is an auger stem, jars, a sinker bar, and either cable or wooden poles for suspending the string of tools as the hole is deepened. The drill and accessories are lifted by the walking beam. The jar is a device acting



OUTFIT FOR DRILLING DEEP WELLS.
(The band wheel is driven by an engine.)

on the principle of two loose links of a chain and designed to loosen the drill by giving a jarring, upward blow. A temper screw is provided for minor adjustment of the drill as to depth. As the work progresses it is necessary to lift out the drill and accessories and substitute a new one, at the same time using the sand pump to remove the material lossened by the drill. A bull wheel at the base of the derrick and a crown pulley at its top, together with a cable, are used to lift the tools, by means of the engine. A sand reel at the base of the derrick, a sand pump pulley at its top, and a sand pump line perform a like service for the pump. Besides the tools named there are special tools for use in sinking the well, and an almost endless variety of fishing tools for recovering lost or broken drilling tools. The casing generally follows pretty closely after the drilling. Packing rings of corrugated rubber and other devices are used to shut out any foreign fluid from the casing. Deep wells are often begun with large casings. When such a casing has been sunk as far as practicable a smaller one is inserted within it.


Spudding Bit for use in Earth.


Drilling Bits for use in Rock.

The cost of a full-sized artesian well outfit, such as is commonly used in the oil wells and for deep artesian wells, is about $10,000. Much simpler and cheaper rigs are used for smaller wells, horse power being substituted for steam. Very effective work is often done by a spring pole operated by two or more men. The tools are suspended from the free end of a pole or beam, which is rigidly secured at or near the other end. The men pull down the pole, then slack the ropes, whereupon the pole flies back into a horizontal position, lifting the drill with it.

Well-sinking of one sort or another is older than history. Comparatively large wells naturally preceded the bored and drilled ones by many centuries. Some of these, even in early times, were a hundred or more feet deep. A laborious method of drilling was employed centuries ago by the Chinese and Hindus. The drill was raised a few feet at a time by means of a rope attached to a lever, then it was let fall by its own weight. Modern deep well-sinking methods had a rude beginning early in the nineteenth century. In 1818 an impulse to the movement for better methods was given by the French Society for the Encouragement of Agriculture. The Grenelle and Passy wells for the supply of Paris were ten and six years in the sinking. The Grenelle well is 1780 feet deep, 8 inches in diameter, and was completed in 1842. The Passy well is 1913 feet in depth, yields 5,500,000 gallons a day, and was completed in 1861. The well was started with a diameter of 40 inches. The wrought-iron drills were lifted by means of wooden poles eight inches square. Jars similar in principle to those already described were used. Subsequently a well 47 inches in diameter and 2900 feet deep was drilled at Butte-aux-Cailles, the drill being worked by a walking beam and steam engine. The first well sunk exclusively for oil was put down near Titusville, Pa., in 1859, by Colonel E. L. Drake. It was sunk by a small derrick rig. Since then the American system of well-drilling, as already described, has been adopted for putting down water, oil, and gas wells all over the world. It is notable for the comparative simplicity and effectiveness of the machinery employed and for the ingenuity displayed in overcoming all difficulties. In 1872 what was at least one of the earliest natural gas wells was sunk at Newton, Pa. The gas from it was piped through a two-inch main and a 3¼-inch pipe line, 5½ miles long, to Titusville, Pa.

Among the deepest wells that have been put down the accompanying table shows the most important:

DEEP WELLS OF THE WORLD

LOCALITY	Depth	Manner of sinking	Object
Sperenberg, near Berlin, Germany............	4170 ft.	Rotary diamond drill.................	Salt
Wheeling, West Virginia........................	4500	Oil well outfit.....	Gas or oil
Peter's Creek, Pittsburg, Pa..................	5580	" "	"
Schladabach, near Leipzig, Germany.....	5740	Rotary diamond drill	Salt
Paruschowitz, near Reibnik, Silesia........	6600	Rotary diamond drill............... .	Salt

BIBLIOGRAPHY. Cox, *Artesian Wells* (Brisbane, Queensland, 1895), a semi-popular account of the methods and machinery employed in their construction; Webster, "Natural Gas in the United States," in *Cassier's Magazine* (New York, February, 1898). See ARTESIAN WELLS; GAS, NATURAL; PETROLEUM; PIPE LINES; WATER SUPPLY.

WELLS'TON. A city in Jackson County, Ohio, 85 miles south by east of Columbus, on the Baltimore and Ohio Southwestern, the Cincinnati, Hamilton and Dayton, the Detroit Southern, and the Hocking Valley railroads (Map: Ohio, E 7). It is in the midst of a coal and iron mining section, and is extensively engaged in the manufacture of cement. There are also blast furnaces, foundries, a barrel factory, etc. The government is vested in a mayor, chosen biennially, and a unicameral council. The water-works and the electric light plant are owned and operated by the municipality. Wellston was settled about 1871, and was incorporated in 1876. Population, in 1890, 4377; in 1900, 8045.

WELLS'VILLE. A city in Columbiana County, Ohio, 39 miles north of Wheeling, W. Va., on the Ohio River, and on the Pennsylvania Railroad (Map: Ohio, J 4). It is chiefly an industrial centre, and is especially known for its important iron, steel, and terra-cotta interests. There are railroad shops and manufactories of pottery, boilers, nails, brick, and foundry and machine-shop products. The vicinity has deposits of coal. The water-works are the property of the municipality. Population, in 1890, 5247; in 1900, 6146.

WELS, vĕls. A town in Upper Austria, 17 miles southwest of Linz, on the Traun River (Map: Austria, C 2). The chief features are the ninth-century Gothic church, the old castle, town hall, and park. There are manufactures of machinery, paper, copper, brass, oil, leather, flour, etc. Population, in 1900, 12,187.

WELS′BY, William Newland (c.1802-64). An English legal writer, born in Cheshire. He was educated at Saint John's College, Cambridge, as a pensioner, and was called to the bar in 1826 It is as a writer and editor of legal works rather than as a practitioner that he is remembered. He edited, in collaboration with various other lawyers, 26 volumes of *Exchequer Reports* (1837-56); *Reports of Mercantile Cases* (1829-30); *Chitty's Collection of Statutes* (1851-54); a set of Blackstone's *Commentaries* (1847), and several other works of smaller proportions.

WELSER, vĕl′zẽr. The name of a famous burgher family of Augsburg, Germany. Its history can be traced back to the thirteenth century. Later its members became widely known as prominent merchants. Bartholomäus Welser lent the Emperor Charles V. a great sum of money for which in 1528 he received as security the Province of Venezuela, but in consequence of their rapacious acts the Welsers were deprived of their rule before the Emperor's reign was over. Bartholomäus's niece, Philippine (1527-80), daughter of Franz Welser, renowned for her learning and beauty, secretly married the Archduke Ferdinand, second son of the Emperor Ferdinand I. Her children were debarred from inheriting their father's rank, but one of them became a cardinal and the other distinguished himself as a soldier and was created Margrave of Burgau. Another member of the Welser family, Markus (1558-1614), became famous for his learning. In the fifteenth and sixteenth centuries branches of the family settled at Nuremberg and in Austria, respectively.

WELSH, Herbert (1851—). An American political reformer and worker for the betterment of the Indians. He was born in Philadelphia, the son of John Welsh (q.v.). He graduated at the University of Pennsylvania (1871), became known as an earnest advocate of the rights of Indians, visited the Sioux Reservation in 1882, and urged upon the public and Congress education for Indian children, holding of lands in severalty by the Indians, and the extension of the civil law to their reservations. As a result of his lectures and addresses, the Indian Rights Association was founded in Philadelphia in 1883. He was also prominent in State politics as a reformer, especially in the election of 1890; was president of the Civil Service Reform Association of Pennsylvania, member of the executive committee of the National Civil Service Reform League, and editor of *City and State*, a weekly devoted to the interests of good government. His more noteworthy books are: *Four Weeks Among Some of the Sioux Tribes in 1882; Civilization Among the Sioux Indians; A Visit to the Navajo, Pueblo, and Hualapai Indians of New Mexico and Arizona in 1884;* and *The Other Man's Country* (1900), a criticism of the Government's Philippine policy.

WELSH, John (1805-86). An American merchant, born in Philadelphia. He was educated in that city and became prominent in business there. For many years he had an active interest in public affairs. During the Civil War he promoted measures of relief and in 1864 became president of the Philadelphia Sanitary Fair, which raised $1,080,000 for army hospitals and ambulances. In 1873 Welsh was elected president of the board of finance of the Centennial Exposition and was chosen at each subsequent election. To his executive ability the success of the Exposition was largely due, and his services were recognized by the city in a subscription of $50,000. With this he endowed the John Welsh chair of English literature at the University of Pennsylvania. He was appointed Minister to Great Britain in 1878, but resigned in the following year.

WELSH CALVINISTIC METHODISTS. See Presbyterianism.

WELSH LANGUAGE AND LITERATURE (AS. *Wealh*, Welshman, OHG. *Walh*, Frenchman, from *walhisc*, Ger. *welsch*, foreign; connected with Celtic *Volcæ*, name of a tribe in Gaul). The literature of Wales is more ancient and far more extended than that of either Cornwall or Brittany, and is to be compared rather with that of Gaelic Ireland. Irish is richer than Welsh as regards the quantity and interest of its ancient monuments, but modern Welsh has held its place as a literary language more successfully than modern Irish. In the history of Welsh, as in that of all the Celtic languages (q.v.), three periods are regularly recognized: *Old Welsh*, extending from the time of the earliest monuments through the tenth century; *Middle Welsh*, from the eleventh to the sixteenth century; and *Modern Welsh*, from the sixteenth century to the present time.

Old Welsh. The monuments of the earliest period are of the same sort in Wales as in Ireland, though much more scanty. The very oldest material is found in funeral inscriptions, some of which date back to the fifth century. These are written in Latin, but the proper names furnish valuable evidence with regard to the character of primitive Welsh. A considerable number of Old Welsh glosses have been preserved in manuscripts ranging from the eighth to the tenth century, but no literary texts have come down from this period. Whether any of the pieces preserved in later manuscripts, but traditionally ascribed to ancient poets, really belong to the times of their reputed authors, is still an unsettled question. The heroic age of Welsh history falls in the sixth century, and several great bards are supposed to have lived at that time. The most famous are the so-called *cynfeirdd:* Aneurin, Llywarch Hen, Merlin, and Taliesin; and many poems bearing their names exist in manuscripts of the twelfth and succeeding centuries. Only a few poems have come down to us which purport to have been written in the period between the sixth century and the twelfth.

Middle Welsh. The earliest continuous texts of assured date appear in the *Book of Llandaff* (*Liber Landavensis*), a manuscript of the twelfth century. To the early Middle Welsh period belongs also the collection of ancient laws ascribed to Howel Dda and probably compiled in their substance in his time. The oldest manuscript of the laws belongs also to the twelfth century. These monuments of course possess rather historical than literary interest. The Middle Welsh literature, properly speaking, falls into two main divisions—bardic poetry and prose romance.

During the ages of struggle between Saxons and Welshmen, the bards were an important class in society, and a very considerable quantity of their poetry has been preserved. Their most flourishing period extends from the time of Gruffudd ab Cynan's return from Ireland in 1080 to the death of Llewelyn ab Gruffudd, the last Prince of Wales of the British line, in 1282. Among the foremost of these Middle Welsh poets were Meilyr, Gwalchmai his son, Owain Cyveiliog and Howel ab Owain Gwynedd (both royal princes), Einion and Meilyr (sons of Gwalchmai), Davydd Benfras, Llywarch ab Llywelyn, Gruffudd ab Maredudd, Cynddelw, and Elidir Sais. After the reign of Llewelyn ab Iorwerth in the first half of the thirteenth century, a decline began in the work of the poets. But the elegy on Llewelyn ab Gruffudd by Gruffudd ab yr Ynad Goch ranks with the best productions of the earlier bards. The poetry of this whole period lacks variety and broad human interest. The greater number of pieces are eulogistic addresses to living princes or elegies on the dead, and they contain little sustained description and almost no narration. The metrical form is usually very conventional, and the language is often obscure. But the style has much elevation and gives expression to strong national spirit. Not infrequently, too, there is revealed a genuine feeling for the beauties of nature, as in some of the poems of Gwalchmai, or fine romantic sentiment, as in the love-poems of Howel ab Owain. To these centuries belong also some religious pieces, and certain mythological poems that are very difficult of interpretation. In some productions of the period—particularly in those of Howel ab Owain—there occur 'Druidical' passages which have led to the theory that the mediæval bards had inherited in some way the philosophy of the ancient Druids. But there is no sufficient ground for this opinion. See Bard.

In the fourteenth century literature received a new impulse, and the poetry of this revival, touched by the influence of the dawning Renaissance, has more general and abiding interest than most of that written by the earlier bards. War songs and elegies now give place in large measure to poems of nature and romantic love. Rhys Goch and Davydd ab Gwilym are the most conspicuous representatives of the new style. The latter, commonly known as the 'Cambrian Petrarch,' combines such charm of fancy and beauty of expression as to stand in the first rank of mediæval lyric poets. The fourteenth century is sometimes called the Golden Age of Welsh poetry. Among the bards who lived then were Rhys Goch Eryri and Iolo Goch. The later Middle Welsh poets were for the most part not equal to Davydd ab Gwilym and his contemporaries. Among the best of them were Lewis Glyn Cothi (of the fifteenth century) and Tudur Aled and Gutyn Owain (about 1500).

The prose literature of the Middle Welsh period consists chiefly of chronicles and romantic tales. The first do not differ in character from the annals of the surrounding nations. The prose romances, on the other hand, form perhaps the most interesting—as they have certainly been the most widely known—of all Welsh writings. They have been treated in a separate article on the *Mabinogion* (q.v.). The Welsh of course possessed translations and redactions of the common stock of religious and didactic literature of the Middle Ages.

Modern Welsh. Welsh literature since the sixteenth century has relatively less interest than in the earlier periods of its history. With the decline of the bardic institution, poetry ceased to be cultivated as of old, and the prose of the modern period has been too largely confined to theological subjects to be of much permanent interest. A few authors, however, deserve special mention. Huw Morus stands out among the poets in the seventeenth century and Goronwy Owen in the eighteenth. The publication of Evans's *Specimens of Welsh Poetry* in 1764 was an event of importance in the early history of the romantic movement in England and one of the first signs among Welshmen of a revival of interest in their own national antiquities. At the beginning of the nineteenth century the *eisteddfod*, long since neglected, was resumed once more as an important national institution, and a new enthusiasm was stimulated among writers of both prose and verse. Specimens of the best work since the time of Huw Morus have been collected by Mr. W. Lewis Jones in his *Caniadau Cymru* (Bangor, 1898), a kind of 'Golden Treasury' of Welsh verse.

One of the first monuments of modern Welsh prose was William Morgan's complete translation of the Bible, published in 1588. This version, revised in 1620 by Bishop Parry, is still in use. In the seventeenth century the most important prose writers were Morgan Llwyd and Charles Edwards. At the beginning of the eighteenth century stands Elis Wynn, whose *Gweledigœthau y Bardd Cwsc* (*Visions of the Sleeping Bard*) is generally recognized as the greatest masterpiece of Welsh prose since the *Mabinogion*. A little later lived Theophilus Evans, whose *Drych y Prif Oesoedd* still ranks as a favorite Welsh classic. In the nineteenth century the principal prose writers have been David Owen ('Brutus'), Thomas Price ('Carnhuanawc'), Gweirydd ap Rhys, Gwallter Mechain, Lewis Edwards, and in quite recent years Daniel Owen, whose novels furnish the best pictures of Welsh life in the present day. Throughout the century a thriving periodical literature has been maintained, and in 1899 at least 29 newspapers and 39 magazines (secular and religious) were printed in the Welsh language. The Welsh, like all their Celtic neighbors, have been possessed of a rich and interesting folk-lore, but their tales are not as well preserved as those of the Gaelic peoples. Active efforts have been made in recent years to put on record and save what is left of these popular traditions; and an extensive collection of material has been published by Rhys under the title *Celtic Folk-Lore* (Oxford, 1901).

Bibliography. The sources for Old Welsh have never been collected. They may be found by consulting Hübner's *Inscriptiones Britanniæ Christianæ* (Berlin, 1876); Zeuss, *Grammatica Celtica* (2d ed., Berlin, 1871); Kuhn, *Beiträge zur vergleichenden Sprachforschung*, vols. iv. and vii.; and *Archæologia Cambrensis* (1873). The *Liber Landavensis* has been well edited by Rhys and Evans (Oxford, 1893). The laws are accessible in Aneurin Owen's *Ancient Laws and*

Institutions of Wales (English Record Commission, 1851). For discussion of the material, with full references, see Rhys and Jones, *The Welsh People*, ch. vi. (London, 1900). The most extensive collection of Middle Welsh poets is *The Myvyrian Archæology of Wales*, edited by Owen Jones, Edward Williams, and W. Owen Pughe (1801; 2d ed. 1878). For the oldest poems see W. F. Skene, *The Four Ancient Books of Wales* (Edinburgh, 1868); also the *Facsimile of the Black Book of Carmarthen*, edited by J. G. Evans (Oxford, 1888). Rhys and Evans have published remarkably accurate editions of *The Mabinogion* (ib., 1887) and *The Bruts* (ib., 1890), from the Red Book of Hergest. Other prose material is contained in Robert Williams's *Selections from the Hengwrt Manuscripts* (1876-92). To these references should be added finally the publications of the Welsh Manuscripts Society (mostly produced before the days of scientific Celtic philology) and the excellent publications of the Society of Cymmrodorion (containing valuable texts and studies). For modern Welsh the most valuable reference is *The Cambrian Bibliography* (*Llyfryddiœth y Cymry*) of Rowlands and Evans (Llanidloes, 1869). This contains a catalogue of all the Welsh books printed up to 1800. The best treatise on the early literary history of Wales is Thomas Setphens's *Literature of the Kymry* (1st ed. 1849; 2d ed. 1876). A commendable work on the modern period is the *Hanes Llenyddiœth Gymreig o 1650 i 1850*, by Charles Ashton (published by the National Eisteddfod Association in 1891). Critical comments of value were made in Matthew Arnold's essay *On the Study of Celtic Literature.*

WELSH MORTGAGE. A form of mortgage formerly used in Wales and Ireland, under which a mortgagee was authorized to enter into possession, collect the rents and profits of the land, and apply the net income to the payment of the interest on the debt. Such a mortgagee could not foreclose his mortgage, or compel payment of the principal. However, the mortgagor could not exercise any acts of ownership over the land until he paid the principal. This form of mortgage is not now used. See Mortgage; Foreclosure.

WELSH MUSIC. See Celtic Music.

WELSH ONION, or Cibol (*Allium fistulosum*). A perennial herb, a native of Siberia. Its fistular garlic-flavored leaves, which appear very early in spring, are used in soups and salads. The seed is sown in spring or summer, leaves fit for use are produced in the following spring, and the bed continues to be productive for a number of years.

WELSH TERRIER. See Terrier.

WELWITSCH, vĕl'vĭch, Friedrich (1806-72). A German botanist, born at Klagenfurt, Carinthia. He studied at the University of Vienna, and in 1839 was sent on a journey of botanical exploration to the Cape Verde Islands and Azores by the Reiseverein of Württemberg. Having been detained in Lisbon, he took up his residence in Portugal, became director of the botanical gardens of Lisbon and Coimbra, and collected 56,000 specimens in Portugal for the Reiseverein. In 1853-61 he traveled in Africa, particularly Angola and Benguela, whence he brought important botanical and zoölogical collections. From 1863 he was in London. He published: *Synopse explicativa das amostras de madeiras e drogas medicinaes de collegidas na provincia de Angola* (1862), and other writings.

WEL'WITSCH'IA. A West African plant. See Gnetaceæ.

WEM'MICK, John. A clerk in the office of Lawyer Jaggers in Dickens's *Great Expectations.* He is hard and inexorable by day in business, and gentle, flighty, and sentimental at night, when he returns to his battery-like home in Walworth, fires salutes, hoists and lowers the flag, flirts with his elderly sweetheart, and listens to the 'Aged P's' readings from the daily paper.

WEMYSS, wēms, Francis Richard Wemyss-Charteris-Douglas, ninth Earl of, and Earl of March (1818—). A British statesman who as Lord Elcho acquired great popularity as a founder of the British volunteer movement. He was born in Edinburgh, and was educated at Christ Church, Oxford. He was member of Parliament for East Gloucestershire in 1841-46, and sat for Haddingtonshire from 1847 until 1883, when he succeeded to the Earldom of Wemyss at the death of his father, and took his seat in the House of Lords. As a Liberal Conservative, he supported Sir Robert Peel in the repeal of the Corn Laws, and was Lord of the Treasury in the Earl of Aberdeen's coalition Ministry (1852-55). In 1859 the menacing attitude of France and the periodical alarms of invasion, owing to the unprotected state of the English shores, led to the organization of the volunteer army of Great Britain, in which he took the earliest and most prominent part. When the Government of Earl Russell brought in the Reform Bill of 1866, Lord Elcho organized a secession from the Whig Party, under the leadership of Earl Grosvenor, which was nicknamed the 'Cave of Adullam,' but which succeeded in defeating the bill and displacing the Government. Lord Derby, on his accession to the Premiership, offered a post in his Government to Lord Elcho, but the offer was declined.

WEN (AS. *wen*, *wæn*, dialectic Ger. *Wenne*, *Wehne*, *Wähne*, wen, wart), or Sebaceous Cyst. An encysted tumor, much more common on the scalp than in any other situation, though occasionally observed on the face or shoulders, and consisting of an obstructed sebaceous gland, which enlarges by the internal pressure of its accumulated secretion. The closed orifice may be often noticed in the form of a small dark point, and in that case the duct may sometimes be gradually enlarged by the gentle introduction of a probe or director, and its contents pressed out. After this treatment it will sometimes shrivel up and disappear. It, however, will in all probability fill up again. If this treatment fails, and the patient finds the tumor annoying, it must be exterminated by excision, which consists in exposure and cutting out of the cystic sac, containing its cheesy contents intact. Or, it may be cut into halves, evacuating the contents; after which the sac must be pulled out with a forceps. Careful antisepsis must be practiced, especially upon the scalp.

WENCESLAS, wĕn'ses-las, Ger. **WENZEL,** vĕn'tsel (1361-1419). Holy Roman Emperor from 1378 to 1400 and King of Bohemia (as such Wenceslas IV.) from 1378 to 1419. He was the son and successor of the Emperor Charles IV. At first he tried to restore order in Germany and to check the growth of the power of the nobles, but, proving unsuccessful, gave himself up to the pleasures of the chase and of wine. In 1393 he caused the priest John Nepomuk (q.v.) to be tortured to death for refusing to betray the secrets of the confessional. In 1394 the Bohemian nobles organized a conspiracy, arrested him, and confined him at Prague; but he was released by the influence of the German princes. In 1395 Wenceslas sold to Gian Galeazzo Visconti the title of Duke of Milan for 100,000 gold florins. He joined with France in the attempt to put an end to the great Schism by demanding the resignation of the rival popes, Boniface IX. and Benedict XIII. This resulted in arousing the enmity of the powerful Archbishop of Mainz, through whose influence Wenceslas in 1400 was deposed as Emperor by a majority of the Imperial electors, Rupert of the Palatinate being chosen to succeed him. In Bohemia, meanwhile, fresh strife had arisen, and in 1402 his brother Sigismund arrested Wenceslas and imprisoned him for fifteen months in Vienna. Wenceslas favored Huss and his party, and his decree of January 18, 1409, brought about the secession of the Germans from the University of Prague, and thus greatly weakened the German ascendency in Bohemia. Not long after this he resigned the reins of government in Bohemia to Sigismund. Consult: Lindner, *Geschichte des deutschen Reiches unter König Wenzel* (Brunswick, 1875-80); Palacky, *Geschichte von Böhmen*, vol. iii. (Prague, 1844).

WĔN-CHOW, wŭn′chou′. A departmental city of Che-Kiang, China, opened as a treaty port in 1877. It stands on the right bank of the Ow River about 20 miles from the sea (Map: China, F 6). Its walls are 35 feet high, have a circuit of 6 miles, and are pierced with 7 gates, the east and west walls passing over low hills which they partly inclose. It stands in a well-watered plain and is intersected by numerous tidal canals. The streets are unusually clean, and the shops good. In the middle of the river is a small island covered with the buildings of a Buddhist monastery, flanked by two pagodas, dating from the ninth and tenth centuries respectively. The town has no direct foreign trade. Population, about 85,000.

WEN′DELL, Barrett (1855—). An American author and educator, born in Boston, Mass. He graduated from Harvard College in 1877, and then studied at the Harvard Law School. From 1878 to 1880, he practiced law, first in New York City, then in Boston. He was then made instructor in English at Harvard, became assistant professor in 1888, and professor in 1898. His published works include novels, biography, critical essays, and treatises on English composition and literary history. Among them are *The Duchess Emilia* (1885) and *Rankell's Remains* (1886), both novels; *English Composition* (1891); *Cotton Mather* (1891); *Stelligeri, and Other Essays Concerning America* (1893); *William Shakspere* (1894); *Raleigh in Guiana* (1894); and *A Literary History of America* (1900), a work of great suggestiveness, much criticised on account of its unsympathetic attitude toward many popular writers, but in many ways the ablest study yet produced in its field.

WENDISH LANGUAGE. A Slavic tongue now spoken by about 115,000 persons within the German Empire. (See Wends.) Wendish was in ancient chronicles the generic name for Slavic. Little by little German began to oust Wendish, and by the fifteenth century the process was completed in the north, while in the south the struggle is still going on. The last religious service in Wendish in the north was performed at Lüneburg in 1751, and in 1826 old men were still living who could speak Wendish; but at present there is not a single person to be found in the region who knows the language. The South Wendish, at present called simply Wendish, Lusatian, Lusatian-Serbian, Sorbian or Sorabian, had a different fate. Hemmed in by the Germans, it survived in Lusatia. As a literary language its domain was extremely restricted until about the middle of the nineteenth century, since which time a considerable national Wendish literature has been developed.

WENDS. A Slavic tribe of the western group, whose migrations early in the Middle Ages carried them from their primitive seats into the heart of modern Germany. At the time of the rise of the German kingdom we find them occupying the country between the Elbe and Saale on the west and the Bober on the east and between the parallel of Berlin on the north and the Erzgebirge on the south. The early kings of Germany waged bloody wars against them and they were gradually forced eastward and finally subdued. A fragment of the Wends has survived to the present day in Lusatia (part of the Prussian provinces of Brandenburg and Silesia and the eastern part of the Kingdom of Saxony). They call themselves Serbs (Serbjo), whence the German name Sorben (Sorbs), which is applied by historians to the mediæval Wends. In early times the German tribes called their Slavic neighbors by the general designation of Wends. The Wends or Sorbs number about 115,000. They are a peasant people, mostly Protestants. See Wendish Language.

WENER, vā′nĕr, Lake. See Vener.

WEN′LEY, Robert Mark (1861—). A Scotch-American teacher and philosophical writer, born in Edinburgh, Scotland. He graduated at the University of Glasgow in 1884, and studied in Italy, France, and Germany. From 1886 to 1894 he was assistant professor of logic at Glasgow; from 1888 to 1895 was head of the philosophical department in Queen Margaret College, Glasgow University; and in 1896 became head of the department of philosophy in the University of Michigan. He was associate editor of the *Dictionary of Philosophy*, and published: *Socrates and Christ* (1889); *Aspects of Pessimism* (1894); *Contemporary Theology and Theism* (1897); *Introduction to Kant* (1897); and *Preparation for Christianity in the Ancient World* (1898).

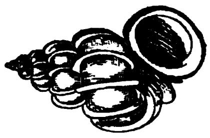
WEN′LOCK. A municipal borough in Shropshire, England, 12 miles southeast of Shrewsbury (Map: England, D 4). The principal buildings are the church, bearing traces of Saxon and Norman architecture; the town hall, an interesting structure, decorated internally with elaborate oak carvings of the time of Charles

II.; and the extensive ruins of a Cluniac abbey, founded in 680. Wenlock has manufactures of bricks and tiles, and large iron works. Population, in 1901, 15,866.

WENLOCK GROUP. An important series of rocks of Upper Silurian age, which are largely developed in Southwestern England. The group is divided into an upper and lower series. The upper, known as the Wenlock limestone, is a gray, sub-crystalline limestone, corresponding to the Niagara limestone of the United States.

WENSLEYDALE, wĕnz′lĭ-dāl, James Parke, Baron (1782-1868). An English jurist, born at Highfield, Lancashire. He was educated at Trinity College, Cambridge, was a fellow of the college in 1804-17, was called to the bar at the Inner Temple in 1813, was very successful in common-law practice, and in 1828 became a justice of the Court of King's Bench. In 1834 he was transferred to the Court of Exchequer, from which he resigned in 1856. As a jurist he was thoroughly versed in the common law; as a Parliamentarian, he spoke little and was not conspicuous in party politics. Consult Manson, *Builders of Our Law* (London, 1895).

WENTLETRAP (from Ger. *Wendeltreppe*, wentletrap, winding stair; from *wenden*, to turn + *Treppe*, stair). A small prosobranch gastropod of the family Scalariidæ. The shell is spiral, with many whorls, the whorls deeply divided, and crossed by remarkably elevated ribs. The aperture is round and rather small. The animal is furnished with a proboscis, and has the eyes placed on an external convexity, the foot short and oval. About 100 species are known, some found in northern seas, as *Scalaria communis* on the coasts of Europe, and *Scalaria Grœnlandica* on those of North America.



WENTLETRAP.

WENTWORTH, Benning (1696-1770). An American colonial governor. He was born at Portsmouth, N. H.; graduated at Harvard in 1715, and settled in Portsmouth, where he became a leading merchant. He represented the town in the Assembly, became a King's councilor in 1734, and from 1741 to 1767 was Governor of New Hampshire. It was during this period that the famous controversy over the 'New Hampshire Grants' arose. Patents for land granted by Governor Wentworth in what is now southern Vermont were disputed by the Governor of New York. Wentworth raised troops in New Hampshire in 1745 for Shirley's Louisburg expedition. He gave Dartmouth College the land upon which its buildings were erected. His second wife was the subject of Longfellow's poem, "Lady Wentworth." Bennington, Vt., was named in his honor.

WENTWORTH, George Albert (1835—). An American author and educator, born at Wakefield, N. H. He was educated at the Wakefield and Exeter academies and at Harvard College. After graduation in 1858 he became instructor of ancient languages in Exeter Academy, and in 1859 he was appointed to the chair of mathematics in the same institution, a position which he retained till 1891, when he was elected president of the Exeter Banking Company. He wrote: *Elements of Geometry* (1878, and several subsequent editions); *Elements of Algebra* (1881, and several later editions); *Plane and Spherical Trigonometry* (1882); *Surveying and Navigation* (1882); *Five Place Tables of Logarithms* (1882); *Elements of Analytic Geometry* (1886); *School Algebra* (1887); *College Algebra* (1888); *Higher Algebra* (1891). He is joint author with Hill of a text-book on *Physics* (1898), and has also writen works on arithmetic.

WENTWORTH, Sir John (1737-1820). An American Loyalist, born at Portsmouth, N. H. He graduated at Harvard in 1755; in 1765 acted as an agent of New Hampshire in England, and in the following year was made Governor of New Hampshire and Surveyor of the King's Woods for all North America. In his administration, although he opposed the arbitrary taxation imposed upon the colonies, he attempted to preserve the loyalty of the colonists to England. For a time he was very popular, but, by dissolving the New Hampshire Assembly because it had nominated a Committee of Correspondence, and by attempting shortly afterwards to get laborers to assist General Gage at Boston, he destroyed all his influence, and after a bitter controversy with the Assembly retired to Fort William and Mary and then to a British warship. A monument of his administration remains in Dartmouth College, which he helped to found in 1770. In 1783 he received a new commission as Surveyor-General of the King's Woods, and went to Nova Scotia, of which he was acting Governor from 1792 until 1808. In 1795 he was created a baronet.

WENTWORTH, Thomas, first Earl of Strafford. An English statesman. See Strafford.

WENTWORTH, William Charles (1793-1872). An Australian statesman, born on Norfolk Island, at that time a penal station of New South Wales, where his father was a Government surgeon. From 1816 to 1824 he was in England studying at Peterhouse, Cambridge, and at the Middle Temple in London. He was admitted to the English bar in 1822 and to the Australian in 1824. On his return to his native country he gave himself up to the cause of Australian self-government, advocating his views through a newspaper, the *Australian*, which he established at Sydney. In 1842, after a struggle of nearly twenty years, Lord Stanley conferred partial self-government on New South Wales. Wentworth was a member of the first Legislative Council and became the head of the so-called 'Squatter Party.' He was the founder of the University of Sydney (1852), was the leading spirit in the movement which carried the new Constitution through the Council in 1854, and was president of the upper chamber of the new House in 1861-62. At the end of the latter year he returned to England and settled there definitely. Wentworth was a man of singular force and aggressiveness, of restless mind, and great eloquence. He was accused in his later years of being influenced by personal considerations in his political views, yet there is little doubt that to him more than to any other one man New South Wales owed her prosperity and Australia her autonomy. His publications include *A Statistical Account of the British Settlements in Australasia* (1819). Consult: Barton, *The Poets* *and Prose Writers of New South Wales* (Sydney, 1866); and Rusden, *History of Australia* (London, 1883).

WĔN WANG, wŭn wăng (B.C. 1231-1135). One of the most noted names in Chinese history. It was posthumously conferred on Ch'ang, the Duke of Chow, by his fourth son, the noted Chow Kung. He was hereditary chieftain of a small principality in what is now the Province of Shensi, was commonly known as Si-Peh, 'Chief of the West,' and was honored by everybody, except the infamous tyrant Chow-sin (then on the throne of China), as a pattern of every princely virtue. Denounced to Chow-sin in 1144 by the Marquis Ch'ung as a menace to the dynasty, he was imprisoned for two years. Yielding at last to the entreaties of the people, Chow-sin released him, and gave him a commission to make war on the frontier tribes. He died at the age of ninety-six, bequeathing his army to his son Fa, who, in 1123, overthrew Chow-sin and became the first ruler of the new dynasty of Chow (B.C. 1122-1246) under the title of Wu Wang, his younger brother, Chow-kung, becoming his wisest and most trusted counselor.

WENZEL, vĕn′tsel. See WENCESLAS.

WEPT OF WISH-TON-WISH, THE. An historical novel by James Fenimore Cooper (1827), dealing with the war of King Philip.

WERDAU, vĕr′dou. A town of the Kingdom of Saxony, Germany, on the river Pleisse, 40 miles south of Leipzig (Map: Germany, E 3). It has important industries, including manufactures of woolen fabrics, chemicals, machinery, playing-cards, motors, wagons, and upholstery goods. Population, in 1900, 19,352.

WERDEN, vĕr′den. A town of Rhenish Prussia, Germany, on the Ruhr, 17 miles northeast of Düsseldorf. It has manufactures of cloth, linen, and silk. There are coal mines in the vicinity. Population, in 1900, 10,700.

WERDER, vĕr′dĕr, AUGUST, Count von (1808-87). A Prussian general, born at Schlossberg, East Prussia. He entered the Prussian Army in 1825; took part in the campaign in the Caucasus in 1842-43; and as lieutenant-general commanded the Third Division at Gitschin and Sadowa in the Seven Weeks' War with Austria. In the Franco-Prussian War he led the army corps of Baden and Württemberg at the battle of Wörth; was then placed in command of a siege corps before Strassburg; after the capitulation of that city was put in command of the new Fourteenth Army Corps, and defeated Garibaldi in the southeast of France. When Bourbaki, with about 150,000 men, threatened the communications of the German army besieging Paris, Werder with a much smaller force delayed the French march by an attack at Villersexel on January 9, 1871, and then took up his famous defensive position southwest of Belfort. Here on January 15th, 16th, and 17th he repulsed all the French assaults. After the war closed he was given a grant of 200,000 thalers, and a statue was erected in his honor at Freiburg. In 1875 he was given the Black Eagle, and on his retirement in the same year was created Count. Consult: Conrady, *Leben des Grafen August von Werder* (Berlin, 1889); and Varnhagen, *Werder gegen Bourbaki* (Berlin, 1897).

WEREWOLF. See WERWOLF.

WERFF, vĕrf, ADRIAEN VAN DER (1659-1722). A Dutch painter, born at Kralingen. He was a pupil of Cornelis Picolet and of Eglon van der Neer. Befriended in 1696 by the Elector Palatine John William, he received a commission for the latter's portrait and for a picture to represent the judgment of Solomon, was appointed Court painter, and was ennobled (1703). His minute biblical, mythological, and genre paintings with their porcelain-like finish thereupon were in great demand. The Munich Pinakothek possesses no less than thirty of them, including "Diana Discovering Callisto's Fall" and some sixteen scenes from the life of Christ. There is a smaller collection of twelve in the Dresden Gallery. Many others are to be found in the principal European galleries. A few mezzotint engravings have also been ascribed to Werff, and the Exchange at Rotterdam is said to have been from his design.

WERGELAND, vĕr′*ge*-lȧnt, HENRIK ARNOLD (1808-45). A Norwegian poet, born in Christiansand. He studied theology at Christiania, withdrew from the ministry in 1834, studied medicine, was given a post in the State library in 1836 and made Keeper of the Archives in 1840. In poetry he used his great enthusiasm and genius as a prophet of national independence and manly individualism. His verse was at first erratic, exuberant in imagination, but lacking alike taste and knowledge. Of Wergeland's work up to 1831 *Creation, Man, and Messiah* (1830), a formless epic, is sufficiently characteristic. From 1831 to 1835 Wergeland's style proved more correct and his thought more mature. By 1840 he had outgrown his audience and in becoming a great poet had sacrificed his political hold on the masses as a liberal patriot. His dramas are negligible and his *Constitutional History* of Norway (1841-43) is forgotten, but his lyric narratives, *Jan van Huysum's Flower-Piece* (1840), *The Swallow* (1841), *The Jew* (1842), *The Jewess* (1844), and *The English Pilot* (1844), are the best of their kind in Norwegian. Wergeland's *Works* are in 9 volumes (Christiania, 1852-57). There is a good selection in one volume (ib., 1859). Consult the biographies by Lassen (Christiania, 1867), Schwanenflügel (Copenhagen, 1877), and Skavlan (Christiania, 1892).

WERGILD, wẽr′gĭld, **WEREGILD,** or **WERGELD** (AS., compensation for a man.) A composition by which, according to the custom of the Anglo-Saxons, Franks, and other Teutonic peoples, homicide and other heinous crimes against the person were expiated. There was an established, progressive rate of wergild, varying at different times and among different Teutonic peoples, from the wergild of the *ceorl* or peasant to that of the King. The sum paid to the relatives in case of homicide, also known as the *man-wyrth*, seems to have been looked on as the equivalent of the dead man's value. But *man-wyrth* is usually distinguished from wergild. Thus for the killing of another man's slave a *man-wyrth* had to be paid, but no wergild proper. As the power of the community or King increased, the exaction of retribution for the death of its members was considered to be the duty of the State, as well as of the relatives, and the principle of division was applied to homicide as well as minor crimes; each payment being a separate full equivalent for the value of the deceased, the one to appease the feud, the other to make atonement to the State. By the Mercian law the King's wergild was 7200 shillings payable to his relatives, and at the same time an equal sum, the *cynebot*, was due to his people. The graduated scales of wergild in use among the different Teutonic nations throw much light on the gradations of society at the period. In general it does not appear that, among the nations who recognized the principle of wergild, the relatives were bound to accept a compensation for their kinsman's slaughter, in place of appeasing the death-feud by blood; the latter practice was often resorted to instead. A similar principle to that of wergild for homicide seems to have been recognized by the Celtic nations, and there are traces of it in the Mosaic code. Consult Robertson, *Scotland Under Her Early Kings*, vol. ii. (Edinburgh, 1862), where the wergilds of the different Germanic races are given.

WERMELSKIRCHEN, vĕr′mĕls-kĕrκ′*e*n. A town of Prussia, 19 miles southeast of Düsseldorf, with important manufactures of cotton, silk, and woolen goods, and upholstery plush. Population, in 1900, 15,469.

WER′NER. A five-act poetical drama by Lord Byron (1822), produced by Macready, who played the title-role, in 1830. It concerns the fate of a morbid German chieftain, and is confusedly founded on the *German's Tale, Kruitzner*, in Lee's *Canterbury Tales*.

WERNER, vĕr′nĕr, ABRAHAM GOTTLOB (1749-1817). A German geologist and mineralogist. He was born at Wehrau, Prussia, and in 1769 he entered the Mining Academy of Freiburg, and afterwards supplemented his studies at Leipzig. His first original work, *Ueber die äussern Kennzeichen der Fossilien* (1764), won him a position as instructor in the Mining Academy of Freiburg, where he labored for more than forty years, attracting students from all parts of Europe and establishing a high reputation for the school, which it has never lost. His principal service to geology consisted in arranging data collected from all sources into a systematic discipline. He divided the various geological formations into five groups, which, being largely founded upon his observations in Saxony and Bohemia, proved defective in the light of more extended research. In his mineralogical system Werner had to depend largely upon the criteria of external characters, as the methods of chemistry at that time had not attained to any degree of perfection. The published works of Werner include *Kerze Klassifikation und Beschreibung der Gebirgsarten* (1787), and *Neue Theorie über die Entstehung der Gänge* (1771), besides short articles on mineralogical and petrographical subjects. The *Life* of Werner has been written by Frisch (Leipzig, 1825).

WERNER, ANTON ALEXANDER VON (1843—). A German illustrator and historical painter. He was born at Frankfort-on-the-Oder, and was educated first in Berlin and Karlsruhe, and then in Paris and Italy. His earliest, and perhaps his best, work was in the line of illustration. For his friend Victor Scheffel he illustrated the poems *Frau Aventiure* (1863), *Juniperus* (1865), *Gaudeamus* (1867), *Bergpsalmen* (1868), and *Der Trompeter von Säckingen*. The first of his historical and genre paintings appeared in 1865, with "Luther and Cajetanus" and "A Confidential Interview." During the Franco-Prussian War he accompanied the Third Army Corps, and for the triumphal return of the troops to Berlin he painted a decorative velarium, "Battle and Victory," which was a symbolic representation of the battle of Sedan. Such was the success of this piece that Werner became practically the official painter of the new Empire. He was at once commissioned to design the mosaic frieze (executed by Salviati of Venice) for the new Siegessäule, was appointed member and professor of the academy (1873), and in 1875 became its director. His numerous patriotic paintings include: "The Proclamation at Versailles of William I. as Emperor," in the Royal Palace, Berlin (the gift of the German princes, 1876); "Close of the Congress of Berlin" (Rathaus, ib., 1881); "Opening of the Reichstag by Emperor William II., June 15, 1889" (1894); and "The Emperor's Greeting to Moltke upon his 90th Birthday" (1896). Werner published in 1896 the *Geschichte der königlichen akademischen Hochschule für die bildenden Künste in Berlin*. Consult the monograph by Rosenberg (Bielefeld, 1900).

WERNER, E. (1838—). The pseudonym of the German novelist Elizabeth Buerstenbinder, born in Berlin. Her works (more than twenty in number) include *Ein Held der Feder* (1871), *Am Altar* (1872), *Glückauf!* (1874), *Gesprengte Fesseln* (1875), *Vineta* (1877), *Ein Gottesurteil* (1885), *Gewagt und gewonnen* (1891), and *Fata Morgana* (1896). She also wrote three plays, two of them dramatizations of her novels. Her collected works were published in 1893.

WERNER, KARL (1808-94). A German water-color painter, born at Weimar. He received his artistic education at Leipzig, and spent almost twenty years in Italy. On a visit to England in 1851 he was made member of the Institute of Painters in Water Colors. Extensive travels in Italy, Spain, and the Orient furnished subjects, mostly architectural, for his drawings, some of which have been published as *The Holy Places* (1866) and *Nilbilder*. He is considered one of the best aquarellists of the nineteenth century, and his work is distinguished for careful execution, brilliancy of color, and poetic conception. Among his easel pictures are to be noted: "Partenkirchen" (1833), "Cathedral of Cefalù" (1838), "Hall in Palazzo Zisa at Palermo" (1852), all in the National Gallery, Berlin; "Interior of House at Granada" (1856); "View of Spalato," "Landing-Place in Harbor of Beirut" (1862), all in the Leipzig Museum.

WERNER, REINHOLD VON (1825—). A German admiral, known also as a prolific writer of history, biography, and fiction dealing with the sea. He was born at Weferlingen, near Magdeburg, in Prussia, and after a number of years' experience in the merchant marine, in the course of which he made numerous voyages to the East Indies, he became, in 1849, an officer in the newly organized fleet of the German nation. In 1852 he entered the Prussian service, became lieutenant-captain in 1856, took part in the Far East expedition of 1859-62, and as commander of a corvette during the war with Denmark in 1864 fought with distinction at Jasmund. During the Seven Weeks' War Werner seized the Hanoverian ports on the North Sea, acted subsequently as chief of the naval docks at Danzig and in 1873 was detailed, at the head of a squadron of five ships, to service off the coast of Spain, where the revolutionary movement was then in progress; he was recalled because of his hostile attitude toward the insurgent forces. He became rear-admiral in 1875, but was retired three years later. In 1898 he was nominated to be vice-admiral and in 1901 was ennobled. Of his numerous writings the best known are: *Die preussische Expedition nach China, Japan and Siam* (1863); *Die Schule des Seewesens* (1866); *Das Buch von der deutschen Flotte* (1868); *Seebilder* (1876); *Errinerungen und Bilder aus dem Seeleben* (1881); *Berühmte Seelearte* (1882-84); *Drei Monate au der Sklavenküste* (1885); *Dirk Mollinga* (1888); *Bilder aus der deutschen See-Kriegs geschichte von Germanicus bis Kaiser Wilhelm II.* (1898). In 1864 he founded at Hamburg the *Hansa*, a periodical devoted to seamanship and the life-saving service.

WERNER, Zacharias (1768-1823). A German romantic dramatist, born in Königsberg, Prussia. He studied law at Königsberg, entered (1793) the Prussian civil service, and after sojourns in Warsaw and Berlin went to Rome, where he joined the Catholic Church. He became a priest in 1814 and thereafter resided mainly in Vienna, where he became noted for the sensational eloquence of his preaching. Werner owes his place in literature to four dramas, *Die Söhne des Thals* (1803), *Das Kreuz an der Ostsee* (1806), *Martin Luther* (1807), and *Der 24. Februar* (1809). His *Works* (13 vols., 1841) contain four other dramas and many poems, hymns, and sermons. The dramas are typical of the luridly romantic "Fate Tragedy." Consult Minor, *Die Schicksalstragödie* (1883). There are *Lives* of Werner by Hitzig (Berlin, 1823), Schütz (Grimma, 1841), and Düntzer (*Zwei Bekehrte*, Leipzig, 1873). Consult also Carlyle, *Miscellanies* (4th ed., London, 1857), and Madame de Staël, *L'Allemagne* (London, 1813).

WERNERITE (named in honor of Abraham Gottlob Werner, q.v.). A mineral calcium-sodium-aluminum silicate crystallized in the tetragonal system. It has a vitreous or pearly lustre, and is light gray, blue, green, or red in color. It occurs in crystalline rocks, in granular limestone, frequently near granite contacts, and is found in Finland, in Norway, and in the United States at various localities in the New England States, New Jersey, and Pennsylvania. This mineral includes the following local varieties: A brown variety called *nuttallite*, from Bolton, Mass.; a green and red variety called *chelmsfordite*, from Chelmsford, Mass.; and a glassy variety called *ontariolite*, from Galway, Ontario. Wernerite is included in the scapolite group of minerals, and is frequently referred to by that name.

WERNIGERODE, vĕr′nē-ge-rō′de. A town of Prussia, in the Province of Saxony, 43 miles southwest of Magdeburg, at the northern base of the Brocken. In the castle, the residence of the counts of Stolberg-Wernigerode, is an extensive library of over 100,000 volumes, including a famous biblical and hymnological collection of 8500 volumes, and 10,000 maps. The town manufactures chocolate, machinery, cigars, and dyestuffs. Population, in 1900, 11,581.

WERRA, vĕr′rȧ. A river of Germany, rising in Saxe-Meiningen in the southeastern part of the Thuringian Forest (Map: Germany, C 3). It flows in a generally northwest direction, passing Meiningen and at Münden uniting with the Fulda to form the Weser. It is 181 miles long and is navigable from Wanfried, 42 miles.

WERTH, vĕrt (or **WERDT**), Johann von (c.1600-52). A German soldier, born at Büttgen, near Jülich. He entered the Imperial Army, and then the Bavarian Army, and fought in the Thirty Years' War. Although not able to read or write, he was a cavalry leader of remarkable ability, and rose to high rank. By a spirited charge at Nördlingen in 1634 he turned the day against the Swedes, and in reward was made a baron and a lieutenant marshal. In 1635 he took Speyer; and in 1636 he invaded France, caused great alarm at Paris, and finally retreated with immense booty. Two years afterwards he was defeated by Bernhard of Saxe-Weimar at Rheinfelden, and was taken prisoner, but in 1642 was exchanged for the Swedish General Horn. In the next year he helped the Imperialists to win the great victory of Tuttlingen. He shared in the defeat at Jankau in 1645. In the same year at the head of his redoubtable cavalry he decided the battle of Mergentheim against Turenne and conducted the retreat of the Imperialists after the death of General Mercy at Allersheim. When the Elector of Bavaria made peace with France and Sweden in 1647, Werth attempted to transfer a part of the Bavarian Army into the service of the Emperor, but his plan was discovered, and he escaped with only a few followers. When the Elector again declared war, he was restored to command, but the Peace of Westphalia soon afterwards brought an end to the long struggle. Consult Teicher, *Johann Freiherr von Werth* (Augsburg, 1876).

WERTHER, vĕr′tĕr. See Sorrows of Werther.

WERWOLF, or **WEREWOLF** (AS. *werwulf*, man-wolf, from *wer*, man + *wulf*, wolf). According to a widespread superstition, a man who, either periodically or at any time, is transformed or transforms himself into a wolf, becoming possessed of all the powers and appetites of a wolf in addition to his own, and being especially remarkable for his appetite for human flesh. There is perhaps no people among whom some evidence of its former prevalence does not exist. It is not yet extinct, even in Europe, although its details vary in different countries and districts. The animal whose shape is taken is not always, though usually, a wolf. The wolf appears most often as the animal most formidable, or considered most inimical to man.

Occasional notices of lycanthropy are found in classical writers; and lycanthropy, as there described, was the change of a man or a woman into a wolf, or, more rarely, into a dog or bull, so as to enable the man or woman to gratify an appetite for human flesh, either by magical means or through the judgment of the gods, as a punishment for some dire offense. According to Herodotus, the Neuri were believed to be sorcerers who had the power of taking once a year, for several days, the shape of wolves; and Pliny relates that in Arcadia, every year, at the festival of Jupiter Lycæus, one of the family of Antæus was chosen by lot, and conducted to the brink of the Arcadian lake, into which, after having hung his garments upon a tree, he plunged, and was transformed into a wolf. Nine years after, if he had not eaten human flesh, he returned to his friends, looking nine years older than when he disappeared. One of the earliest werwolf stories of the modern type is found in the *Satyricon* of Petronius, in which a friend of the hero removes his clothing and immediately becomes a wolf. In this form he is wounded, runs away, and is later found in human form with a knife-stab where he had been wounded as a wolf.

In Norway and Ireland it used to be believed that there were men who were 'not of one skin.' Such men could take upon themselves other shapes than that of man, their natures then corresponding to the shapes which they assumed, and they also had the strength and other powers of the animal whose shape they bore, as well as their own. It was believed that the change of shape might be effected in one of three ways: simply by putting on a skin of the animal; by the soul of the man deserting the human body for a time and entering into a body borrowed or created for the purpose; or, without any actual change of the form, by means of a charm, which made all beholders see the man under the shape of the animal whose part he was sustaining. Nothing of the man remained unchanged except his eyes; by these only could he be recognized. Perhaps the best stories of werwolves which are to be found are contained in the northern sagas. Scarcely anywhere did the belief in them go so deep into the minds of the people as among the northern races, although the Lithuanians and Livonians also shared in this belief.

Instances of persons being changed into wolves by way of punishment were freely believed in the Middle Ages; for example, Saint Patrick was believed to have changed Vereticus, King of Wales, into a wolf; and there was an illustrious Irish family which had incurred the curse of Saint Natalis, every member of which, male and female, according to the popular belief, had to take the shape of a wolf and live the life of a wolf for seven years. The werwolves, like the witches, were now regarded as servants of the devil, from whom they got the power—often exercised by anointing with salve—of assuming the wolf's form; and it was believed that great numbers of them trooped together to the Devil's Sabbath. The stories of mutilations and other mishaps befalling them in the wolf state, by which, when they resumed the human form, they were identified as werwolves are exactly like the stories told of witches. In September, 1573, we find a court of Parliament sitting at Dôle, in Franche-Comté, authorizing the country people to take their weapons and beat the woods for a werwolf, who had already—thus went the recital—"carried off several little children, so that they had not since been heard of, and done injury to some horsemen, who kept them off only with great difficulty and danger to their persons." Throughout Europe the judicial cognizance of witchcraft and of lycanthropy ceased at the same time. In Great Britain, where wolves had early been exterminated, the werewolf was only known by rumors coming from abroad, although Gervase of Tilbury in the thirteenth century says they were often seen at the changes of the moon. The belief, however, that witches could transform themselves into cats and hares, which did prevail, was analogous to the belief in werwolves, especially in its later forms. Consult Gould, *The Book of Werewolves* (London, 1865).

WESEL, vā'zel. A town of Prussia on the Rhine, 32 miles north-northwest of Düsseldorf (Map: Prussia, B 3). Of its churches, the Willibroed Kirche, consecrated in 1181, is one of the finest Gothic edifices on the Lower Rhine. Wesel has sugar refineries, brick kilns, wire and lead works, soap factories, flour and saw mills, and ship yards. Population, in 1900, 22,547.

WESER, vā'zẽr. A river of Germany, formed by the junction of the Werra, which rises in the Thüringerwald, and the Fulda, rising in the Rhöngebirge, on the frontiers of Prussia and Bavaria. These streams, after a northern course, unite at Münden, near the southern extremity of the Prussian province of Hanover, whence the Weser flows north, mainly watering Prussian territory, till, passing Bremen, it forms for about 40 miles the boundary between Oldenburg and Hanover, and enters the North Sea by a wide estuary, much interrupted by sand flats (Map: Germany, C 2). Its length from the confluence of the headstreams is 280 miles, and from the source of the Werra, 447 miles. It is navigable at high water to Münden and small vessels proceed some distance up the Werra, while the Fulda has been canalized as far as Cassel. A canal connects the estuary with that of the Elbe, and extensive improvements of the river below Bremen were completed in 1894 at a cost of nearly $8,000,000. The principal affluent of the Weser is the Aller, which has a large tributary in the Leine.

WES'LEY, Charles (1707-88). An English clergyman, brother of John Wesley, with whom he was closely associated. He was born at Epworth, the eighteenth child of Samuel Wesley. At nine years of age he entered Westminster School, from which he went to Christ Church, Oxford, in 1726. Here, with some friends, he began the observance of a strict system of life, persuading them "to observe the method of study prescribed by the statutes of the university." "This gained me," he says, "the harmless nickname of methodist"—which seems at first not to have had a religious significance. After taking his degree, he had pupils for a while, whom he influenced in the spiritual life, though at this time he had not decided to take orders. He was, however, ordained in 1735, just before joining his brother John in the Georgia mission. His sojourn in America was even shorter than John's; it was marked by unpopularity due to the same cause of what was thought excessive strictness in life and doctrine. Returning to England, he became curate of Saint Mary's, Islington, and threw himself vigorously into evangelistic work. In 1739, after some unfriendliness and censure from the constituted authorities of the Church, he entered definitely on the itinerant ministry, which he pursued with great earnestness for the next seventeen years. He was of a more cautious and conservative temperament than John, and looked with distrust upon the gradual development of a tendency in the Methodist societies to separate from the Church of England, and upon his brother's views of perfection, which he thought must be attained by a gradual process. He died in London, after a period of failing health, and was buried in Marylebone churchyard. He is known chiefly for his hymns, of which he wrote over six thousand, many of them still in constant use. The poetical works of the brothers were published in thirteen volumes by the Rev. G. Osborne (1868-72). For the biography of Charles, apart from what appears in the *Lives* of his brother, consult Jackson (London, 1849) and Telford (ib., 1866).

WESLEY, John (1703-91). An English clergyman, generally known as the founder of Methodism. He was born at Epworth, in Lincolnshire, the fifteenth child of the Rev. Samuel Wesley, and of a family which had been known as nonconformists, though Samuel had taken orders in the Church of England. At ten he was sent to Charterhouse School, where for a time he suffered from the persecutions of the older boys, but finally won a place in the esteem of all. In 1720 he matriculated at Christ Church, Oxford. He took his degree in 1724, and not long after began to think about following his father's profession. He was ordained deacon in 1725, and in the next year elected a fellow of Lincoln College. Ordained priest in 1728, for a while he acted as curate to his father at Epworth, but was recalled to Oxford by the college regulations. Finding his brother Charles and some other undergraduates associated in what was called by unsympathetic outsiders the 'Holy Club,' he naturally saw much of them, and became practically their director. On his father's death he was urged to accept the living of Epworth, but thought his place was at Oxford.

It was not long, however, before he changed his mind, and was persuaded to go with General Oglethorpe as a missionary to Georgia. His mission was not altogether a success; he was regarded as too strict, and some of the points on which he insisted were not thought to be in harmony with Protestantism. His sojourn in Georgia was not, however, without fruit, and his departure was regarded as a real loss to the colony. On his voyage to Savannah, he met for the first time some of the Moravian Brethren, whose simple evangelical piety made a deep impression on him. On his return to London, he sought them out, and from Peter Böhler, one of their preachers, imbibed the doctrine of 'saving faith,' and broke away from the influence of William Law, which had been strong in his earlier life.

In the summer of 1738 he went abroad to visit their leaders, and spent some time at Herrnhut and with Zinzendorf at Marienborn. He corresponded with Zinzendorf for some time, and his letters are still preserved at Herrnhut. His new experiences made a vital difference in him. He associated with Moravians in England, and with other societies interested in the growth of the spiritual life.

Early in 1739 he took more definite steps in the direction he was afterwards to follow. His friend George Whitefield invited him to Bristol. When he saw Whitefield preaching in the open air, his High Church principles were at first offended, but on April 2d he preached his first open-air sermon, and thus began what was really his life work. His success in the neighborhood of Bristol was so great that a special place had to be built in which to care for the converts. A still more important step was taken on July 20, 1740, when he formed the first society under his direction. They met in a building called the Foundry, formerly Government property, but long disused, near Finsbury Square in London, which for many years was the headquarters of Methodism.

The success of his preaching soon called him so much away from his societies that he was unable to give them proper care. In 1742 one of his followers proposed that the members should be divided into bands of twelve, with a leader over each. The plan was adopted and worked well. The leaders reported to Wesley the conduct of the members and the receipt of money. The class-meetings thus originated contributed greatly to the success of the movement. Wesley now preached frequently all about London and Bristol. But the fervor and enthusiasm of his converts was looked upon with suspicion by the clergy in general, accustomed to an orderly and 'respectable' conduct of religious matters. He began to develop his organization by the appointment of lay preachers, who were to be communicants of the Church of England, and not to conflict in their preaching with the church services. Among the early preachers of this sort were John Cennick and Thomas Maxfield. In 1744 the first conference of his principal helpers was held.

As a result of the Arminian tendencies of Wesley and his friends, Whitefield and Cennick withdrew from relations with them and formed the Calvinistic Methodists. The success of Wesley's work was, however, unabated. In five years from the preaching of the Bristol sermon forty-five preachers were laboring with him, and there were two thousand members in London alone. There is no question that the religious life of England was in need of some stirring and vivifying influence; and this the burning words, the ardent faith of Wesley brought it. His labors were prodigious. His evangelistic labors extended to all parts of the British Isles. He preached from twice to four times daily, and traveled (on horseback until advancing age compelled him to use a carriage) about 4500 miles a year. He met the societies, classes, and boards, and inquired minutely into their affairs. He saw to the erection of chapels, and collected money to defray the expense. He found time for an amazing variety of literary work, selecting, condensing, abridging, and writing on all kinds of subjects what he thought would be most useful for his followers. He joined in every movement for the improvement of humanity. Sunday-schools, the abolition of slavery, education, the circulation of tracts, and charitable associations of all kinds interested him and enlisted his coöperation.

By 1790 he found himself at the head of 511 preachers and 120,000 members, while at least four times that number were in attendance with the Methodist Congregations. He died March

2, 1791, in the house attached to the City Road Chapel in London, and was buried there. He was of less than the average height, but, says Tyerman, "beautifully proportioned, without an atom of superfluous flesh, yet muscular and strong, with a forehead clear and smooth, a bright penetrating eye, and a lovely face which retained the freshness of its complexion to the latest period of his life." In social life he was a charming man, a good talker, and never ill at ease. He numbered many of all classes among his friends. The obedience which he exacted, for the good of the cause, from his followers was readily given. It is not too much to say that in eighteenth century England "no single figure influenced so many minds, no single voice touched so many hearts."

His works were first published by himself (Bristol, 1771-74); the religious writings, edited by Thomas Jackson (London, 1829-31; 11th ed. 1856-62); an American edition in seven volumes (New York, 1831). His journals give the fullest account of his career; they extend from 1735 to 1790, and present a marvelously full and graphic picture of the England of his day. Condensations of them were published by Welch (1899) and Parker (1903). At least forty biographies have been written. The more important among them are those by Tyerman (London, 1870-71), Southey (1820; ed. by Coleridge, 1846; Curry, 1867; Atkinson, 1890), Rigg (London, 1874), Telford (ib., 1890). Consult also: Wedgwood, *Wesley and the Evangelical Reaction of the Eighteenth Century* (London, 1870); Overton, *John Wesley* (ib., 1891); Urlin, *Wesley's Place in Church History* (ib., 1870). The two hundredth anniversary of Wesley's birth was almost universally observed among the Methodists in 1903, and much literature relating to him appeared in consequence.

WESLEY, SAMUEL (1662-1735). An English clergyman, father of John Wesley. He was born at Winterborn-Whitchurch, Dorsetshire, and educated first at Dorchester Grammar School and then at Stepney and Newington, in London, with a view to the Independent ministry. Some severe invectives having appeared against the Dissenters, he was asked to reply to them; but while doing the necessary reading he changed his opinions, and decided to conform to the Established Church. He entered Exeter College, Oxford, and graduated in 1688. He was ordained deacon almost immediately, and priest in 1690. After two curacies and a year as chaplain on board a man-of-war, he obtained the living of South Ormsby in Lincolnshire in 1690, and in 1695 that of Epworth, which is closely associated with the later history of his family, and which he held until the year before his death. He was a prolific author, especially in verse, in which he published a Life of Christ (1693), a biblical history (1704), *Marlborough, or the Fate of Europe* (1705); and in prose several works of a theological nature. Consult his *Life* by Tyerman (London, 1866).

WESLEY, SAMUEL (1691-1739). An English poet and clergyman, son of the preceding and elder brother of John and Charles Wesley. He was born in London, and educated at Westminster and Christ Church, Oxford, where he took his degree in 1715. He was ordained not long after, and for the next twenty years was a master in Westminster School. In 1732 he became head master of Blundell's School at Tiverton, where he remained until his death. At Westminster he became acquainted with Pope, Swift, Prior, Harley, and other Tory poets and statesmen, who thought highly of his abilities in satiric and humorous verse. The first edition of his poems appeared in 1736; a second, with additions, in 1743; and a third, with biography by Nichols, in 1862. Some of his hymns are still in common use.

WESLEY, SAMUEL SEBASTIAN (1810-76). An English composer, born in London. In 1832 he was organist at Hereford Cathedral, three years later went to Exeter Cathedral, and in 1842 to Leeds Parish Cathedral. In 1849 he was organist at Winchester Cathedral, and in 1865 became organist at the Cathedral at Gloucester. His works include anthems, glees, songs and part-songs, exercises and pieces for the organ, and four church services. He also wrote, in 1849, *A Few Words on Cathedral Music and the Musical System of the Church, with a Plan of Reform.*

WESLEYAN METHODIST ASSOCIATION. See METHODISM.

WESLEYAN METHODIST CONNECTION. See METHODISM.

WESLEYAN UNIVERSITY. The oldest college under the patronage of the Methodist Episcopal Church, founded at Middletown, Conn., in 1831. The campus of 14 acres is beautifully situated on a terrace 150 feet above the Connecticut River, and contains the five principal buildings, North and South Colleges, the Memorial Chapel, the Library (Rich Hall), and the Orange Judd Hall of Natural Sciences. Other buildings are Observatory Hall, with an equatorial telescope by Alvan Clark & Sons, the electrical laboratory, and the Fayerweather Gymnasium. The grounds and buildings were valued at $687,380 in 1903, when two new buildings, Willbur Fisk Hall, named after the first president, and the Scott Physical Laboratory, were erected at a cost of $220,000. The university offers three parallel courses of four years, classical, Latin-scientific, and scientific, leading to the degrees of bachelor of arts, philosophy, and science. In each course nearly all the studies of the first year are prescribed, the amount of required work being progressively diminished in the three remaining years. The institution is coeducational, but the number of women in the college in any year is limited to 20 per cent. of the total enrollment of the preceding year. In connection with commencement week of 1903 an elaborate celebration took place in honor of the 200th anniversary of the birth of John Wesley. In that year the attendance was 322, the faculty numbered 36, and the library contained 63,000 volumes. The total value of the property under control of the college was $2,131,134, with an endowment of $1,443,754, and a gross income of $113,811.

WESSEL, vĕs'sel, JOHANN, surnamed GANSFORT (c.1420-89). A mystic of the Brothers of the Common Life (q.v.) at Zwolle, and a friend of Thomas à Kempis. He was born at Groningen and studied at Cologne, Louvain, and Paris. He visited Rome and taught philosophy at Heidelberg and at Paris. Johann Reuchlin and Rodolphus Agricola (qq.v.) were among his scholars. His later years were spent in monastic retirement. Wessel's friends, among whom were the Bishop of Utrecht, David of Burgundy, brother to Charles the Bold, called him *lux mundi*, with reference to his evangelical views, but his critics called him 'master of contradictions,' in allusion to his attitude to the Roman Catholic Church and to his mind, which held scholastic, mystic, and classical culture together with scientific knowledge in one consciousness without feeling the contradiction. He published but little, and almost all his writings were mere notes and sketches for lectures. His friends saved his manuscripts and sent them to Luther, who published a farrago of them (1512), leaving out an essay on the Eucharist because it advocated Zwingli's view and not his own. Wessel's writings are aphoristic and no single idea stands out prominently. Consult: Muurling, *Commentatio Historica-Theologica de Wesseli* (Utrecht, 1831); id., *De Wesseli Principiis atque Virtutibus* (Amsterdam, 1840); Ullmann, *Reformatoren vor der Reformation* (Halle, 1847).

WES'SEX (AS. *Westseaxe*, West Saxons). An Anglo-Saxon kingdom. It was situated in Southern Britain, extending from Watling Street to the Channel. In 495 the West Saxons, or Gewissas, landed about where Southampton is now under the leadership of Cerdic and Cynric. After defeating the Britons in several battles, Cerdic became King of the conquered territory in 519. Further progress was checked for a time by a victory of the Britons in 520. After Cerdic's death, Cynric became ruler, and in 552 again took up the work of conquest. Under his son Ceawlin the kingdom was widely extended, but the King's own people finally rose against him, and he was defeated at Woddesbeorg or Wanborough in 592. For some time thereafter Wessex was of little importance. In the seventh century it became Christian and was often ruled by other kingdoms, notably Mercia. A new period began with Ine, who ruled from 688 to 726. He drove back the Mercians, and his laws are the earliest ones of the West Saxons we possess. After his death war was renewed with Mercia, which again asserted its overlordship successfully. The great period of Wessex history begins with Egbert (q.v.). In time he became the ruler of the whole of England, and Wessex henceforth had no independent history. Consult Green, *A Short History of the English People*, vol. i. (London, 1892). See ENGLAND.

WEST, ANDREW FLEMING (1853—). An American Latinist, born at Allegheny, Pa. He obtained his collegiate education at Princeton, from which he received his A.B. in 1874. In 1883 he became professor of Latin, and in 1901 dean of the Graduate School, in Princeton University. He wrote various articles on university education and was editor of *Terence* (1888), of *The Philobiblon of Richard de Bury* (1880), and of *A Latin Grammar* (1902).

WEST, BENJAMIN (1738-1820). An American historical painter. He was born at Springfield, Pa., October 10, 1738, of Quaker parentage. Strange stories are told of his youthful talent; how he made his own brushes, and gained his first knowledge of mixing colors from the Indians. After some study with an artist named Williams he set up as a portrait painter in Philadelphia at the age of eighteen. Later he removed to New York, and finally, in 1760, went to Italy to study Michelangelo. There he stood in high favor, and was in course of a year made honorary member of the academies of Florence, Bologna, and Parma. His stay of three years confirmed his natural tendency toward the grand style. On his arrival at London, where he permanently settled in 1763, he was well received and encouraged by Sir Joshua Reynolds. His fortune was made by "Agrippa Landing with the Ashes of Germanicus," for Drummond, Archbishop of York, who obtained for him the royal patronage. In 1772 George III. appointed him historical painter, and in his "Death of General Wolf" (Grosvenor Gallery, London) he discarded the convention of painting figures in a modern battle clothed in the costumes of the Greeks and Romans, though Sir Joshua Reynolds and the Archbishop of York tried to dissuade him from his intentions. Sir Joshua subsequently retracted his objections and acknowledged West's success, proclaiming the change as an epoch-making innovation. West was one of the founders of the Royal Academy and succeeded Sir Joshua Reynolds as its president in 1792. He produced over four hundred canvases of heroic size, but of rather commonplace merit. His sense of composition is good, but his color flat and spiritless and his imaginative power not of the highest order. His pictures may be seen in England at the National Gallery and at Hampton Court. In America, Philadelphia possesses "Christ Healing the Sick," "Penn's Treaty with the Indians," and "Death on the Pale Horse," and the Boston Museum his "Kingdom." Consult his *Life* by Galt (London, 1820); *Art Journal* (1863); Tuckerman, *Book of the Artists* (New York, 1867).

WEST, EDWARD WILLIAM (1824—). An English Pahlavi scholar, born in London. He was educated at home by his mother until he entered King's College, London, in 1839, from which he was graduated with honor in the engineering department. In 1844 he went to India as a civil engineer in connection with the railway system of the Bombay Presidency. He visited the cave temples, especially at Kanheri, and in 1848 began his studies of Pahlavi inscriptions and manuscript texts. In 1876 he retired from his engineer duties in India, returned to Europe, and led a student's life, devoting his time to editing, deciphering, and translating the most important works of Pahlavi literature. Among his works are: *The Book of the Mainyo-i-Khard* (1871); *The Book of Ardāvīrāf and a Glossary* (1872-74); *Shikand-gūmānīk Vijāṛ* (1887); and five volumes of *Pahlavi Texts* translated in Müller, *Sacred Books of the East*, vols. v., xviii., xxiv., xxxvii., xlvii. (Oxford, 1880-95).

WEST, REBECCA. The principal female character in Ibsen's *Rosmersholm*, an adventuress who, from love of the clergyman Rosmer, plays upon his wife's inherited tendency toward suicide until that unfortunate woman drowns herself. The character symbolizes the 'free-love' influence in modern society.

WEST AFRICAN COLONIES. A name applied to the four British crown colonies of Gold Coast, Lagos, Gambia, and Sierra Leone.

WEST AUSTRALIA. See Western Australia.

WEST BAY CITY. A city in Bay County, Mich., on the Saginaw River, opposite Bay City, and on the Michigan Central, the Detroit and Mackinac, and the Grand Trunk railroads (Map: Michigan, K 5). It is connected with Bay City by four bridges. The city is in a farming and coal-mining region, and is extensively engaged in ship-building. There are also flouring mills, machine shops, lumber mills, bone factories, breweries, a sugar-beet factory, a chicory factory, etc. The public library has 30,000 volumes. Under the charter of 1897 the government is vested in a mayor, chosen every two years, and a unicameral council. The water-works and the electric light plant are owned and operated by the municipality. West Bay City is to be consolidated with Bay City (q.v.). Population, in 1890, 12,981; in 1900, 13,119.

WEST′BORO. A town in Worcester County, Mass., 12 miles east of the city of Worcester, on the Boston and Albany Railroad. It has a public library with 12,000 volumes, the Lyman School for Boys, and the Westboro Insane Hospital (Map: Massachusetts, D 3). The town is mainly interested in manufacturing, the most important products being boots and shoes, straw goods, automobiles, underwear, tape, and leather specialties. The water-works are owned and operated by the town. Westboro was settled about 1659, and was known as Chauncy until it was incorporated as a town in 1717. Population, in 1890, 5195; in 1900, 5400. Consult: Hurd, *History of Worcester County* (Philadelphia, 1889); and Forbes, *The Hundredth Town. Glimpses of Life in Westborough 1717-1817* (Boston, 1889.)

WEST BROMWICH, brŭm′ĭch *or* ĭj. A manufacturing town in the south of Staffordshire, England, 5 miles northwest of Birmingham (Map: England, D 4). There are fine municipal buildings. The city has rich mines of coal and iron, blast furnaces, and slitting mills, and manufactures firearms, swords, cutlery, agricultural implements, and metal goods of every kind. Although mentioned as Bromure in Domesday and the seat of a Benedictine priory in the twelfth century, the town is of comparatively modern growth and was incorporated in 1882. Population, in 1901, 65,170.

WEST′BROOK. A city in Cumberland County, Maine, 6 miles northwest of Portland, on the Boston and Maine and the Maine Central railroads (Map: Maine, C 8). It has the Memorial Library with 7400 volumes. Manufacturing is the most important industry, the chief establishments including paper mills, warp mills, brick works, and silk mills. Under the revised charter of 1891 the government is vested in a mayor, chosen annually, and a unicameral council. Westbrook was part of Falmouth until incorporated as a separate town in 1814. It included Deering (now a part of Portland) until 1870. In 1891 it became a city under a charter granted in 1889. Population, in 1890, 6632; in 1900, 7283.

WEST CHES′TER. The county-seat of Chester County, Pa., 25 miles west of Philadelphia, on the Pennsylvania and the Philadelphia, Baltimore and Washington railroads (Map: Pennsylvania, F 4). It has the West Chester State Normal School, Darlington Seminary for Young Ladies, and the Friends' School; the Chester County Hospital; and several libraries, including a public library. Marshall Square with its botanical gardens, Turk's Head Hotel dating from pre-Revolutionary times, the county court house, and the county jail are other noteworthy features. Although primarily a residential place, West Chester has considerable commercial and industrial importance. It is in a productive farming section, known for its grain interests, and having extensive nurseries. Dairy implements are the principal manufactured products, the Sharples Dairy Implement Works being among the largest establishments of the kind in the country. There are also a creamery, a large grain elevator, wheel works, a tag factory, planing mills, etc. The government is vested in a chief burgess, elected triennially, and a council. The borough owns and operates the water-works. West Chester was founded in 1784, was incorporated as a town in 1788, and was chartered as a borough in 1799. Population, in 1890, 8028; in 1900, 9524.

WEST′COTT, Brooke Foss (1825-1901). An English scholar and divine, born in Birmingham. He was educated at King Edward VI.'s School, Birmingham, and at Cambridge University. In 1852 he left Cambridge to become one of the masters of Harrow. His more public career began in 1869, when he became Canon of Peterborough. This office he held until 1883. From 1870 he was also regius professor of divinity at Cambridge. In 1883 Gladstone appointed him a. Canon of Westminster, and in 1890 he was appointed Bishop of Durham. Westcott was an accurate and widely read scholar, a profound and spiritual theologian, and an influential adviser in social reform movements. His joint editorship of Westcott and Hort's Greek New Testament gave him a place among the first New Testament scholars of the last century, and his successful mediation of the great Durham coal strike of 1892 was only one of the many disinterested public services that won for him the epithet of 'everybody's bishop.' Of his numerous writings particular mention may be made of *The History of the Canon* (1855), *Introduction to the Study of the Gosepls* (1860), *The Gospel of the Resurrection* (1866), *The New Testament in the Original Greek* (with Dr. Hort, 1881), *Christus Consummator* (1886), *Social Aspects of Christianity* (1887), *The Epistle to the Hebrews* (Greek text with notes and essays, 1889), *The Incarnation and Common Life* (1889). Consult the biography by his son (London, 1903).

WESTERÅS. A town of Sweden. See Vesterås.

WESTERGAARD, vĕs′tĕr-gôrd′, Niels Ludvig (1815-78). A Danish Orientalist and philologist, born at Copenhagen. In 1838 he went to Bonn, where he studied Sanskrit, and then visited Paris and London, after which he returned to Denmark. In 1841 he made a journey to India and in 1843 to Persia. In 1844 he became lecturer and afterwards professor of Indian philology at the University of Copenhagen. Noteworthy among his publications are: *Radices Linguæ Sanskritæ* (1841); *Sanskrit Læsebog* (1846); and *Bundehesh, Liber Pehlvicus* (1851). His most important work was his edition of the

Zendavesta, or the Religious Books of the Zoroastrians (1852-54).

WEST'ERLY. A town, including several villages, in Washington County, R. I., 44 miles southwest of Providence, on the Pawcatuck River, and on the New York, New Haven and Hartford Railroad (Map: Rhode Island, A 4). It is the centre of large granite-quarrying and farming interests, and manufactures cotton and woolen goods, thread, printing presses, etc. There is a public library with more than 15,000 volumes. The water-works are owned by the town. Watch Hill, within the town limits, on the coast, is a popular summer resort, being known for its good bathing. Westerly was settled in 1661 and was known as Misquamicutt until 1669, when it was incorporated under its present name. Population, in 1890, 6813; in 1900, 7541. Consult Denison, *Westerly and Its Witnesses for 250 Years* (Providence, 1878).

WEST'ERN, Sophia. The heroine of Fielding's *Tom Jones.* The tyranny of her father, the squire, drives her into various hazardous performances, but she is finally happily married to the title-character of the story. She is one of the most sympathetic, to modern readers, of all Fielding's personages, and as such became in 1886 the title-character and leading rôle in Robert Buchanan's stage adaptation of the tale.

WESTERN, Squire. A typical eighteenth-century English country squire in Fielding's *Tom Jones;* brutal and selfish, but attached to the daughter whom he yet constantly maltreats.

WESTERN AUSTRALIA. A State of Australia, occupying the entire western third of the continent. It is bounded on the north, west, and south by the Indian Ocean, and on the east by South Australia. Western Australia is the largest of the Australian States, having an area of 975,920 square miles.

Physical Features. The interior presents no well-marked surface features. It consists mainly of undulating sand or sandstone plateaus of no great elevation, their level surfaces being broken by isolated sandstone ranges, sand hills, and wind-blown ridges. The southeastern part of the State consists of a limestone plateau about 200 miles wide and ending in a line of steep cliffs running for several hundred miles along the southern coast. The only real mountains in the State are the Stirling and Darling ranges along the southwest coast, but their highest elevation does not exceed 3600 feet. The extreme northern part of the State, known as the Kimberley District, consists of elevated plains in the interior, falling toward the coast in several lines of precipitous and rugged escarpments broken by deep ravines. The coasts of Western Australia are very little indented and afford scarcely any good harbors. Along the south coast not a single stream enters the sea for about 600 miles from the eastern boundary. On the west coast, however, there are a number of rivers, some of considerable size, such as the Murchison, Gascoyne, Ashburton, and Fitzroy. Most of the smaller streams are little more than storm-water channels, dry the greater part of the year. In the interior there are a number of so-called lakes, which in the dry season are nothing but mud flats covered with incrustations of salt.

Climate and Vegetation. The climate is healthful and pleasant and very dry, so that the heat, though intense, is not oppressive. The range of temperature is considerable, and frost may occur in winter. The annual rainfall is between 30 and 40 inches in the extreme southwestern and northeastern sections, between 10 and 20 inches along the western coast, and less than 10 inches in the great interior. The southeastern plateau is covered with rich grass during the wet season, and good grazing land is also found in the upper valleys of the western rivers. The southwestern section of the State is a great forest region, in which the eucalyptus grows to an immense height. The interior, however, consists mainly of sandy and stony desert, partly barren, partly covered with acacia scrub and spiny grass, and almost destitute of surface water.

Geology. Large areas in the north and south are of ancient formation, chiefly Paleozoic in the north, and older crystalline rocks in the south, where there are immense outcrops of granite with auriferous quartz. These areas are surrounded by vast deposits of Tertiary sandstone occupying the central interior and western coast region. The chief mineral is gold, and a broad belt of gold-bearing reefs runs parallel with the coast from Coolgardie in the south to the Kimberley region in the north.

Mining. The chief source of income is the gold mines. Gold was discovered in the Kimberley district in 1882, and in the Yilgarn district in 1887. Progress in mining, however, was at first slow, and in 1891 the year's product was valued at only £115,182. The year following, however, the Coolgardie discoveries were made, and mining rapidly developed at that point, so that in 1896 the value of the product had increased to £1,068,807. In 1896 water was obtained farther east at Kalgoorlie, and this became the most active gold-mining centre. Subsequently mining developed in the Mount Margaret and a number of other districts. In 1901 the gold output was valued at £7,235,652, or nearly half of the total product for the Australian Commonwealth.

Agriculture. Except along the southwestern coast agriculture has made little progress. In a large part of the country the rainfall is inadequate for the maturing of crops. There has, however, been a marked increase in the crop acreage, since the development of gold-mining. In 1901 there were 216,824 acres under crops. About half of this was hay (from wheat and oats) and the larger part of the remainder was wheat. At the end of 1901 6,815,334 acres had been alienated or were in process of alienation. The difficulty in obtaining water also seriously limits the pastoral industry. In 1901 there were in the State 2,542,844 sheep, 394,580 cattle, and 73,830 horses. There are over 3000 camels, these animals being used as beasts of burden.

Transportation. In June, 1902, there were 2,143 miles of railway in operation, of which 629 miles were private. No other Australian State has so large a mileage of privately owned lines. The construction of the private lines was encouraged, however, by Government grants of land. In 1901 a net profit of nearly 1 per cent. was realized on the Government railways.

Government. The Governor is appointed by the British Crown. The Parliament consists of a Legislative Council of 30 members elected for 6 years, and a Legislative Assembly of 50 members elected for 3 years. Electors must be residents of the election district or have certain property qualifications. The right of suffrage is conferred without distinction of sex. The capital is Perth.

Finance. In 1902 the total revenue amounted to £3,688,049 and the expenditures to £3,490,026. The customs and excise duties contribute about one-third of the revenue, and the railways about 42 per cent. The participation of the Government in the construction of railways and other industrial enterprises has created a heavy public debt, which amounted in 1902 to £14,942,310.

Population. Western Australia is one of the most sparsely settled regions in the world. Most of it is wholly uninhabited, the population being confined mainly to portions of the coast region and the gold-mining settlements in the interior. The first reports of gold at Kimberley and Yilgarn did not result in any marked immigration, and in 1890 the total population was only 49,200. The remarkable discoveries of gold at Coolgardie in 1892 incited a rush of miners into the region which has not yet ceased. In 1895 the population had increased to 101,238 and in 1901 to 194,889. As is common in a mining region, a large percentage of the population is centred in the towns. In 1901 Perth contained 36,274 inhabitants; Freemantle, 20,444; Kalgoorlie, 6652; Boulder, 4601; and Coolgardie, 4249.

Religion. In 1901 the adherents of the Church of England numbered 75,617; Roman Catholics, 40,584; Wesleyans, 17,823; Presbyterians, 14,707.

Education. School attendance is compulsory between the ages of 6 and 14. Fees are charged, but under certain conditions their payment is not required. Public instruction is secular, but religious instruction may be given by clergymen of the same denomination with the child's parents. In 1901 there were 20,548 pupils enrolled in the Government schools and 5810 in the assisted schools. For the year ending June 30, 1902, £102,359 was expended on education. Only those private schools are given aid which had enjoyed that advantage prior to 1895.

History. The coast was probably visited by Spanish and Portuguese navigators in the sixteenth century. In the following century the Dutch explored the shores, and Tasman surveyed the north coast. The west coast was only surveyed after numerous later explorations. The earliest settlement—English—was made in 1825. The British took formal official possession of the land in 1827. The colonization of Western Australia was definitely commenced in 1829 by a British organization to which the Government gave large land grants. Several thousand convicts from Sydney were numbered among the early settlers. It was not until 1870, however, that great efforts began to be made by the British to facilitate the development of the colony. On January 1, 1901, Western Australia became a State of the Australian Commonwealth.

Consult: Calvert, *Western Australia, Its History and Progress* (London, 1894); id., *Mineral Resources of Western Australia* (ib., 1894); Chambers, *Western Australia* (Perth, 1897); Vivienne, *Travels in Western Australia* (London, 1901).

WESTERN COLLEGE. An educational institution for both sexes at Toledo, Iowa, founded in 1855 at Western, Iowa, and removed to Toledo in 1881. The college is under the control of the United Brethren in Christ, but is non-sectarian in its teaching. It has two courses, classical and scientific, leading to the degrees of B.A. and B.S., a preparatory school under the direct control of the faculty, and, as adjunct departments, a conservatory of music, a college of commerce, a school of elocution and oratory, and a department of art. The master's degree in art and science is conferred after one year's graduate study or three years' work on approved lines *in absentia*. In 1903 the college had 259 students, 14 instructors, and a library of 4000 volumes. The income was $47,000.

WESTERN EMPIRE. That part of the Roman Empire which after the division of A.D. 395 was ruled by Honorius, the younger son of Theodosius, and his successors. It fell in 476, while the Eastern or Byzantine Empire survived it by nearly a thousand years. See Rome.

WESTERN ISLES. See Hebrides.

WESTERN RESERVE. In American history, the name given to a section of northern Ohio, reserved by Connecticut when that State ceded to the general Government in September, 1786, her claim to the Western lands. By her charter of 1662 Connecticut was made to extend from sea to sea. Her claim to considerable tracts of land in the West, however, was disputed by both New York and Pennsylvania. In September, 1786, Connecticut yielded all claim except that to the territory between 41° and 42° 2′, extending westward 120 miles from the western boundary of Pennsylvania. Out of this tract she kept a half million acres in the West, later known as the 'Fire Lands.' The remainder was sold in 1795-96 for $1,200,000 to forty-eight men who with others afterwards formed the Connecticut Land Company, and in 1796 began a survey. (See Phelps, Oliver.) Settlement was slow at first, as there was doubt concerning the title. Connecticut had kept a shadowy claim of jurisdiction, but surrendered this to the general Government on May 30, 1800. After 1812 settlement was rapid, largely from Connecticut and other New England States, and thirteen counties have been formed wholly or in part from the territory. The district has kept a distinctive character to this day. There the Abolition movement found strong supporters. Oberlin College (q.v.) was the first college opened to negroes as well as whites. Among the men from this section who have achieved national prominence may be mentioned Joshua R. Giddings (q.v.), Benjamin F. Wade (q.v.), and James A. Garfield (q.v.). Consult Mathews, *Ohio and Her Western Reserve* (New York, 1902).

WESTERN RESERVE UNIVERSITY. An institution of learning at Cleveland, Ohio, founded in 1826 at Hudson as the Western Reserve College. The university consists of seven departments: Adelbert College, the original institution, removed from Hudson to Cleveland in 1882, and renamed in memory of the son of a benefactor, Amasa Stone, who gave the institution $500,000; the College for Women, established in 1888; the Department of Graduate Instruction, established in 1888; the Medical College, formerly the Cleveland Medical College, founded in 1844; the Franklin T. Backus Law School, opened in 1892; the Dental Department, established in 1892; and the Library School, opened in 1904. The university confers the degrees of B.A., B.L., B.Ph., LL.B., M.A., Ph.D., M.D., and D.DS. In 1902 the students in all departments numbered 780, with a teaching force of 153. The library had 48,000 volumes. The campus, occupying 22 acres, is situated in the midst of the city's park system, and with the buildings was valued in 1902 at $1,451,000. The endowment in 1902 was $1,300,000; the income was $258,000, and the property was valued at $2,751,000. The school for the training of librarians was made possible in 1904 by Mr. Andrew Carnegie's gift of $100,000. The school is to be organized as a postgraduate department of the university.

WEST FARNHAM, färn'*a*m. A town of Canada. See FARNHAM.

WEST'FIELD. A town, including several villages, in Hampden County, Mass., 9 miles west of Springfield, on the Westfield River, and on the Boston and Albany and the New York, New Haven and Hartford railroads (Map: Massachusetts, B 3). It is the seat of a State normal school, and has the Westfield Athenæum with more than 17,600 volumes, Noble Hospital, and Woronoco Park. The town is chiefly engaged in manufacturing and is especially known for its extensive whip-making establishments and cigar factories. There are also paper mills, machine shops, and manufactories of thread, boxes, brick, steam heating apparatus, organs, etc. The water-works, electric light plant, and gas plant are owned by the town. Settled as a trading post, probably as early as 1642, Westfield was known as Woronoco until incorporated under its present name in 1669. Population, in 1890, 9805; in 1900, 12,310. Consult Holland, *History of Western Massachusetts* (Springfield, 1855).

WEST HAM. A municipality suburban to London, England. See HAM, EAST AND WEST.

WEST HARTLEPOOL, här't'l-pōōl'. A municipal borough of Durham County, England, an extension of Hartlepool (q.v.), and forming with that town the Parliamentary borough and port of The Hartlepools (Map: England, E 2). It was founded in 1847, and incorporated in 1887. It carries on an important trade with Baltic ports, exporting coke, cement, etc. Its harbors and docks cover 300 acres. The town has fine parks and public buildings. Population, in 1891, 42,800; in 1901, 62,600.

WEST HAVEN. A borough in New Haven County, Conn., separated from New Haven by the West River, here spanned by a handsome bridge; on the New York, New Haven and Hartford Railroad (Map: Connecticut, D 4). It is chiefly a residential place, and has a fine town and borough hall, the Union School building, and a public square, containing about seven acres. Manufacturing is the leading industry of the borough, the most important products being pianos, buckles, safes, fertilizers, and hack saws. Savin Rock, in the southern part of the borough, on Long Island Sound, is a noted summer resort. West Haven was a part of New Haven until 1822, when it was united with North Milford, the two forming the township of Orange. Population, in 1900, 5247.

WEST HO'BOKEN. A town in Hudson County, N. J., adjoining Jersey City and Hoboken. It occupies an elevated site and commands an extended view. The Monastery Church is the principal architectural feature. West Hoboken is primarily noted for the manufacture of silk and silk goods. Other important products include braid, gloves, brush handles, artificial flowers, feathers, sashes, doors and blinds, etc. The cultivation of flowers and plants is also extensively carried on. West Hoboken was originally a part of Bergen, and was separately incorporated in 1861. Population, in 1890, 11,665; in 1900, 23,094.

WESTHOUGTON, wĕst'hō'tŭn. A town in Lancashire, England, 5 miles southwest of Bolton. Coal-mining and the manufacture of silk and cotton goods and nails constitute the principal industries. Population, in 1891, 12,042; in 1901, 14,377

WEST INDIES, ĭn'dĭz. A large archipelago in the Atlantic Ocean between the North and South American continents. It consists of the Bahama Islands, a somewhat irregular group lying to the southeast of the peninsula of Florida and the Greater and Lesser Antilles (see ANTILLES), a long chain of islands stretching in a great curve from the entrance to the Gulf of Mexico eastward and southward to the mouths of the Orinoco, and inclosing the Caribbean Sea between it and the mainland. The total area of the archipelago is about 92,000 square miles, of which the Greater Antilles alone take up over 82,000. With the exception of the Bahamas, which are low, of coral formation, the islands are nearly all mountainous. The Antilles are, in fact, the projecting remnants of a former mountain range which was similar in formation to the Central American Cordillera, and formed a continuous or nearly continuous bridge between the northern and southern continents. The range consists of a core of crystalline rocks flanked by Cretaceous and Tertiary deposits, and these formations make up the larger portion of the Greater Antilles, but appear only sporadically in the Lesser Antilles, chiefly in the Virgin Islands, in the eastern half of Guadeloupe, and in Barbadoes and Trinidad. The other members of the Lesser Antilles owe their origin to a line of volcanic activity, and consist of recent, and generally still active, volcanic cones. The West Indian cordillera culminates in Haiti at an altitude of over 10,000 feet, while in the Lesser Antilles the maximum elevation is about 5000 feet. The climate of the West Indies is tropical, with an average mean temperature of 72° for the coldest and 80° for the warmest month, and average extremes of 54° and 100°. The annual rainfall varies between 40 and 66 inches. Most of the rain is brought by the northeast trade wind, which is the prevailing wind in summer. Hence the summer is the wet season, the winter months being comparatively dry, as the winds then are generally southeast. A peculiar feature of the climate is the extremely violent hurricanes which from time to time, generally between

July and November, cause serious destruction of life and property. The flora is related to that of tropical South America, though less rich in distinctively tropical species. The fauna is characterized chiefly by a paucity of large mammals as compared with the fauna of the mainland, though the other divisions of the animal kingdom are well represented. For details of flora and fauna, see articles on the separate groups and islands.

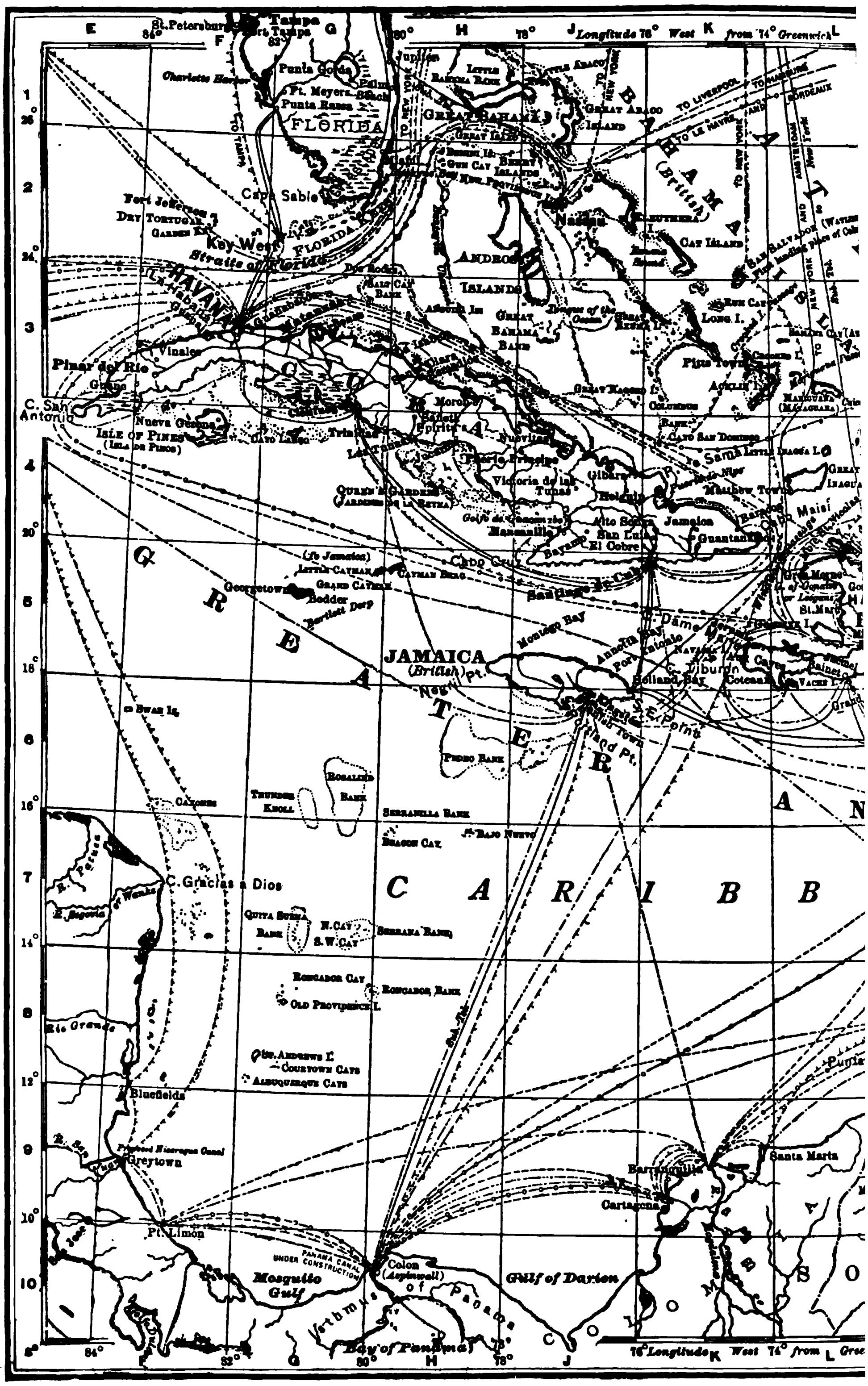
The industries are mainly agricultural, and sugar, tobacco, and coffee are the principal economic plants. The importance of cane sugar has declined in recent years, but fruit and cotton culture is developing. The population of the whole archipelago is a little more than 6,000,000. Two-thirds of the inhabitants are negroes or of African blood, though in Cuba and Porto Rico the whites are in the majority. The Europeans are chiefly descendants of Spanish, French, and English settlers. The principal remaining element of the population is the imported Chinese and Indian coolies, the aboriginal Indian population being almost wholly extinct. Politically the West Indies are much divided. Of the Greater Antilles, Porto Rico belongs to the United States and Jamaica to Great Britain, while Cuba and Haiti represent independent republics, the latter containing two—Haiti and Santo Domingo. The other islands are colonial possessions of Great Britain, France, the Netherlands, and Denmark, the British possessions being by far the largest. The West Indies were so called because they were at first believed to be a part of India. They were the earliest parts of the New World to be discovered and settled, and served as a base for the Spanish expeditions of conquest and exploration on the mainland. For details of history, see articles on the separate islands.

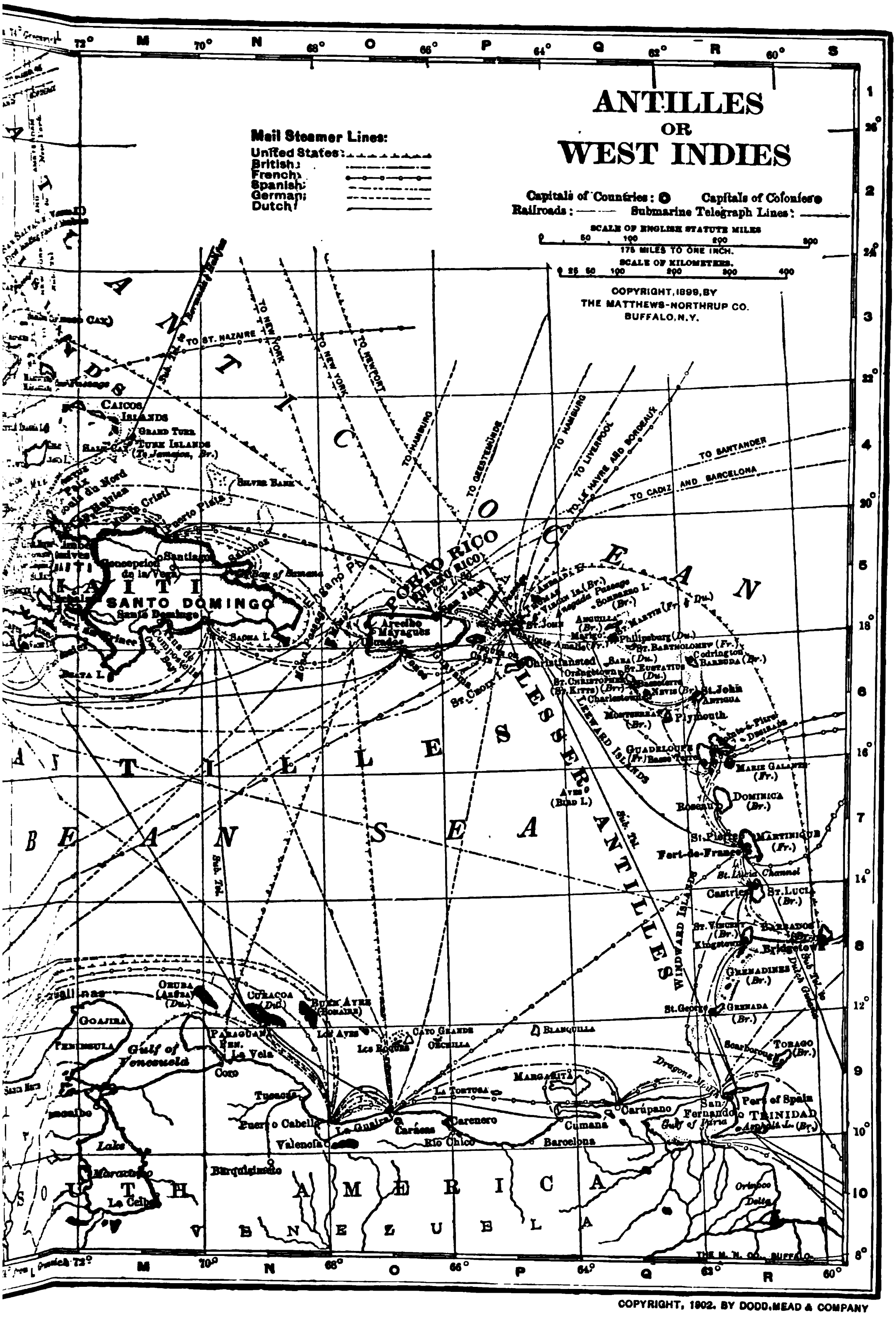
BIBLIOGRAPHY. Hooper, *The Forests of the West Indies* (ib., 1888); Deckert, *Politisch-geographische Betrachtungen über West-indien* (Leipzig, 1896); Redway, *The West Indies and the Spanish Main* (New York, 1896); Fiske, *The West Indies* (ib., 1899); Hamm, *Porto Rico and the West Indies* (London, 1899); Froude, *The English in the West Indies* (London, 1888). See also the authorities cited under CUBA and PORTO RICO.

WEST INDIES, DANISH. A group of three islands in the West Indies, situated east of Porto Rico, belonging geographically to the Virgin Islands, and politically to Denmark. It consists of Saint Croix (q.v.), Saint Thomas (q.v.), and Saint John (q.v.), with a total area of 138 square miles (Map: West Indies, P 5). The chief industry is the cultivation of sugar. The trade is chiefly with the United States and Denmark, the exports consisting almost entirely of sugar and rum. The group is practically autonomous. The legislative power is vested in two councils, one for each of the two districts into which the colony is divided; three-fourths of their members are elected. The executive power is in the hands of the Governor-General, appointed by the Crown. The revenue is derived principally from customs, and as the trade of the colony is in a state of decline, it is insufficient to cover the expenditures. Population, in 1901, 30,527. The inhabitants are mostly negroes, the Danish element being represented almost exclusively by the officials and their families. The chief language is a Spanish dialect, but English is generally spoken in the ports. The seat of government is Christiansted, on Saint Croix. Negotiations for the sale of the islands to the United States were for a number of years in progress, but were terminated in 1902 by the rejection of a treaty of sale by the Danish Parliament.

WEST INDIES, DUTCH. See NETHERLANDS, paragraph on *Colonies*.

WESTINGHOUSE, GEORGE (1846—). An American inventor and engineer, famous for his invention of the air-brake. He was born at Central Bridge, Schoharie County, N. Y., but removed when a young boy to Schenectady, where he was educated in the public schools. His father was a large manufacturer of agricultural machinery, and Westinghouse spent considerable time in the machine shops, showing his inventive and mechanical genius at an early age. In the Civil War he served with the Twelfth New York Regiment and the Sixteenth New York Cavalry until the latter part of 1864, when he became assistant engineer in the United States Navy. On his return to Schenectady in 1865 he matriculated at Union College and studied until the end of the sophomore year, being occupied in the meantime with mechanical investigations. His first invention of note was a railway frog, and from this and other railway appliances his attention was turned to brakes. Realizing the necessity for a power brake, and that it was impossible to use steam, on account of condensation, he experimented with compressed air, which was then beginning to be used as a motive power in European tunneling. In 1868 he invented the air-brake, which was successfully used in that year and soon came to be employed universally throughout the United States and gradually in Europe. From time to time this important adjunct to railway travel received important and extensive improvements at the hands of Westinghouse and its efficiency was wonderfully increased. (See AIR-BRAKE.) Railway signaling also attracted Westinghouse's attention, and many inventions and improvements in safety devices followed. Becoming interested in electricity, Westinghouse acquired patents for alternating current machinery and immediately devoted himself to the development of this branch. Through his efforts the alternating current for power and lighting was used on a large scale, notably at the Chicago Exposition of 1893, and in spite of the opposition of the direct-current advocates, came rapidly into widespread use. The induction motor of Tesla and other inventions that were developed under his direction made possible long-distance transmission of power. To construct air-brakes, and electrical and other machines large works were erected at Pittsburg, which were constantly added to and maintained at a high degree of efficiency, especially as regards equipment and organization. From these works were supplied the generators for the great power plants at Niagara Falls, and of the elevated and rapid transit systems of New York, while in their different departments were constructed steam and gas engines, steam turbines, and electrical and other machinery, which in nearly all cases was of improved form, invented or developed in the Westinghouse shops and


E
F
G
H
J
K
L
84°
82°
80°
78°
76°
74°
Longitude 78° West from 74° Greenwich
1
2
3
4
5
6
7
8
9
10
26°
24°
20°
18°
16°
14°
12°
10°
8°
St. Petersburg
Tampa
Port Tampa
Charlotte Harbor
Punta Gorda
Ft. Meyers
Punta Rassa
FLORIDA
Jupiter
Little Bahama Bank
Little Abaco
Great Bahama
Great Abaco
To New York
To Liverpool
To Le Havre
To Hamburg
Bordeaux
Amsterdam
Great Isaac
Cape Sable
Fort Jefferson
Dry Tortugas
Garden Key
Key West
Florida Reefs
Straits of Florida
Gun Cay
Berry Islands
New Providence
Nassau
Eleuthera
Cat Island
Andros
Islands
San Salvador
Bahama
(British)
Havana
Matanzas
Salt Cay Bank
Great Bahama Bank
Tongue of the Ocean
Great Exuma
Rum Cay
Long I.
Crooked I.
Pinar del Rio
Vinales
C. San Antonio
Nueva Gerona
Isle of Pines
(Isla de Pinos)
Cienfuegos
Trinidad
Cayo Largo
Sancti Spiritus
Moron
Nuevitas
Puerto Principe
Victoria de las Tunas
Gibara
Holguin
Queen's Gardens
(Jardines de la Reina)
Golfo de Guacanayabo
Manzanillo
Bayamo
Alto Songo
San Luis
El Cobre
Jamaica
Guantanamo
Cabo Maisi
Great Inagua
Little Inagua
Mayaguana
Acklin
Great Ragged I.
Columbus Bank
Matthew Town
Cabo Cruz
Santiago de Cuba
Windward Passage
Little Cayman
Cayman Brac
Grand Cayman
Georgetown
Bodden
Bartlett Deep
(To Jamaica)
G R E A T E R   A N
JAMAICA
(British)
Negril Pt.
Montego Bay
Annotto Bay
Port Antonio
Kingston
Spanish Town
Portland Pt.
Morant Point
Holland Bay
C. Tiburon
Navassa I.
Cayemites
Coteaux
Vache I.
St. Marc
Gonaives
Gonave
Dame Marie
Swan Is.
Pedro Bank
Rosalind Bank
Thunder Knoll
Caratasca
Serranilla Bank
Bajo Nuevo
Beacon Cay
C. Gracias a Dios
R. Patuca
R. Segovia or Wanks
C A R I B B
Quita Sueño Bank
N. Cay
S.W. Cay
Serrana Bank
Roncador Cay
Roncador Bank
Old Providence I.
St. Andrews I.
Courtown Cays
Albuquerque Cays
Rio Grande
Bluefields
R. San Juan
Proposed Nicaragua Canal
Greytown
Pt. Limon
Panama Canal under construction
Colon
(Aspinwall)
Mosquito Gulf
Gulf of Darien
Isthmus of Panama
Bay of Panama
Santa Marta
Barranquilla
Cartagena
Punta
C O L O M B I A
S O



COPYRIGHT, 1902, BY DODD, MEAD & COMPANY

laboratories. In addition to being the head of a number of corporations, capitalized at some $75,000,000 and employing over 20,000 people, Westinghouse established large factories and works in Europe. He was decorated with the French Legion of Honor, the Royal Crown of Italy, and the Order of Leopold. Westinghouse's work in mechanical engineering has always been typical of the best American practice both in the field of invention and in the organization and operation of manufacturing plants, and few works have been operated on a larger scale or more efficiently than those under his control.

WEST'LAKE, John (1828—). An English legal scholar, born at Lostwithiel, Cornwall. He graduated at Trinity College, Cambridge, in 1850, was fellow of the college in 1851-60, was called to the bar at Lincoln's Inn in 1854, and became a bencher of the Inn in 1874. In 1885 he was elected to Parliament as Liberal member for the Romford Division of Essex, in 1888 was appointed professor of international law in the University of Cambridge, and in 1899 was a member for Great Britain of the International Court of Arbitration at The Hague. His publications include: *A Treatise on Private International Law* (1858; 2d ed., rewritten, 1880; 3d ed. 1890); and *Chapters on the Principles of International Law* (1894).

WEST LOTHIAN. A county of Scotland. See Linlithgow.

WEST'MACOTT. A family of distinguished English sculptors.—Sir Richard Westmacott (1775-1856), the first to attain eminence, was the son and pupil of Richard Westmacott, also a sculptor. In 1793 his father sent him to Rome, where he received his actual artistic training from Canova, carrying off the gold medal of the Academy of Saint Luke with his bas-relief of "Joseph and His Brethren." In the same year (1795) he was made a member of the Florentine Academy. Returning to London in 1797, he was in 1811 elected Academician, and in 1827 succeeded Flaxman as professor of sculpture at the Royal Academy. His commissions included, besides public works in England, a number for India and the colonies. Among the most important were the statues of Addison, Pitt, Fox, and Perceval in Westminster; the monuments to Abercromby, Collingwood, Captain Cook, and General Pakenham in Saint Paul's; a colossal bronze statue of Achilles in Hyde Park, after the original on Monte Cavallo at Rome; and the statue of the Duke of York on the column in Waterloo Place. One of his latest works was the pediment groups representing the "Progress of Civilization," executed for the British Museum (1847). In 1837 he was knighted. After retiring from his profession he continued to lecture until 1854, and died in London, September 1, 1856.

His son and pupil, Richard Westmacott (1799-1872), born in London, was also a sculptor. After studying at the Royal Academy from 1820 to 1826 he resided in Italy, devoting himself to ancient sculpture and its history. His earliest works, exhibited at the Royal Academy, were ideal figures, but from 1840 until 1855, when he retired from his profession, he was principally engaged in monumental sculptures, and in portrait busts like those of John Henry Newman, Lord Russell, Sir Roderick Murchison, and others. From 1857 to 1867 he was professor of sculpture at the Royal Academy, in which office he succeeded his father. Westmacott was also well known as a writer and lecturer on art subjects, and was elected a fellow of the Royal Society in 1837. He was the author of the *Handbook of Ancient and Modern Sculpture* (1864).

WEST'MEATH. An inland county of the Province of Leinster, Ireland, bounded, north by the counties of Cavan and Meath, east by Meath, south by King's County, and west by Roscommon (Map: Ireland, D 3). Area, 708 square miles, largely devoted to pasturage. Chief towns, Athlone and Mullingar, the capital. Population, in 1841, 141,600; in 1901, 61,500.

WEST'MINSTER. A metropolitan borough of London, England, on the left bank of the Thames, southwest of the city so called. In this borough the laws and fashions of Great Britain are made, and the Government officials and aristocracy dwell. It contains the Houses of Parliament, the Government offices, Westminster Abbey, Saint James's Palace, Buckingham Palace, Belgrave Square, the eastern end of Hyde Park, Green Park, Trafalgar Square, the Mall, Pall Mall, Piccadilly, Whitehall, and Charing Cross and Victoria stations. Population, in 1901, 182,977.

WESTMINSTER. The county-seat of Carroll County, Md., 33 miles northwest of Baltimore, on the Patapsco River, and on the Western Maryland Railroad (Map: Maryland, K 2). It is the seat of the Western Maryland College (Methodist Protestant), opened in 1868, and of the Westminster Theological Seminary (Methodist Protestant), opened in 1882. Other features are the homes of the fraternal organizations and the county court-house. The city is surrounded by a region having extensive marble quarries and other mineral wealth, and manufactures flour, canned goods, shirts, etc. Founded in 1764, Westminster was incorporated as a borough in 1838, and was chartered as a city twenty years later. Population, in 1890, 2903; in 1900, 3199.

WESTMINSTER, Hugh Lupus Grosvenor, Duke of (1825-99). An English nobleman. He was born in London and was the son of Richard, second Marquis of Westminster. He was educated at Eton and at Balliol College, Oxford; was member of Parliament for Chester from 1847 to 1868; succeeded to the Marquisate in 1869; was created Duke in 1874, and held several high official positions, including that of Lord Lieutenant of the County of London in 1888. His vast landed estates won for him the reputation of the wealthiest of English nobles. He was an active and steadfast supporter of Gladstone during that statesman's crusade against the Turkish atrocities in Armenia. He was succeeded by his grandson, Hugh Richard Arthur Grosvenor (1879—), the second Duke of Westminster.

WESTMINSTER, Provisions of. In English history, a number of ordinances enacted in October, 1259, supplementary to the well-known Provisions of Oxford (q.v.) and intended to meet the special grievances of the barons. See England; Montfort, Simon de.

WESTMINSTER ABBEY. One of the principal churches, and, in a peculiar sense, the national sanctuary, of England. It was originally the abbey church of a monastery founded in the reign of King Offar of Mercia, and reorganized by Dunstan in 971. The first church is said to have been built by King Sebert of Essex (616) on Thorney Isle, in the Thames. The foundation did not, however, achieve importance until the reign of Edward the Confessor, who had a palace at Westminster, and in 1049-65 built a church on the present site, dedicated to Saint Peter, whence the present official name of Westminster Abbey, the Collegiate Church of Saint Peter. In the later thirteenth century Henry III. undertook the reconstruction of the church, which was consecrated in 1269, and the work was continued by his successors, the nave not having been completed until the fifteenth century. The chapel of Henry VII. was added in 1502-20 under Henry VIII., and the two west towers by Sir Christopher Wren and Hawkesmore (1722-40), and the north transept was restored in 1890. The Abbey was heavily endowed and under the special protection of the Kings of England, whose palace was at Westminster. It was disendowed during the Reformation as a cathedral (1540-50), but restored by Queen Mary, and received its present organization, under a dean and twelve canons, from Elizabeth.

Westminster Abbey is one of the largest and best examples of the early English style. More than any other, it shows the French influence, in its polygonal apse and chapels, the loftiness of the nave and heavy flying buttresses. Its proportions are grandiose. The total exterior length, including Henry VII.'s chapel, is 423 feet 6 inches; the breadth is 71 feet 9 inches, for nave and aisles, and 203 feet 2 inches across the transepts. The nave is the loftiest in England (101 feet 8 inches); the towers measure 225 feet 4 inches. The imposing effect of the interior, with its beautiful stone and fine glass windows, is somewhat marred by restorations and the monuments. The Chapel of Henry VII., forming the apsidal termination of the Abbey, is a very remarkable structure in the Perpendicular style (late Gothic), having a ceiling vaulted with fan tracery of the highest and most elegant character imaginable. The beautiful oak choir stalls are appropriated by the Knights of the Bath, each seat bearing the armorial bearings of the occupant, whose sword and banner hang overhead.

Of all English churches none is so intimately connected with the national life and history. English kings since William the Conqueror have been crowned there, and there the ancient regalia (q.v.) were kept till their destruction under the Commonwealth. The coronation chair, containing the ancient Stone of Scone, brought by Edward I. from Scotland, still stands in the Chapel of Edward the Confessor. In Westminster Abbey lie buried thirteen kings, including Edward the Confessor, and others from Henry III. to George II., five sovereign queens, besides the consorts and descendants of kings. Among the most celebrated tombs are the Shrine of Edward the Confessor, erected by Henry III. in that saint's chapel, and the tombs of Henry VII. and his consort, Elizabeth of York, beautiful marble effigies, by the Florentine sculptor Torrigiano. The practice of interring courtiers, statesmen, and soldiers in the Abbey began under Richard II., and continues to be practiced. The two Pitts, Fox, Palmerston, Warren Hastings, and other modern statesmen too numerous to mention have been accorded this honor. In the Poets' Corner (South Transept) repose some of England's greatest poets, Chaucer, Spenser, Dryden, Gray, and others, and near by rest the men of letters. There are places for theologians, actors, musicians, artists, and scientists. By no means all of England's great men have been offered or accepted the honor of interment in the Abbey; but for such special statues, busts, or tablets frequently are erected there. With a few exceptions, all these monuments are disappointing from the artistic standpoint. On the east side of the Abbey is the Chapter House, a beautiful octagonal Gothic hall, in which from 1282 till 1547 the House of Commons assembled. The Jerusalem Chamber, to the southwest of the Abbey, and so called because of its former decorations, is celebrated as the death-chamber of Henry IV. Westminster School, founded by Queen Elizabeth in 1560 from revenues of the Abbey, occupies the ancient dormitory of the Abbey as a schoolroom and its refectory as a dining-room. The latter contains some ancient tapestry and stained glass.

Bibliography. The best and most complete of the numerous works on Westminster Abbey and its monuments are those of Neale and Brayley (London, 1818), Dean Stanley (ib., 1886), and Loftie (ib., 1890). For its architectural features, consult the work of Gilbert Scott (ib., 1862).

WESTMINSTER ASSEMBLY. See Creeds and Confessions.

WESTMINSTER HALL. The great hall of the ancient Palace of Westminster, now used as a vestibule to the Houses of Parliament. The Hall, begun by William Rufus in 1097, was destroyed by fire in 1291. Its present form is due to Richard II., who had the walls buttressed and the wooden roof added (1398). This ceiling, covering without columnar support a hall 290 feet long, 68 feet broad, and 92 feet high, is one of the most remarkable pieces of timber architecture in existence, both as to beauty and constructive skill. No other hall in England is as rich in historical associations. Here the King, surrounded by his chaplains, heard legal cases and administered justice. A year after its completion its builder, Richard II., was deposed in it, as was Edward II. before him; Charles I. received in it the death sentence, and a few years later Cromwell was installed here. Among the great men condemned here were Sir William Wallace, Sir John Oldcastle, Sir Thomas More, and the Earl of Strafford. Here the seven bishops who opposed James II. were acquitted, as was Warren Hastings. The hall was used for great public festivals, as during the coronation ceremonies, or when the Lord Mayor was sworn into office, for the last time in 1882.

WESTMINSTER PALACE. The ancient palace by this name was built by Edward the Confessor, perhaps on the site of an earlier structure. It was improved and altered from

WESTMINSTER ABBEY
FROM A PHOTOGRAPH

time to time by succeeding sovereigns, especially by Henry III. It was not a homogeneous building, but a complex of separate apartments, comprising the royal residence, the great hall, the royal exchequer, the law courts, and rooms for other administrative and judicial functions. In 1834 the entire complex, except the great hall, was destroyed by conflagration. For the new Palace of Westminster, see PARLIAMENT, HOUSES OF.

WESTMINSTER SCHOOL. One of the oldest of English public schools, established by Henry VIII., refounded in 1560 by Queen Elizabeth, and reorganized in 1868 as one of the seven great public schools. There are 60 foundationers, about 20 vacancies occurring every year. The school is particularly famous for the Westminster Play, an annual representation of a Latin comedy, produced by the scholars. There are a number of close scholarships and exhibitions tenable at Christ Church, Oxford, and Trinity College, Cambridge.

WESTMINSTER STANDARDS. A set of books drawn up by the Westminster Assembly, comprising: (1) the Confession; (2) the Larger and Smaller Catechisms; (3) the Directory of Public Worship; and (4) the Directory for Church Polity and Discipline. The name is often used for the first two alone. For their history and contents, see CREEDS AND CONFESSIONS; PRESBYTERIANISM. For the text, consult: Schaff, *Creeds of Christendom* (New York, 1884); the Edinburgh edition (University Press, 1855); and the various editions of the American Presbyterian Board of Publication (Philadelphia). Consult also: A. A. Hodge, *Commentary on the Confession of Faith* (New York, 1869); Mitchell and Struthers, *Minutes and Sessions of the Westminster Assembly* (London, 1874); Mitchell, *The Westminster Assembly and Standards* (ib., 1883).

WEST'MORELAND or **WESTMORLAND.** A northwestern county of England, bounded by Cumberland, Durham, Yorkshire, and Lancashire (Map: England, D 2). In the southwest it has a short coast line on Morecambe Bay, separating Lancashire into two detached portions. Area, 783 square miles. Its surface is mountainous, rising in Helvellyn, on the Cumberland boundary, to a height of 3118 feet. The western part belongs to the Lake District; Lake Windermere lies on the western boundary. Large areas are wooded. Only one-half of the county is improved, and of this by far the greater part is pasture, cattle and sheep-raising being the chief occupation. Population, in 1901, 64,305. County town, Appleby. Consult: Fleming, *Description of Westmoreland* (London, 1882); Ferguson, *History of Westmoreland* (London, 1894).

WES'TON, EDWARD (1850—). An American electrician, born in London, England. He studied medicine in England, but in 1870 came to the United States, and there became chemist to a nickel-plating company. He improved the process of nickel-plating, made investigations in electricity, and in 1875 established at Newark, N. J., the first factory in the United States exclusively for the manufacture of dynamo-electric machines. This was consolidated in 1881 with another company, and he was electrician of the new organization from 1881 to 1888. He made particular study of incandescent and arc electric lighting, and patented many devices in both systems. Among his inventions are a series of improved meters for electric measurements, which have attained international repute for accuracy and general efficiency, a standard cell (see VOLTAIC CELL OR BATTERY), an improved carbon filament for incandescent lamps, and a system of high-power incandescent lamps. He was a founder of the American Institute of Electrical Engineers, and its president in 1888.

WES'TON, THOMAS (?-1643?). An English colonist in America. He was a London merchant and the prime mover in the joint-stock company to assist the Plymouth Colony in 1620, which practically ended in a fiasco. Two years later he began a settlement of his own at Wessagussett (Weymouth), coming over himself. His colonists proved to be a thriftless set and were rescued from annihilation by the Indians through the efforts of Miles Standish; most of them went to Plymouth, and Weston himself soon returned to England.

WESTON-SUPER-MARE, -sū̆'pẽr-mā̆'rê. A watering place in Somerset, England, on the Bristol Channel, 20 miles southwest of Bristol (Map: England, C 5). Population, in 1891, 15,860; in 1901, 19,047.

WEST ORANGE. A town in Essex County, N. J., 5 miles northwest of Newark, and 12 miles west of New York City; on the Delaware, Lackawanna and Western railroad and a branch of the Erie (Map: New Jersey, D 2). It is finely situated at the base and along the slope of Orange Mountain. Eagle Rock (elevation over 600 feet) commands a magnificent view of the vicinity and of the city and harbor of New York. The town has well-paved streets, and there are two public parks owned and maintained by the county. Llewellyn Park, comprising 750 acres, studded with handsome dwellings, is one of the most beautiful residence parks in the country. Manufacturing is the leading industry, the principal establishments being the Edison Phonograph and Electrical Works and hat, box, and carriage factories. Population, in 1890, 4358; in 1900, 6889.

WESTPHAL, vĕst'fȧl, JOACHIM (1510-74). A German theologian, born at Hamburg. He studied theology at Wittenberg under the guidance of Luther, and then at the universities of Heidelberg, Strassburg, and Basel. In 1541 he was appointed preacher in his native city. He became specially known through his polemical activity on the Lutheran side in the controversy between the Swiss and German Reformers concerning the Lord's Supper. Among the pamphlets Westphal published on this contest are: *Recta Fides de Cœna Domini* (1553); *Collectanea Sententiarum Aurelii Augustini de Cœna Domini* (1555); and *Confutatio Aliquot Enormium Mendiorum I. Calvini* (1558).

WESTPHAL, RUDOLF (1826-92). A German classical scholar, born at Obernkirchen, Schaumburg. He studied at Marburg, was professor extraordinary at Breslau in 1858-60, and professor of philology at Moscow in 1875-79. His works, most of which deal with Greek music and versification, include: *Metrik der* *griechischen Dramatiker und Lyriker* (1854-65; rewritten in the third edition, under the title of *Theorie des mesischen Künste der Hellenen*, 1885-86); *Prolegomena zu Æschylus' Tragödien* 1869); *Theorie der neuhochdeutschen Metrik* (1870); *Elemente des musikalischen Rhythmus mit Rücksicht auf unsere Opernmusik* (1872); *Vergleichende Grammatik der indogermanischen Sprachen* (of which only the volume on the verb appeared, 1873); and *Die Musik des griechischen Altertums* (1883).

WESTPHA'LIA. A province of Prussia, bounded on the north and east by Hanover, on the east by Schaumburg-Lippe, Lippe, Brunswick, Hesse-Nassau, and Waldeck, on the southeast by Hesse-Nassau, on the southwest by the Rhine Province, and on the northwest by the Netherlands (Map: Prussia, B 3). Area, 7803 square miles. It is nearly altogether mountainous and hilly, the highest point being about 2700 feet above the sea. The region belongs to the basins of the Rhine, Ems, and Weser.

Westphalia is rich in iron and coal. The output of coal in 1900 was valued at $90,000,000. Dortmund is the chief coal centre. In iron the province leads all the others in Prussia, the value of the output for 1900 having been $28,000,000. Westphalia also ranks among the first Prussian provinces in the production of zinc and copper. Lead and other ores are also mined. The stone output is heavy and the salt industry considerable. The supply of coal and iron has lent great impetus to manufacturing interests. There are numerous iron works, and machinery and all varieties of metal wares are largely manufactured. The region between the Weser and the Lippe has for centuries been the seat of important linen industries. Woolen cloths, hosiery, and cottons are among the conspicuous manufactures. Paper, leather, and wood carvings also figure extensively in the shipments. In 1900 sugar was produced to the amount of 17,620 tons.

About 40 per cent. of the total area of Westphalia is in farms, gardens, and vineyards, about 28 per cent. in woodland, and about 25 per cent. in meadows. Rye and oats lead in importance among the cereals. Potatoes and wheat are produced in considerable quantities, and the province is noted for excellent flax. Dairying and gardening thrive, and the cattle and swine industries are prominent.

The province embraces the three administrative districts of Münster, Minden, and Arnsberg. Münster is the capital. It sends 17 members to the Reichstag and 31 to the Prussian Landtag. The population in 1900 was 3,187,777—about evenly divided between Protestants and Catholics. At the head of the excellent provincial education system stands the Academy of Münster.

HISTORY. The ancient duchy of the Saxons was divided into Westfalen (Westphalia) in the west, Ostfalen (Eastphalia) in the east, and Engern, between the two. With the dissolution of the Saxon duchy at the close of the twelfth century the name Westphalia came to designate a duchy ruled by the archbishops of Cologne. Its territory lay in the southeastern part of what is now the Province of Westphalia. The archbishops held sway till 1803. The district then passed to Hesse-Darmstadt, which in 1815 transferred it to Prussia. This duchy was one of many sovereignties which arose in the Middle Ages in the present Province of Westphalia. In the seventeenth century Brandenburg acquired dominion in the region by obtaining possession of the counties of Mark and Ravensberg and the See of Minden. The Congress of Vienna (1814-15) assigned to Prussia the whole of Westphalia within its present limits. One of the circles into which the Holy Roman Empire was divided was called the Westphalian Circle. It embraced an extensive region between the Rhine and Weser, extending northward to the North Sea, and a large territory west of the Rhine, comprising part of the modern Netherlands and Belgium. See WESTPHALIA, KINGDOM OF.

Consult: Weddigen, *Westfalen, Land und Leute* (Paderborn, 1896); Schücking and Freiligrath, *Das malerische und romantische Westfalen* (ib., 1898); Schulze, *Die Provinz Westfalen* (Minden, 1900).

WESTPHALIA, KINGDOM OF. A kingdom created by Napoleon in August, 1807, for his brother Jerome Bonaparte. It was constituted out of part of the territories given up by Prussia in the Treaty of Tilsit and of the dominions of the Elector of Hesse-Cassel and the Duke of Brunswick. It had an area of about 15,000 square miles and a population of about 2,000,000. The kingdom came to an end in 1813, after the defeat of Napoleon at Leipzig.

WESTPHALIA, PEACE OF. The treaty which closed the Thirty Years' War (q.v.) in 1648 and gave a new adjustment to the religio-political affairs of Europe. It is so called from the fact that the envoys met in the cities of Münster and Osnabrück, in the Circle of Westphalia. It is sometimes spoken of as the Treaty of Münster. The minor German States had long sought relief from the devastations of war, and in 1641, at a convention held at Hamburg, preliminaries regarding the conduct of negotiations for peace were agreed upon. In 1644 a congress which had been called to meet in March, 1642, opened. The representatives of France, the Empire, Spain, and the German Catholics met at Münster, and those of Sweden, the Empire, and the German Protestants at Osnabrück. Portugal, the United Provinces, Savoy, Tuscany, Lorraine, Mantua, and Switzerland were also represented. The negotiations were long drawn out, but Torstenson's decisive campaign in 1644-45 and the successes of Turenne and Wrangel in Southern Germany, together with the capture of part of Prague by Königsmark in July, 1648, forced the Emperor Ferdinand III. to give up his dilatory tactics. After the signing of treaties at Osnabrück and Münster the Osnabrück diplomats went to Münster in October, 1648, and the general Peace of Westphalia was signed there on the 24th. Its terms, as regards the German Empire, were as follows: The sovereignty and independence of the different States of the Empire were fully recognized, and liberty was given them to contract any alliances with each other, or with foreign powers, if these were not against the Emperor or the Empire. All religious persecution in Germany was interdicted. The Treaty of Passau of 1552 and the religious Peace of Augsburg of 1555 were confirmed. With respect to the secularization of ecclesiastical benefices, everything was to remain in Austria as it was in 1624, and in the Palatinate, Baden, and Württemberg as it was in 1618. The power of putting under the ban of the Empire was only to be exercised with the consent of the Diet. The Reformed or Calvinist Protestants were put on a footing of equality as to privileges with the Lutherans. In every State the religion of the Prince might be made incumbent on his subjects, but the right of emigration for dissenters was guaranteed. The territorial changes were as follows: The Lower Palatinate was restored to the eldest son of Frederick V., Elector Palatine, and an eighth electorate was created in his favor, but the Upper Palatinate was confirmed to Bavaria, on condition that, should the two States become united, one electorate was to be abolished. France was confirmed in the possession of the bishoprics of Metz, Toul, and Verdun, and obtained possession of the Austrian territories in Alsace with the suzerainty over the ten Imperial cities of that region; Breisach, on the right bank of the Rhine, remained in French hands. Sweden obtained Hither Pomerania, with Stettin, the island of Rügen, Wismar, and the secularized sees of Bremen and Verden, with minor territories. These remained fiefs of the Empire, and Sweden was given three deliberative voices in the Diet. Brandenburg obtained, as compensation for its cessions in Pomerania, the secularized bishoprics of Halberstadt, Minden, and Cammin, together with the succession to the see of Magdeburg. Mecklenburg was enlarged by the secularized sees of Schwerin and Ratzeburg. Hesse-Cassell obtained the rich abbacy of Hirschfeld. The Elector of Saxony was allowed to retain Lusatia. The see of Osnabrück was to be alternately in the hands of a Catholic bishop and a prince of the House of Brunswick-Lüneburg. The independence of the United Provinces was recognized by Spain, and they, together with Switzerland, were declared independent of the Holy Roman Empire. France and Sweden became guarantors for the execution of the provisions of the treaty. The Peace of Westphalia, by weakening the central authority of the Empire, destroyed its unity, and afforded France, as one of the guarantors, a pretext for continual interference with its internal affairs. France now became the chief power of the Continent, taking the place formerly occupied by Spain. The Peace of Westphalia marks the close of the period of religious wars. Henceforth European contests were mainly for political ends.

Consult: Von Meiern, *Acta Pacis Westphalicæ Publica* (6 vols., Göttingen, 1734-36); Woltmann, *Geschichte des westphälischen Frieden* (Leipzig, 1808); Ogier, *Journal du congrès de Münster* (Paris, 1893); Philippi, *Der westphälische Friede* (Münster, 1898). See also references under THIRTY YEARS' WAR.

WEST PITTSTON. A borough in Luzerne County, Pa., on the Susquehanna River, opposite Pittston (q.v.), with which it is connected by two bridges (Map: Pennsylvania, F 2). It has wide streets and attractive residences, many of the Pittston business men having their homes in this borough. Population, in 1890, 3906; in 1900, 5846.

WEST POINT. The county-seat of Clay County, Miss., 97 miles north of Meridian, on the Southern, the Illinois Central, and the Mobile and Ohio railroads (Map: Mississippi, H 3). It is the commercial centre of a district engaged in cotton-growing and farming, and also has industrial interests of importance. There are a large cotton factory, carriage and wagon factories, lumber mills, electrical apparatus works, and manufactories of brick, tiling, foundry and machine-shop products, axe handles, etc. The water-works and the electric light plant are the property of the muncipality. Population, in 1890, 2762; in 1900, 3193.

WEST POINT. A military post on the right bank of the Hudson River, on the eastern edge of Orange County, N. Y., 50 miles from the city of New York, with which it is connected by the West Shore and New York Central and Hudson River railroads and daily steamboats. Its site is one of remarkable picturesqueness, the Hudson here breaking through the Highlands in a winding gap. It is the seat of the United States Military Academy. The reservation comprises 2300 acres, to 2100 of which the United States Government acquired title in 1790 and to the remainder in 1826 and 1875. It was an important military position during the American Revolution, and at various times (1775-80) the surrounding heights, at an elevation of 500 to 1500 feet, were fortified at a total cost of $3,000,000. The Polish patriot Kosciuszko was engaged here as chief engineer in charge of the works. The defenses comprised a curious and massive iron chain stretched across the channel from the Point to Constitution Island. In 1779 West Point was for a time headquarters of the commander-in-chief of the Continental Army. One year later (August, 1780) it was commanded by Major-General Benedict Arnold, a trusted and distinguished officer of the American Army, who, under the influence of pique at his treatment by Congress, conspired with the enemy to betray his trust and surrender his post, an act only averted by the arrest of the British agent, Major André, and the exposure of the plot. At the disbandment of the army at the close of the Revolution, West Point was designated as one of the depots for the storage of military property; in 1794 it was garrisoned by the new 'Corps of Artillerists and Engineers;' in 1802 the 'Corps of Engineers' was created to be stationed at West Point and to constitute a military academy. Until 1866 the immediate supervision and command of West Point were vested in the Corps of Engineers, but since that time officers of the army at large have been eligible to this detail. In addition to the professors and tactical instructors, an excellent military band and detachments from the engineers, artillery, and cavalry are stationed at the post for duty in connection with its police and security. The buildings are grouped upon a plateau of some 200 acres, at an elevation of 175 feet above the river. They comprise officers' quarters, cadet barracks, academic buildings, library, superintendent's office, mess hall, hospital, and riding hall. By bequest of a former superintendent a handsome and spacious building —known as the Cullum Memorial Hall—was erected in 1897. It contains relics and trophies of the wars in which the United States has been engaged and portraits and busts of distinguished graduates. At certain points in the grounds are placed statues—equestrian and otherwise—of famous American generals, while towering above all is a marble shaft surmounted by a figure of "Victory" in memory of the officers and men of the Regular Army who fell in defense of the Union (1861-65). Under an act of Congress approved June 28, 1902, an appropriation of $5,500,000 was made to cover the cost of new buildings, viz. an additional cadet barracks, a new academic building, a new chapel, bachelor officers' quarters, a riding hall (600 X 150 feet), artillery and cavalry barracks, stables, and a heating and lighting plant. These improvements when completed will greatly increase the capacity of the academy and the attraction of this famous military educational institution and picturesque military post. Consult: Boynton, *History of West Point and the Military Academy* (1863); Farrow, *West Point and the Military Academy* (New York, 1879). See Military Academy, United States.

WEST SPRING'FIELD. A town, including several villages, in Hampden County, Mass., on the Connecticut River, opposite Springfield, and on the Boston and Albany Railroad (Map: Massachusetts, B 3). It is the residence of many business people of Springfield. There is a public library with more than 7000 volumes. The community is chiefly interested in farming, market gardening, and the manufacture of paper and cigars. The Boston and Albany Railroad maintains extensive repair shops here. The waterworks are owned by the town. West Springfield, originally a part of Springfield, was settled about 1655, and was incorporated in 1774. Population, in 1890, 5077; in 1900, 7105.

WEST VIRGIN'IA. A South Atlantic State of the United States, popularly called the 'Panhandle State.' It lies between latitudes 37° 13′ and 40° 38′ N., longitudes 77° 40′ and 82° 40′ W., and is bounded on the northeast by Pennsylvania and Maryland, on the southeast and south by Virginia, on the southwest by Kentucky, and on the northwest by Ohio, being separated from the latter State by the Ohio River. Most of the boundaries are natural, that is, formed by rivers or mountain ridges, whence the outlines of the State are irregular. The general shape is that of an oval, 210 miles long from southwest to northeast and 125 miles wide, but two narrow tongues extend northward between Pennsylvania and Ohio and northeastward between Virginia and Maryland, each of them being known as 'panhandles.' The area of the State is 24,780 square miles, making it thirty-seventh in size among the States.

Topography. The surface of West Virginia is, as a whole, uneven, and in the east mountainous. The main range of the Alleghanies crosses the northeastern section, and farther south forms the State boundary toward Virginia. The greater part of the mountain region, occupying more than one-third of the State, belongs to the Allegheny Plateau, though the mountains in the extreme southern section may be considered as a northern extension of the Cumberland Plateau. The mountains of the northeast are chiefly in the form of parallel ridges with a southwest and northeast trend, but the southern part of the plateau is irregularly dissected by river valleys, presenting broad domes with spurs running in all directions, and but few definite ridges. The elevation of the valleys is about 2000 feet, and the elevation of the ridges is from 3000 to over 4000 feet. The highest point is Spruce Knob, with an altitude of 4860 feet. West of the mountains there is a belt of broad, flat hills from 1000 to 2000 feet in elevation, followed by a more gently rolling country which slopes toward the banks of the Ohio River, where the altitude ranges between 500 and 650 feet.

With the exception of the northeastern section, the whole State belongs to the Ohio basin, and is drained by a number of streams flowing from the mountain belt northwestward to the main river on the boundary. The largest of these tributaries are the Big Sandy, which forms the southwestern boundary of the State, the Guyandotte, Great Kanawha, Little Kanawha, and Monongahela; the last flows northward into Pennsylvania, but its two main headstreams are within West Virginia. The Potomac forms most of the boundary on the side of Maryland, and its largest headstream, the South Branch, drains most of the northeastern section of the State. All of these streams furnish abundant water power, and several of them are navigable.

Climate. West Virginia enjoys an agreeable and healthful climate, with pure mountain air and freedom from violent extremes of heat or cold. The mean temperature for January ranges from 30° in the northeastern mountains to 32° and 35° in the west and southwest. For July the mean is between 75° and 76° in nearly all sections of the State. The average maximum is between 94° and 98°, though a temperature of 104° has been recorded; the average minimum is between 5° and 10° above zero, the extreme being 10° below. The average rainfall ranges from 33 inches in the northeast to 45 inches in the south, and is fairly evenly distributed through the year.

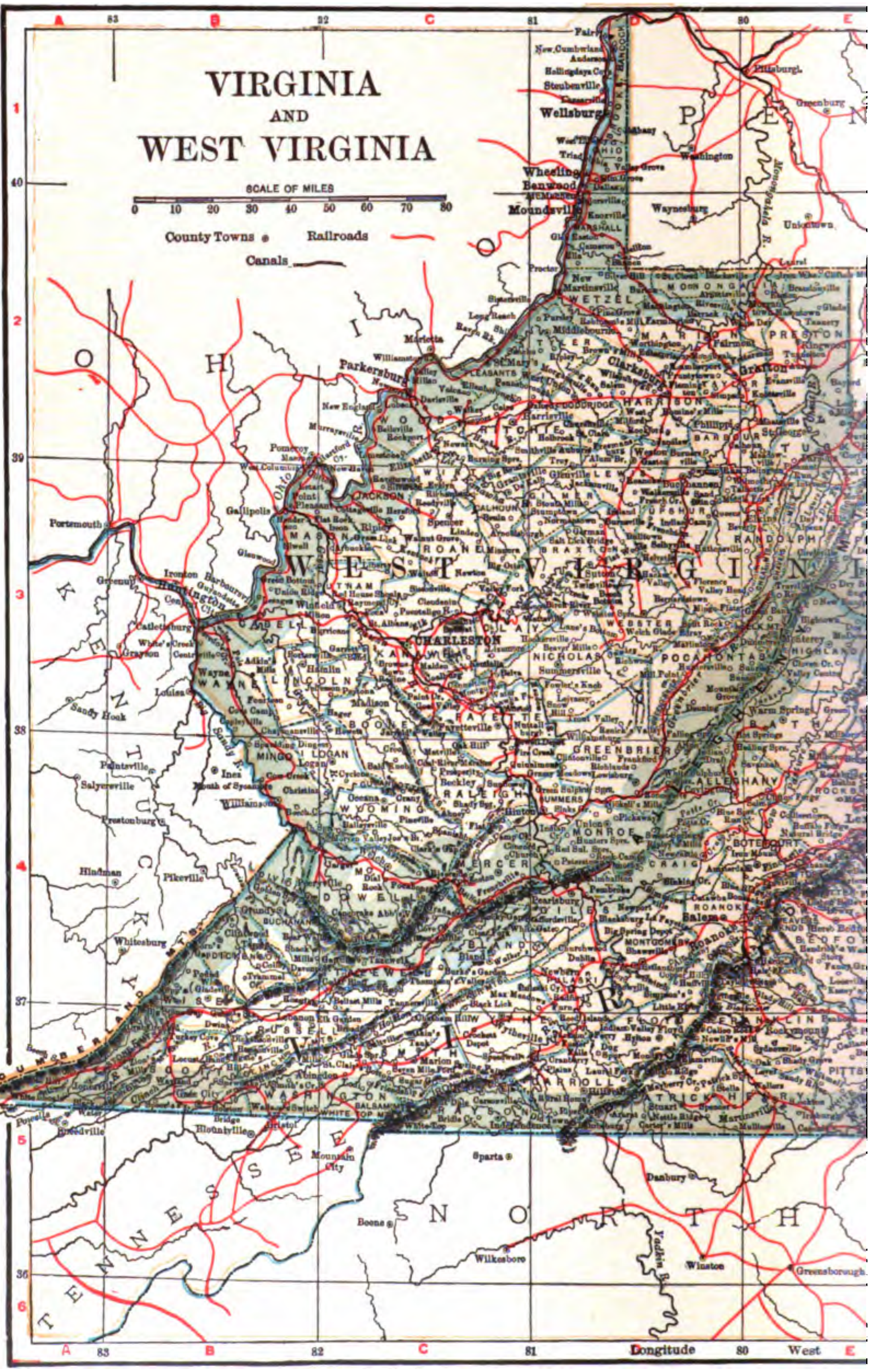
Soil and Vegetation. The soils are all formed from local disintegration of the rocks. In the northeast they are sandy and of little fertility, but many of the mountains are covered to their summits with a fertile clayey soil, and the Ohio Valley in the west has a soil formed chiefly from limestone, which gives it great fertility. West Virginia is one of the most typical sections of the Appalachian floral region. (See Flora under United States.) Large areas, especially in the east and south, are still covered with dense forests, largely of deciduous trees, such as black, red, white, and chestnut oak, hickory, chestnut, locust, maple, liquidambar, tulip-trees, and on the higher mountains, birch. On the mountains there are also extensive forests of black spruce, white pine, and hemlock.

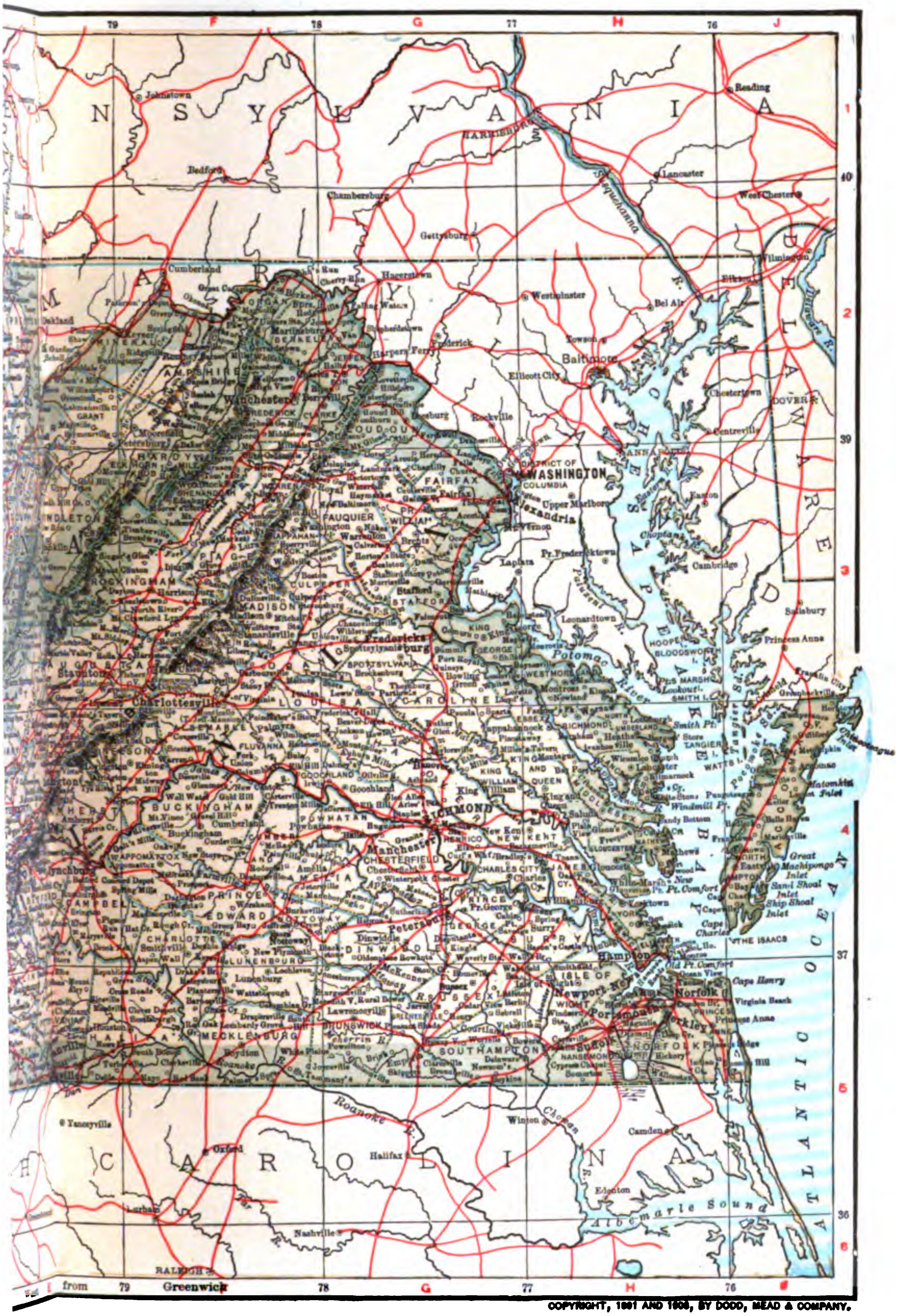
For Fauna, see that title under United States.

Geology and Mineral Resources. By far the greater part of the State is covered by rocks of the Carboniferous system, only the northeastern section and a narrow band along the southeastern boundary belonging to the Lower Paleozoic series. The rocks are here mainly Devonian, with several broad bands of Silurian in the northeast extending as far as the Cambrian sandstone on the slope of the Blue Ridge at the extreme northeastern limit of the State. West Virginia includes 16,000 square miles of the Alleghany coal measures. The upper and lower coal measures, separated by 250 feet of barren shales and sandstone, each contain sev-

AREA AND POPULATION OF VIRGINIA BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles	Population.	
				1890.	1900.
Accomac	J 3	Accomac	478	27,277	32,570
Albemarle	F 4	Charlottesville	755	26,788	28,473
Alexandria	H 3	Fort Myer	32	4,258	6,430
Alleghany	D 4	Covington	452	9,283	16,330
Amelia	F 4	Amelia	355	9,068	9,037
Amherst	E 4	Amherst	464	17,551	17,864
Appomattox	F 4	West Appomattox	342	9,589	9,662
Augusta	E 3	Staunton	1,012	30,030	32,370
Bath	E 3	Warm Springs	548	4,587	5,595
Bedford	E 4	Bedford City	729	31,213	30,356
Bland	C 4	Bland	352	5,129	5,497
Botetourt	E 4	Fincastle	548	14,854	17,161
Brunswick	G 5	Lawrenceville	529	17,245	18,217
Buchanan	B 4	Grundy	492	5,867	9,692
Buckingham	F 4	Buckingham	552	14,383	15,266
Campbell	E 4	Rustburg	551	21,378	23,256
Caroline	G 3	Bowling Green	562	16,681	16,709
Carroll	D 5	Hillsville	445	15,497	19,303
Charles City	G 4	Charles City	183	5.066	5,040
Charlotte	F 4	Smithville	479	15,077	15,343
Chesterfield	G 4	Chesterfield	484	16,965	18,804
Clarke	F 2	Berryville	189	8,071	7,927
Craig	D 4	Newcastle	351	3,835	4,293
Culpeper	F 3	Culpeper	399	13,233	14,123
Cumberland	F 4	Cumberland	297	9,482	8,996
Dickenson	B 4	Clintwood	324	5,077	7,747
Dinwiddie	G 4	Dinwiddie	521	13,515	15,374
Elizabeth City	H 4	Hampton	50	16,168	19,460
Essex	H 4	Tappahannock	277	10,047	9,701
Fairfax	G 3	Fairfax	433	16,655	18,580
Fauquier	G 3	Warrenton	676	22,590	23,374
Floyd	D 5	Floyd	383	14,405	15,388
Fluvanna	F 4	Palmyra	289	9,508	9,050
Franklin	D 5	Rockymount	690	24,985	25.953
Frederick	F 2	Winchester	425	12,684	13,239
Giles	D 4	Pearisburg	349	9,090	10,793
Gloucester	H 4	Gloucester	253	11,653	12,832
Goochland	F 4	Goochland	296	9,958	9,519
Grayson	C 5	Independence	438	14,394	16,853
Greene	F 3	Stanardsville	150	5,622	6,214
Greenesville	G 5	Emporia	288	8,230	9,758
Halifax	E 5	Houston	806	34,424	37,197
Hanover	G 4	Hanover	478	17,402	17,618
Henrico	G 4	Richmond	273	22,006	30,062
Henry	E 4	Martinsville	425	18,208	19,265
Highland	E 3	Monterey	407	5,352	5,647
Isle of Wight	H 5	Isle of Wight	352	11,313	13,102
James City	H 4	Williamsburg	159	3,812	3,688
King and Queen	G 4	King and Queen	336	9,669	9,265
King George	G 3	King George	183	6.641	6,918
King William	G 4	King William	246	9,605	8,380
Lancaster	H 4	Lancaster	137	7,191	8,949
Lee	A 5	Jonesville	433	18,216	19,856
Loudoun	G 2	Leesburg	519	23,274	21,948
Louisa	F 3	Louisa	529	16 997	16,517
Lunenburg	F 4	Lunenburg	471	11,372	11,705
Madison	F 3	Madison	336	10,225	10,216
Mathews	H 4	Mathews	92	7,584	8,239
Mecklenburg	F 5	Boydton	640	25,359	26,551
Middlesex	H 4	Saluda	156	7,458	8,220
Montgomery	D 4	Christiansburg	394	15,682	15,852
Nansemond	H 5	Suffolk	393	19,692	23,078
Nelson	E 4	Lovingston	472	15,336	16,075
New Kent	G 4	New Kent	233	5,511	4,865
Norfolk	H 5	Portsmouth	425	28,899	50,780
Northampton	J 4	Eastville	232	10,313	13,770
Northumberland	H 4	Heathsville	235	7,885	9,846
Nottoway	F 4	Nottoway	304	11,582	12,366
Orange	F 3	Orange	349	12,814	12,571
Page	F 3	Luray	317	13,092	13,794
Patrick	D 5	Stuart	489	14,147	15,403
Pittsylvania	E 5	Chatham	966	49,636	46,894
Powhatan	G 4	Powhatan	284	6,791	6,824
Prince Edward	F 4	Farmville	345	14,694	15,045
Prince George	G 4	Prince George	302	7,872	7,752
Princess Anne	H 5	Princess Anne	285	9,510	11,192
Prince William	G 3	Manassas	353	9,805	11,112
Pulaski	D 4	Pulaski City	338	12,790	14,609
Rappahannock	F 3	Washington	264	8,678	8,843
Richmond	H 4	Warsaw	188	7,146	7,088
Roanoke	D 4	Salem	297	13,942	15,837
Rockbridge	E 4	Lexington	593	22,018	21,799
Rockingham	E 3	Harrisonburg	870	31,299	33,527
Russell	B 5	Lebanon	503	16,126	18,031
Scott	B 5	Gate City	535	21,694	22,694
Shenandoah	F 3	Woodstock	486	19,671	20,253
Smyth	C 5	Marion	444	13,360	17,121
Southampton	G 5	Courtland	609	20,078	22,848
Spottsylvania	G 3	Spottsylvania	401	9,705	9,239
Stafford	G 3	Stafford	285	7,362	8,097
Surry	H 4	Surry	292	8,256	8,469
Sussex	G 5	Sussex	490	11,100	12,082
Tazewell	C 4	Tazewell	557	19,899	23,384
Warren	F 3	Front Royal	226	8,280	8,837


VIRGINIA
AND
WEST VIRGINIA
SCALE OF MILES
0 10 20 30 40 50 60 70 80
County Towns ⊛
Railroads
Canals
A
83
B
82
C
81
D
80
E
1
40
2
39
3
38
4
37
5
36
6
Longitude
West
OHIO
KENTUCKY
WEST VIRGINIA
VIRGINIA
TENNESSEE
NORTH
PENN
CHARLESTON
Parkersburg
Wheeling
Huntington
Clarksburg
Grafton
Pittsburgh
Portsmouth
Wilkesboro
Winston
Greensborough
Sparta
Boone
Bristol
Salem



COPYRIGHT, 1891 AND 1902, BY DODD, MEAD & COMPANY.

AREA AND POPULATION OF VIRGINIA BY COUNTIES.

(*Continued.*)

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Warwick	H 4	Denbigh	85	2,201	4,888
Washington	B 5	Abingdon	605	26,118	28,995
Westmoreland	H 3	Montross	245	8,399	9,243
Wise	B 4	Wise	413	9,345	19,653
Wythe	C 5	Wytheville	474	18,019	20,437
York	H 4	Yorktown	124	7,596	7,482
City of Alexandria	G 3		...	14,339	14,528
City of Bristol	B 5		. .	2,902	4,579
City of Buena Vista	E 4		...	1,044	2,388
City of Charlottesville	F 3		...	5,591	6,449
City of Danville	E 5		...	10,305	16,520
City of Fredericksburg	G 3		...	4,528	5,068
City of Lynchburg	E 4		...	19,709	18,891
City of Manchester	G 4		...	9,246	9,715
City of Newport News	H 5		...	4,449	19,635
City of Norfolk	H 5		...	34,871	46,624
City of Petersburg	G 4		...	22,680	21,810
City of Portsmouth	H 5		...	13,268	17,427
City of Radford	D 4		...	2,060	3,344
City of Richmond	G 4		...	81,388	85,050
City of Roanoke	E 4		...	16,159	21,495
City of Staunton	E 3		...	6,975	7,289
City of Williamsburg	H 4		...	1,831	2,044
City of Winchester	F 2		...	5,196	5,161

AREA AND POPULATION OF WEST VIRGINIA BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Barbour	D 2	Philippi	393	12,702	14,198
Berkeley	C 4	Martinsburg	257	18,702	19,469
Boone	C 3	Madison	512	6,885	8,194
Braxton	D 3	Sutton	541	13,928	18,904
Brooke	D 1	Wellsburg	97	6,660	7,219
Cabell	B 3	Huntington	261	23,595	29,252
Calhoun	C 3	Grantsville	276	8,155	10,266
Clay	C 3	Clay	348	4,659	8,248
Doddridge	D 2	West Union	344	12,183	13,689
Fayette	C 3	Fayetteville	775	20,542	31,987
Gilmer	D 3	Glenville	367	9,746	11,762
Grant	E 2	Petersburg	483	6,802	7,275
Greenbrier	D 4	Lewisburg	1,051	18,034	20,683
Hampshire	F 2	Romney	662	11,419	11,806
Hancock	D 1	New Cumberland	86	6,414	6,693
Hardy	F 3	Moorefield	594	7,567	8,449
Harrison	D 2	Clarksburg	431	21,919	27,690
Jackson	C 3	Ripley	455	19,021	22,987
Jefferson	G 2	Charlestown	213	15,553	15,935
Kanawha	C 3	Charleston	872	42,756	54,696
Lewis	D 3	Waston	411	15,895	16,980
Lincoln	B 3	Hamlin	441	11,246	15,434
Logan	C 4	Logan	494	11,101	6,955
McDowell	C 4	Welch	538	7,300	18,747
Marion	D 2	Fairmont	357	20,721	32,430
Marshall	D 2	Moundsville	311	20,735	26,444
Mason	B 3	Point Pleasant	457	22,863	24,142
Mercer	C 4	Princeton	437	16,002	23,023
Mineral	E 2	Keyser	332	12,085	12,883
Mingo	B 4	Williamson	424	......	11,359
Monongalia	D 2	Morgantown	368	15,705	19,049
Monroe	E 4	Union	464	12,429	13,130
Morgan	F 2	Berkeley Springs	235	6,744	7,294
Nicholas	D 3	Summersville	691	9,309	11,403
Ohio	D 1	Wheeling	111	41,557	48,024
Pendleton	E 3	Franklin	1,707	8,711	9,167
Pleasants	C 2	Saint Marys	142	7,539	9,345
Pocahontas	B 3	Marlinton	858	6,814	8,572
Preston	E 2	Kingwood	671	20,355	22,727
Putnam	C 3	Winfield	353	14,342	17,330
Raleigh	C 4	Beckley	560	9,597	12,436
Randolph	D 3	Elkins	1,086	11,633	17,670
Ritchie	C 2	Harrisville	457	16,621	18,901
Roane	C 3	Spencer	547	15,308	19,852
Summers	D 4	Hinton	368	13,117	16,265
Taylor	D 2	Grafton	132	12,147	14,978
Tucker	E 2	Parsons	440	6,459	13,433
Tyler	D 2	Middlebourne	269	11,962	18,252
Upshur	D 3	Buckhannon	326	12,714	14,696
Wayne	B 3	Wayne	545	18,652	23,619
Webster	D 3	Addison	590	4,783	8,862
Wetzel	D 2	New Martinsville	365	16,841	22,880
Wirt	C 3	Elizabeth	254	9,411	10,284
Wood	C 2	Parkersburg	357	28,612	34,452
Wyoming	C 4	Oceana	526	6,247	8,380

eral beds of coal from 1 to 9 feet thick. The coal is chiefly bituminous, though in some places it is partly metamorphosed. In the northern and central parts of the State there are immense deposits of petroleum and, associated with them, equally rich reservoirs of natural gas. Iron ore is found, chiefly as limonite, in many parts of the State, and among non-metallic minerals the most important are salt, sandstone, limestone, and clay. West Virginia has a large number of valuable mineral springs, especially sulphur.

Mining. West Virginia rivals western Pennsylvania as a mining region. Its large mineral wealth consists mainly of the mineral fuels—coal, petroleum, and natural gas. Coal-mining has developed chiefly since 1880, since which year the production has steadily increased. The average annual gain for that period was over 1,000,000 tons. The output in 1901 amounted to 24,068,402 short tons, valued at $20,848,184. Coal underlies a large part of the State and was mined in 1901 in 21 counties. The output was divided among the four districts of the State as follows: New and Kanawha River district, 8,036,292 short tons; Pocahontas or Flat Top district, 6,736,107 short tons; Fairmont or Upper Monongahela district, 5,174,160 short tons; and the Upper Potomac or Elk Garden district, 1,856,677 short tons. The development of coal-mining has been closely related with the improvement of transportation facilities, and especially with the improvements on the Great Kanawha River. West Virginia coal has a high value for coking purposes. (See *Manufactures*, below.) The rapid increase in the production of petroleum did not begin until after 1890. The yield was then only 492,578 barrels. In 1900 it surpassed the output of Pennsylvania, and ranked second only to that of Ohio. In 1901 there was a decrease in the yield, which was estimated at 14,177,126 barrels. The greater part of the oil is forced through pipe lines to Philadelphia and Baltimore. Very little natural gas was utilized prior to 1892. The value of the yield in 1901 was estimated at $3,954,472. The principal centre of production is Wetzel County. The largest part of the product is piped into the neighboring manufacturing districts of Pennsylvania. Clays are utilized and some stone is quarried.

Agriculture. In 1900 10,654,513 acres, or 67.5 per cent. of the State's area, were included in farms. The area of improved land (5,498,981 acres) is more than twice that of the corresponding area in 1870. The average size of farms has decreased nearly one-half since 1870, being 114.7 acres in 1900. In the latter year 78.2 per cent. of the farms were worked by their owners. The soil in the western part of the State consists of rich clay and sand loams, well suited to general farming. The flat hills to the eastward are better adapted to grazing. The system of agriculture practiced is typical of the Northern rather than of the Southern States. Between 1870 and 1880 there was a heavy increase in the production of corn and wheat. During the next decade these crops only about held their own, yet enjoyed a considerable increase again in the decade 1890-1900. In but few States does buckwheat have so great a relative importance. Oats and rye are the other cereals worthy of note. Hay and forage rank second in acreage. Potatoes and other vegetables are commonly grown. Tobacco and sorghum cane are worthy of mention. Probably the most noteworthy development between 1890 and 1900 was in the raising of orchard fruits. The total number of trees much more than doubled during the period. In 1900 there were 5,441,112 apple trees, constituting 70.2 per cent. of the total number of orchard trees. The following table of acreages is self-explaining:

CROPS	1900	1890
Corn	724,646	592,763
Wheat	447,928	349,016
Oats	99,433	180,815
Buckwheat	21,410	13,696
Rye	13,758	14,962
Hay and forage	601,935	....
Potatoes	30,123	....
Tobacco	5,129	....
Sorghum cane	6,870	....
Dry beans	5,221	....

Stock-Raising. Stock-raising holds a prominent place and the industry has made enormous gains since 1870. The most marked development has been in cattle-raising. Much progress is being made in dairying. In 1899 there was 41 per cent. more milk produced than in 1889. The development of mining has created a large demand for horses, so that rapidly increasing numbers are raised. The number of sheep have decreased since 1890. The following table gives the number of domestic animals on farms:

ANIMALS	1900	1890
Dairy cows	205,601	188,492
Other cattle	434,181	377,574
Horses	185,188	154,722
Mules and asses	11,470	7,390
Sheep	572,739	785,063
Swine	442,884	411,018

Forests and Forest Products. West Virginia has a great wealth of timber. The wooded area in 1900 was estimated at 18,400 square miles, or 73 per cent. of the total area. Considerable areas have been cleared in the Ohio River and lower valley counties, and on the higher levels much valuable timber has been culled, but merchantable timber still covers extensive areas. The highest regions are clothed with white pine, which, owing to its inaccessibility, generally remains in its primeval state. The low levels are covered with hard woods—largely white oak and poplar, which have supplied the largest part of the timber cut. Hemlock and spruce are abundant on the higher levels. The railroad construction since 1896 has opened up new regions, with a resulting heavy increase in the lumbering operations.

Manufactures. West Virginia has a good basis for the development of the manufacturing industry. The value of the State's manufactured products increased 91.7 per cent. between 1890 and 1900, being estimated in the latter year at $74,177,681. There were 33,085 persons engaged in the industry, or 3.5 per cent. of the population. The iron and steel industry ranks first and represented the largest absolute gain of any industry between 1890 and 1900. The iron and steel manufacture is confined to Wheeling and its vicinity, where it has the advantage of natural gas as a fuel and is conveniently near the Pittsburg manufacturing district. The State claims to have had the first rolling mill set up west of the Alleghanies. The closely allied foundry and machine-shop industry has had a rapid recent growth. In the manufacture of coke the State ranks second, and the Flat Top district, in the southern part of the State, is the second most important coking region in the United States. The availability of natural gas has led to a thriving glass-manufacturing industry. There was a significant development between 1890 and 1900 in the manufacture of pottery, terra-cotta, and fire-clay products in the region adjacent to East Liverpool, Ohio. Flour and grist milling shares in the State's general industrial progress. The extensive oak and hemlock forests furnish bark for tanning and a thriving leather industry has recently developed.

The following table shows the industrial status according to census reports:

INDUSTRIES	Year	Number of establishments	Average number wage-earners	Value of products, including custom work and repairing
Total for selected industries for State	1900	2,060	21,347	$48,897,302
	1890	1,181	11,624	22,513,520
Increase, 1890 to 1900		879	9,723	26,383,782
Per cent. of increase		74.4	83.6	117,2
Per cent. of total of all industries in State	1900	46.7	64.5	65.9
	1890	49.7	60.1	58.2
Cars and general shop construction and repairs by steam railroad companies	1900	23	2,605	2,943,557
	1890	7	1,022	910,393
Clay products:				
Total	1900	55	1,744	1,451,239
	1890	35	448	304,865
Brick and tile	1900	41	475	346,356
	1890	27	387	247,493
Pottery, terra-cotta, and fire-clay products	1900	14	1,269	1,104,883
	1890	8	61	55,372
Coke	1900	77	3,131	3,529,241
	1890	45	1,034	1,130,762
Flouring and grist mill products	1900	737	314	5,541,352
	1890	496	545	3,902,994
Foundry and machine shop products	1900	62	591	1,401,852
	1890	30	355	506,513
Glass	1900	16	1,949	1,871,795
	1890	7	1,371	945,234
Iron and steel,	1900	11	4,467	16,514,212
	1890	7	2,013	7,490,934
Leather, tanned, curried, and finished	1900	46	664	3,210,753
	1890	50	210	896,120
Lumber and timber products	1900	950	5,327	10,612,837
	1890	454	4,182	5,515,065
Lumber, planing-mill products, including sash, doors, and blinds	1900	83	555	1,820,463
	1890	50	444	910,640

TRANSPORTATION AND COMMUNICATION. West Virginia owes its rapid growth and industrial importance to the excellent transportation facilities with which it is favored. The navigable streams include the Ohio, Monongahela, Great and Little Kanawha, and the Big Sandy. The natural commercial advantages of the Monongahela and the Great Kanawha have from time to time been augmented by the deepening of their channels and the construction of locks and dams. The improvements wrought in the Great Kanawha by the National Government in 1899 enable coal to be shipped via this river at all seasons of the year, and in 1902 the navigable length of the Monongahela was extended as far as Fairmont, affording an outlet for the large coal area of that region. The bulk of the State's foreign trade is carried on by way of the Ohio, which offers means of water communication with the Gulf. The sections of the State remote from navigable waterways have to a large extent been brought into touch with the trade centres by the development of the railroads. There are three trunk lines traversing the State from east to west—the Chesapeake and Ohio, the Baltimore and Ohio, and the Norfolk and Western. The Chesapeake and Ohio, built in 1872, and extended to Cincinnati in 1888, forms an outlet for the vast deposits of bituminous coal in the region drained by the New and the Great Kanawha rivers, while the building of the Norfolk and Western in 1884 made possible the exploitation of the coal fields in the extreme southern part of the State. In 1902 five railroads in all had extended their lines into the different coal regions of the State. The rapid development of the railroads is disclosed by the fact that a mileage of 1847 in 1894 had increased to a mileage of more than 3500 in 1902. Additional lines aggregating 1000 miles in length are projected.

BANKS. The condition of the banks of West Virginia in 1902 is given in the following table, which is based upon the report of the Comptroller of the Currency:

	National	State (July 16, 1902)	Savings (July 30, 1902)
Number	55	111	1
Capital	$4,455,000	$5,119,600	....
Surplus	1,437,000	1,733,400	....
Cash, etc	1,069,000	1,718,700	417,500
Loans	18,065,000	24,982,000	....
Deposits	20,765,000	30,367,000	680,000

GOVERNMENT. The right to vote is given to male citizens twenty-one years of age who have resided in the State one year and in the county sixty days. Upon the demand of a majority of the members elected to either House of the Legislature the question of calling a constitutional convention must be submitted to the people, and the issue is decided by a majority of the votes cast. The acts of the convention must be submitted to the people for ratification. A proposed amendment must receive the approval of two-thirds of the members elected to each House, after which it is submitted to the people and decided by a majority of those voting. General elections are held on the Tuesday after the first Monday in November.

LEGISLATIVE. The minimum number of members in the Senate is twenty-four, and in the House of Delegates sixty-five. The former are elected for four years, and the latter for two years. The Legislative Assembly meets biennially, on the second Wednesday of January in the odd years. The sessions may continue not longer than forty-five days unless with the concurrence of two-thirds of each House. Members receive $4 per day and mileage. The Legislature is prohibited from establishing any board or court of registration for voters. The House of Delegates impeaches and the Senate tries all cases of impeachment.

EXECUTIVE. The Governor, Secretary of State, Superintendent of Free Schools, Auditor, Treasurer, and Attorney-General are each elected for a term of four years. The president of the Senate and the Speaker of the House, respectively, are in the line of succession to the Governorship in case of a vacancy in that office. The Governor is vested with the usual pardoning power. He may veto any bill or any item of an appropriation bill, but such action may be overruled by a majority vote of the members elected to either House.

JUDICIAL. The Superior Court consists of four judges elected by the voters of the State to serve for terms of twelve years. The State is divided into thirteen circuits, in one of which two judges are elected and in the others one judge each for terms of eight years. Court is held in each county three times a year. There are county courts, consisting of three commissioners who are elected for six years, and a clerk of the county court elected for a like period.

LOCAL GOVERNMENT. The different counties elect surveyors, prosecutors, sheriffs, and one or two assessors, all of whom serve for four years. Coroners, overseers of the poor, and surveyors of roads are appointed by the county court.

FINANCE. When West Virginia was set off from Virginia the question arose as to the share of the public debt to be borne by either Commonwealth. All attempts to reach an agreement failed, and the matter is still unsettled. The financial welfare of West Virginia has been safeguarded by the most stringent provisions in the Constitution, and there has been no debt incurred since the State entered the Union. The receipts for the fiscal year 1902 amounted to $2,348,987.89, and the expenditures to $2,292,533.86. The chief sources of revenue are licenses, land, railroad taxes, capitations, and intangible personal property.

West Virginia sends five members to the National House of Representatives. The capital is Charleston.

MILITIA. The men of militia age in 1900 were 200,503. The organized militia in 1901 numbered 995.

POPULATION. The population by decades has been as follows: 1870, 442,014; 1880, 618,457; 1890, 762,794; 1900, 958,800. In the last census year the State ranked twenty-eighth in population. The rate of increase for the last decade was 25.7 per cent., as against 20.7 per cent. for the nation. But few States have a smaller proportion of foreign born, the number of these in 1900 being only 22,451. There were 43,499 negroes. Of the total population, 499,242 were males and 459,558 females. There were 38.9 inhabitants to the square mile. In 1900 eight cities had over 5000 inhabitants each. These were: Wheeling, 38,878; Huntington, 11,923; Parkersburg, 11,703; Charleston, 11,099; Martinsburg, 7564; Fairmont, 5655; Grafton, 5650; and Moundsville, 5362.

RELIGION. The Methodists are the strongest denomination. Next in order come the Baptists, Roman Catholics, Presbyterians, Disciples of Christ, and Lutherans.

EDUCATION. Separate schools are maintained for white and colored pupils. The revenue for school purposes is derived from the school fund and capitation and general taxes. The expenditures for school purposes in 1902 were about $3,000,000. In the census year 1900, the population of school age was 356,471, of which 186,410, or 51.7 per cent., were in attendance. The illiterates in the same year formed 11.4 per cent. of the total population of ten years of age and upward. The school report for 1902 showed an enrollment in the public schools of 276,234, a substantial increase over the 1900 figures. The principal institutions include the University of West Virginia, at Morgantown (see WEST VIRGINIA, UNIVERSITY OF); Bethany College, at Bethany; and Morris Harvey College, at Barboursville. There are normal schools at Athens, Fairmont, Glenville, Huntington, Shepherdstown, and West Liberty. The West Virginia Colored Institute, at Institute, also gives a normal training course.

CHARITABLE AND PENAL INSTITUTIONS. The State maintains an asylum for incurables at Huntington, and miners' hospitals at Fairmont, McKendree, and Welsh. Hospitals for the insane are located at Weston and at Spencer, having in 1900 an aggregate of 1629 inmates. There are a school for the deaf and blind at Romney, with 209 inmates, a boys' reform school at Pruntytown, with 288 inmates, and a girls' industrial school at Salem, with 50 inmates. The penitentiary, located at Moundsville, is supported by the labor of the convicts. In 1900 there were 508 inmates.

HISTORY. For many years after the settlement of the eastern part of Virginia the western section was entirely unknown. John Lederer, a German surgeon in the employ of Governor Berkeley, was probably the first white man to explore the region, in 1669. In the same year La Salle floated down the Ohio River and landed at several places within the State. Abraham Wood in 1671 discovered the Great Kanawha, and Governor Spotswood of Virginia made an expedition into the present State in 1716. The grant to Lord Fairfax of the northern neck of Virginia included part of the present State, and his surveyors planted a stone at the headwaters of the northern branch of the Potomac to show the limits of his grant. When the western part of Virginia began to fill up with the adventurous Scotch-Irish after 1732, scattered pioneers crossed the mountains, and soon came in conflict with the French, who also claimed the country. (See OHIO; FRENCH AND INDIAN WAR; VIRGINIA.) The Six Nations of New York also claimed this country by right of conquest, but ceded their claim to the whites in 1754 at Fort Stanwix. The other Indians refused to acknowledge the cession, and in 1774, at Point Pleasant, one of the bloodiest of Indian battles was fought between a confederacy of Shawnees, Delawares, Wyandots, Cayugas, and other Indians under Cornstalk, and Virginia settlers and militia under Gen. Andrew Lewis. Lord Dunmore, the Governor of Virginia, did not attempt to aid the settlers, though he was near with a strong force, and it was openly charged that his hope was to cripple the colony so that it could not join in resistance to Great Britain. In spite of the King's proclamation of 1763 declaring the western territory to be 'Indian country,' colonization was rapid and counties were formed. After the Revolution an entirely different society grew up in the western woods, compared with that in the east. The hardy backwoodsmen had few luxuries, few slaves, and little touch with European culture. Jealousies ensued between the sections, and the west complained bitterly that they had all the burdens of government without corresponding benefits. The representation in the eastern counties was based partially upon the number of negroes, and a western freeman did not have the same representation as a resident of the east. The peculiar shape of the western part of the State made a number of the counties border on the free States of Ohio and Pennsylvania, and many of the counties were Northern in sentiment at the approach of the Civil War. When Virginia passed the ordinance of secession there was much dissatisfaction. Numerous small meetings were held, and on May 13, 1861, delegates from twenty-five counties met at Wheeling and called a convention to meet June 11th. Representatives from forty counties attended, declared their independence of Virginia, and took measures for the establishment of a provisional government by electing Francis H. Pierpont (q.v.) Governor. On July 2d a Legislature met and elected representatives to the United States Senate, who were admitted by that body. This action was approved by the people October 24th, and delegates were also elected to a convention which met at Wheeling on November 26th, to frame a constitution, which was adopted on May 3, 1862. On May 13th the Legislature of the 'Restored Government of Virginia' gave its consent to the formation of a new State. The act of admission was approved by President Lincoln, December 31, 1862, to take effect upon the insertion of a clause providing for gradual emancipation, and the State was formally admitted June 19, 1863. During the war an unusually large part of the population was in arms, and 32,068 men were furnished to the Federal Army. Slavery was entirely abolished February 3, 1865, in advance of the adoption of the Thirteenth Amendment. The return of the Confederate soldiers to the southern and eastern counties threatened the Republican control, and in 1866 an amendment was added to the Constitution disfranchising all who had given aid and comfort to the Confederacy after June, 1861. In 1869 the number of voters numbered about 50,000, and the disfranchised 29,316. By a compromise, general amnesty and negro suffrage were coupled and adopted in 1871, and in 1872 a new constitution went into force. The vote of the State was cast for Republican electors before this time. For the twenty years from 1872 to 1892 Democratic candidates were uniformly successful. The great development of mining and manufacturing has brought about a change of sentiment, and in 1896 and 1900 the State was found in the Republican column.

GOVERNORS OF WEST VIRGINIA

Arthur I. Bareman	Republican	1863-69
D. D. T. Farnsworth	(acting)	1869
William E. Stevenson	Republican	1869-71
John J. Jacobs	Democrat	1871-77
Henry M. Mathews	"	1877-81
Jacob B. Jackson	"	1881-85
E. Willis Wilson.	"	1885-90
A. Brooks Fleming	"	1890-93
William A. McCorkle	"	1893-97
George W. Atkinson	Republican	1897-1901
Albert B. White	"	1901—

BIBLIOGRAPHY. Dodge, *West Virginia* (Philadelphia, 1865); Summers, *The Mountain State: Description of the Natural Resources of West Virginia* (Charleston, 1893). For history, in addition to the references for Virginia, consult: Thwaites, ed., *Wither's Chronicles of Border Warfare* (Cincinnati, 1895); Lewis, *History of West Virginia* (Philadelphia, 1889); Hale, *Trans-Alleghany Pioneers* (Cincinnati, 1886); Atkinson and Gibbens, *Prominent Men of West Virginia* (Wheeling, 1890).

WEST VIRGINIA UNIVERSITY. A coeducational State institution of higher learning at Morgantown, W. Va., founded in 1868. It absorbed the West Virginia Agricultural College (founded 1867), the Monongahela Academy (founded 1814), and the Woodburn Seminary. It now comprises colleges of arts and sciences, engineering and mechanical arts, agriculture, and law, schools of music, military science and tactics, and commerce, and preparatory schools at Morgantown, Montgomery, and Keyser, with an attendance of 1099 students in 1903, and 70 instructors. Its principal sources of support are the land grant of 1862, the Morrill and Hatch funds, and biennial State appropriations, the total income in 1902 being $218,124. The university has a campus of 50 acres bordering the Monongahela River, and a farm of about 100 acres for the use of the agricultural experiment station and the college of agriculture. The buildings and grounds were valued in 1900 at $675,000. The library contained 25,000 volumes.

WESTWARD HO! (1) A comedy by Webster and Dekker, printed in 1607, describing the suburban pastimes of contemporary London. (2) A novel (1855) by Charles Kingsley, whose scene is laid in Elizabethan England and in what is now Venezuela.

WEST'WOOD, JOHN OBADIAH (1805-93). An English entomologist and antiquary. He was born in Sheffield, and became a lawyer in London, but never practiced, devoting himself to entomology and antiquarian researches. He was a founder (1833) of the Entomological Society of London, and finally its honorary life president. In 1861 he was appointed Hope professor of zoölogy at Oxford. While his works were largely systematic, he added greatly to our knowledge of the transformations and habits of insects. His *Introduction to the Modern Classification of Insects* (1839-40) was a work of permanent importance. Several of his works, as the

Arcana Entomologica (1841-45). are sumptuous in the richness of their plates. Besides nearly 400 memoirs and minor articles, his published works on insects, etc., are: *The Entomologist's Textbook* (London, 1838); *British Butterflies and Their Transformations*, with plates by H. N. Humphreys (1841; new ed. [1857-] 1858); *British Moths and Their Transformations*, with plates by H. N. Humphreys (London, 1843-45; new eds. in 1851 and 1857-58); with Doubleday, *The Genera of Diurnal Lepidoptera* (1846-52); *The Cabinet of Oriental Entomology* (London, [1847-] 1848, 4to); *The Butterflies of Great Britain* (London, 1855); *Catalogue of Orthopterous Insects in the British Museum*, part i., *Phasmidæ* (1859); *Thesaurus Entomologicus Oxoniensis* (1874); *Revisio Insectorum Familiæ Mantidorum* (1889); with Charles Spence Bate, *A History of the British Sessile-Eyed Crustacea* (1863-68). In addition to this he edited or contributed parts relating to insects of many other works dealing with natural history.

Westwood was also widely known for his works on English archæology. He excelled in reproducing old manuscripts, illuminations, and drawings of old ivories and inscribed stones. His antiquarian works are: *Palæographia Sacra Pictoria* (1843-45); *Illuminated Illustrations of the Bible* (1846); *On the Distinctive Character of the Ornamentation Employed by the Early British, Anglo-Saxon, and Irish Artists* (1854); *Wood Carvings—Report of the Commissioners Appointed to Inquire into the Causes of Decay in Wood Carvings* (1864); *Facsimiles of the Miniatures and Ornaments of Anglo-Saxon and Irish Manuscripts* (1868); *The Utrecht Psalter* (1874); *The Bible of the Monastery of Saint Paul Near Rome* (1876); *Catalogue of the Fictile Ivories in the South Kensington Museum* (1876); *Lapidarium Walliæ: The Early Inscribed and Sculptured Stones of Wales* (1876-79); *The Book of Kells: A Lecture* (Dublin, 1887).

WETH'ERELL, Elizabeth. The pen name of Susan Warner.

WETSTEIN, vĕt'stīn (or **WETTSTEIN**), Johann Jakob (1693-1754). A Swiss theologian, born in Basel. He studied for the Church, and after 1717 devoted himself to the critical study of the Scriptures in Basel, where he was a deacon. He was forced to leave the city in 1730 on account of suspected heretical beliefs. He was called to Amsterdam in 1733 as professor of Church history in the university, and spent the rest of his life in that city. Among his writings are *Prolegomena* (1730; annotated by Semler in 1764 and republished by Lotze in 1831), and a critical edition of the *New Testament* (2 vols., 1751-52). The latter was a distinct advance toward modern scholarship.

WETTER, vĕt'tĕr. A lake of Sweden. See Vetter.

WETTEREN, vĕt'tĕr-*en*. A town in the Province of East Flanders, Belgium, 8 miles east by south of Ghent, on the Scheldt River (Map: Belgium, B 3). It is of considerable industrial importance, having extensive bleaching establishments and manufactures of cotton goods, lace, gunpowder, etc. Population, in 1901, 14,500.

WETTERHORN, vĕt'tĕr-hôrn. A peak of the Bernese Alps in Switzerland. It belongs to the Finsteraarhorn group, and is situated 8 miles southeast of the Lake of Brienz, east of Grindelwald (Map: Switzerland, C 2). It rises from the valley in an abrupt rocky wall, and has three summits, the highest of which has an altitude of 12,167 feet.

WETZLAR, vĕts'lär. A Prussian town in a detached part of the Rhine Province, on the Lahn, opposite the mouth of the Dill, eight miles southwest of Giessen and 33 miles northwest of Frankfort-on-the-Main (Map: Prussia, C 3). Population, in 1900, 8906. In the vicinity are large mines of iron, manganese, and phosphorus. The cathedral dates from the eleventh century, with additions in the fourteenth, fifteenth, and sixteenth centuries. Wetzlar was formerly an Imperial free city, and from 1691 to 1806 was the seat of the Imperial Court of Justice. Here, on June 15, 1796, the Archduke Charles defeated the French under Jourdan. The town, which had been held by Prince Dalberg, was transferred to Prussia by the Congress of Vienna in 1815. During the summer of 1772 Goethe lived at Wetzlar; here and in the vicinity occurred the incidents which suggested the *Sorrows of Werther*.

WEX'FORD. A maritime county of the Province of Leinster, Ireland, bounded by the Irish Sea and the counties of Waterford, Kilkenny, Carlow, and Wicklow (Map: Ireland, E 4). Area, 901 square miles. The surface is in general level or undulating, becoming mountainous toward the northwest. The soil is fertile. The barley crops are the largest in Ireland, and rye, oats, potatoes, and turnips are also raised, while dairy products are exported in large quantities. Population, in 1901, 104,104. County seat, Wexford.

WEXFORD. The capital of Wexford County, Ireland, a seaport, Parliamentary and municipal borough, at the mouth of the Slaney, 82 miles south of Dublin (Map: Ireland, E 4). The town is situated on the southwestern shore of the estuary of the Slaney, known as Wexford Harbor, along which the quay extends nearly 1000 yards. The chief occupations are distilling and the grinding of corn. The harbor contains a patent slip and dock, and an active shipping trade is carried on. The town was occupied by the Danes as one of their strongest settlements. From the time of the invasion, it became an English stronghold against the native population. During the Civil War it was occupied by the confederated Catholics, but was taken by Cromwell in 1649. The insurgents of 1798 had possession of it for a short time. Population, in 1901, 11,154.

WEYDEN, vī'*den*, Rogier van der (c.1400-64). A Flemish painter, founder of the school of Brabant. Next to the brothers Van Eyck he was the most gifted and influential master of the early Flemish school. He was not a pupil of Jan van Eyck, as was formerly supposed, but rather a rival, although probably influenced by his art. Modern research has established his identity with Rogelet de la Pasture, who was born at Tournai in 1399 or 1400, became a pupil of Robert Campin in 1427, and a master of the Painters' Guild in 1432. In April, 1435, he removed to Brussels, and in the following year the office of painter to the city was created for him. In 1449 he went to Italy, where he enjoyed the highest reputation and the most distinguished patronage. For the

Duke of Florence he painted a triptych, a panel of which probably survives in the fine "Pieta" at the Uffizi; for Francesco Sforza, Duke of Milan, a "Crucifixion" (Brussels Museum), with portraits of the Duke, his wife and son; and for Cosimo de' Medici a "Madonna, with Patron Saints" (c.1450, Städel Institute, Frankfort). The great paintings of Italy, however, had no influence upon his art. He returned to Brussels, where he died June 16, 1464, as a member of a religious fraternity.

Rogier van der Weyden's art was as deeply religious as his personality. In sentiment it represents a reaction against the placid painting of Jan van Eyck, intended for comfortable middle classes, and appeals to the more popular religious tendency of the day. His intense dramatic action sometimes leads to exaggeration, and his drawing, though always careful, is sometimes defective. His colors are less bright and luminous than Van Eyck's, being rendered with dawn and twilight effects. The heads, with their large eyes and prominent brows, are wonderfully expressive and spiritual. His influence was even wider than Van Eyck's. In the Netherlands Hans Memling was his pupil, and he exercised a formative influence upon Dierich Bouts and Quentin Massys. The Cologne school of the later fifteenth century was dependent upon him; Martin Schongauer of Colmar was probably his pupil, and even Wolgemut and the Nurembergers felt his influence. Through his designs for reliefs he had a wide influence upon the sculpture of his day.

To Rogier's earliest period no paintings can with certainty be ascribed. About 1440 he painted a "Descent from the Cross," now in the Madrid Museum; replica in the sacristy of the Escorial. Of his later achievements the great altar-piece in seven panels of "The Last Judgment" (1449), in the Hospital at Beaune (Côte-d'Or), France, is one of the most important. Of great originality is the altar-piece representing "The Seven Sacraments," in the Antwerp Museum. The Old Pinakothek at Munich possesses an "Adoration of the Magi," which became a model for later painters, and "Saint Luke Painting the Madonna." In the Berlin Museum are three altar-pieces, including the celebrated Middelburg Altar, with the "Adoration of the Holy Child." Consult the biographics by Wauters (Brussels, 1856) and Pinchart (ib., 1876); also Crowe and Cavalcaselle, *Early Flemish Painters* (London, 1872); Müntz, in *Revue de l'art chrétien* (1895); and Firmenich-Richartz, in *Zeitschrift für bildende Kunst*, vol. x. (Leipzig, 1898-99).

WEYER'S CAVE. A large stalactite cavern in Augusta County, Va., opening into a western spur of the Blue Ridge, 11 miles northeast of Staunton. It ranks next in importance to the Mammoth and Wyandotte Caves, and contains several chambers, of which the largest is Washington's Hall, 250 feet long and more than 90 feet high.

WEYLER, vā'ê-lâr', NICOLAU VALERIANO, Marquis of Teneriffe (1838—). A Spanish general. He was born in Palma, island of Majorca, December 17, 1838. He entered the army, was military attaché of the Spanish Legation in the United States during the Civil War, and accompanied General Sheridan on some of his campaigns. In the ten years' war in Cuba (1868-78) he held a command under Balmaceda, and in 1873 served in Spain against the Carlists, with some distinction. In 1879 he was made Governor-General of the Canaries and in 1889 Captain-General of the Philippines, where he amassed a fortune. He was later commissioned as Provincial Governor of Catalonia, and in 1896 he was sent to Cuba, in response to the demands of the advocates of severe methods, to succeed Martinez Campos (q.v.). His ruthless policy aroused a strong protest in the United States, and he was recalled in 1897. In 1900 the military party gained ascendency in the Government and he was made Captain-General of Madrid. In the Sagasta Cabinet, which held office from March, 1901, to December, 1902, he was Minister of War.

WEYMAN, wī'*man or* wā'*man*, STANLEY JOHN (1855—). An English novelist of the romantic school. He was born at Ludlow, Shropshire, August 7, 1855, and was educated at Shrewsbury and at Christ Church, Oxford. He was called to the bar in 1881, and practiced until 1889. His first three romances, *The House of the Wolf* (1890), *The New Rector* (1891), and *The Story of Francis Cludde* (1891), were followed by *A Gentleman of France* (1893), which established his fame as a romanticist. It was translated into several languages. Without quite equaling this effort, Weyman has since published *Under the Red Robe* (1894), *My Lady Rotha* (1894), *Memoirs of a Minister of France* (1895), *The Red Cockade* (1895), *The Man in Black* (1896), *Shrewsbury* (1897), *The Castle Inn* (1898), *Sophia* (1900), *In Kings Byways*, twelve short stories (1902), and several other romances.

WEYMOUTH, wā'mŭth. A town, including several villages, in Norfolk County, Mass., 12 miles southeast of Boston, on the New York, New Haven and Hartford Railroad (Map: Massachusetts, F 3). It has the Tufts Library with more than 20,000 volumes, and the Fogg Library. Weymouth is primarily an industrial town, being especially interested in the manufacture of shoes and in wool-scouring. There are also car-repair shops here. The water-works are owned and operated by the town. Population, in 1890, 10,866; in 1900, 11,324. Thomas Weston came to Weymouth in 1622, but the first permanent settlement was made by Capt. Robert Gorges in 1623. It was here that Thomas Morton of Merrymount was first seized in 1628 by the Plymouth colonists. Until 1635, when it was incorporated, the place was called by its Indian name, Wessagusset. Consult C. F. Adams, Jr., *Proceedings on the 250th Anniversary of the Permanent Settlement* (Boston, 1874).

WEYMOUTH, or MELCOMBE REGIS AND WEYMOUTH. A seaport and fashionable watering-place in Dorsetshire, England, on a bay at the mouth of the Wey, four miles north of the Isle of Portland, and eight miles south of Dorchester (Map: England, D 6). A fortified point, called the Nothe, separates the old town of Weymouth, lying to the south, and Melcombe-Regis, extending to the north. The two communicate by means of a bridge. The old town is uninteresting in appearance. Melcombe Regis, elegantly built, stands on a narrow peninsula, with the sea on the east, and an estuary on the west side. Its chief features are the sea-terrace and an esplanade, over a mile long, adorned with a statue of George III. Ship and boat building, rope and sail making, and brewing are carried on, and there is steam traffic with France and the Channel Islands. The boroughs were united in 1571, and enlarged in 1895. Population, in 1901, 19,831.

WEYPRECHT, vī'prĕKt, Karl (1838-81). A German Polar explorer, born near Michelstadt; Hesse. He entered the Austrian navy in 1856, and with Payor undertook, in 1871, an expedition to Spitzbergen and Nova Zembla, and in 1872-74 led the great Austrian Arctic expedition, the result of which was the discovery and exploration of Franz Josef Land. At the meeting of German naturalists at Gratz in 1875, he proposed a plan to substitute for the polar expeditions a systematic exploration by means of an international system of permanent observation stations. This plan was carried into effect in 1882-83, after Weyprecht had died at Michelstadt. He published: *Die Metamorphosen des Polareises* (1879); *Astronomische und geodätische Bestimmungen der oesterreichisch-ungarischen arktischen Expedition* (1877); *Praktische Anleitung zur Beobachtung der Polarlichter und der magnetischen Erscheinungen in hohen Breiten* (1881), besides contributions to Petermann's *Mitteilungen* and other periodicals. Consult Littrow, *Karl Weyprecht, Erinnerung und Briefe* (Vienna, 1881).

WEYR, vīr, Rudolf (1847—). An Austrian sculptor, born in Vienna. He was a pupil of Bauer and Cesar in the academy, where with his group of "Samson and Delilah" he won the Reichel prize in 1870. In 1878 he was awarded in competition the work of decorating the Grillparzer monument (reliefs of the Hexedra). He attained repute through his decorative reliefs and his experiments in polychrome sculpture. His works include the great fountain before the Imperial Palace, Vienna; his chef d'œuvre, the great frieze of the "Triumphal Procession of Bacchus and Ariadne" for the pediment of the new Burgtheater; and numerous decorative features for the museum and university buildings.

WHALE (AS. *hwæl*, OHG. *wal-fisc*, Ger. *Wal-fisch*, whale). Any large marine mammal of the order Cetacea (q.v.), the only essential difference between a whale and a dolphin or porpoise being the size, although the name is more particularly applicable to the toothless or whalebone whales. One of the most widely current popular errors in zoölogy is the notion that a whale is some kind of a fish. The warm blood, the well-developed brain, the double circulation, the lungs, and the mammary glands and reproductive organs, all combine, however, to show clearly the far higher organization of a whale as compared with even the highest fishes. The young of whales are born alive, well developed after a long pregnancy, and are suckled and cared for by the mother as in the case of land mammals. Nevertheless, in their extreme adaptation to an exclusively aquatic life, whales have certain superficial resemblances to fishes, especially in the elongated, tapering body, the fin-like limbs, and the termination of the body in a caudal fin, the principal organ of locomotion. The skin of a whale is, however, smooth and without scales, although there are frequently barnacles and parasitic crustaceans attached to it in considerable numbers. The only outgrowths of the skin are hair-like bristles near the mouth, and these are not always present, being rather a characteristic of the young. The fore limbs of whales are supported by the same bones as in other mammals, but are very much flattened, and the digits, which have an unusual number of phalanges, are all united in a common skin. The clavicle is wanting, the scapula is very large, and the humerus and forearm bones are very short. The hind limbs are entirely wanting, the only evidence of their ancestral occurrence being a pair of small, slender bones, completely imbedded in the body wall and not connected with the backbone, supposed to represent vestigial ischia. The caudal fin, unlike that of a fish, is flattened horizontally, and the two halves, known as 'flukes,' are therefore right and left, not dorsal and ventral as in a fish; this fin is connected with the body by a narrow but extremely muscular part, known as the 'small.' Not only does the tail serve as the organ of locomotion, but it is also the most effective weapon of both offense and defense which the true whales possess. Most whales have more or less of a dorsal fin on the median line of the back, but it is simply an outgrowth of the integument, and even in those forms where it is most highly developed it has no bony supports. The head of a whale is very large proportionately, in some species as much as one-third of the total length.

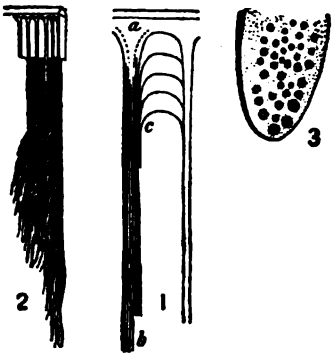
The eyes are small, as is the ear-opening; there are no external ears. The nostrils or nostril (there is often only one) are situated far back from the nose, on the vertex of the head, and are closed by a plug-like valve, which can only be opened by pressure from the inside. The so-called 'blowing' of a whale takes place through the nostrils, and is merely the release of the long-confined moisture-laden breath, which condenses in the cooler air and gives the appearance of a column of water being blown from the nostrils. The old idea that a whale takes water in at the mouth and blows it out through the nostrils is entirely baseless, although water may be blown into the air if the breath is released before the animal has quite reached the surface. The mouth of a whale is always large, though the œsophagus may be quite narrow. Teeth are wanting in the true whales, but in all other cetaceans they are present, at least in the lower jaw, and in the embryos of true whales they are found well formed about the middle of fœtal life, but they are gradually absorbed and no trace of them exists at birth. The teeth are always simple, with conical or compressed crowns and single roots, and there is only one set, milk teeth not being developed. The number of teeth shows a wide range of variation.

In the toothless whales the roof of the mouth is provided with a large number of vertical horny plates, quite close together, placed transversely on each side, so that there is a bare space in the median line. The outer end of each plate is smooth and hard, but the inner end is frayed out into long bristly fibres, so that the roof of the mouth looks as though covered with hair. (See Whalebone.) This whole apparatus serves as a sieve for straining out the minute animals on which these whales feed, the water being taken into the mouth anteriorly and then let run out at the sides of the mouth, between the ends of the baleen-plates. The surface water of the ocean swarms with animal life, on the feeding grounds of the whale this consists largely of mollusks of various kinds, together with more or less crustacean material. All this animal life is collectively known by whale-fishermen as 'brit' and is the only food supply of the toothless whales. Owing to the large size of the mouth, the maxillary and mandibular bones of the skull are greatly elongated, giving the cranium proper a disproportionately small appearance, although it is in reality of relatively good size. There are always seven vertebræ in the neck, but they are crowded close together, are practically immobile, and are more or less fused together into a single piece. The remaining vertebræ are remarkably large, numerous, and very freely movable upon each other. There is no union of any of them in the sacral region. All the bones of a whale are spongy, the cavities being filled with oil.

There are many peculiarities in the soft parts of the whales, notably the development of 'blubber,' a layer of fat, consisting of a dense mesh of areolar tissue, the interstices of which are filled with oil. This is an extraordinary non-conductor of heat and serves to maintain the temperature of the body, thus replacing the external coat of hair present in other mammals but wanting in all cetaceans. The salivary glands of a whale are rudimentary or wanting, the stomach is many-chambered and quite peculiar, the intestinal cæcum is wanting or very small, the gall-bladder is wanting, the larynx has a peculiar shape, the blood system is remarkable for its plexuses, both arterial and venous, the brain is large and round, with numerous and complex cerebral surface convolutions, and the mammary glands are situated far back, one on each side of the female reproductive opening. There is a special arrangement of dilated ducts and compressor muscles, so that the milk can be forced into the mouth of the young one in considerable quantities at a time, by the action of the mother, so that 'sucking' under water is made feasible.

Whales are very widely distributed in all parts of the ocean and are frequently gregarious, sometimes occurring in thousands. Some species, however, are generally seen singly or in pairs. A few species appear to be regularly migratory, while others wander almost at will, restricted by no natural barriers. All whales are carnivorous, but only the killers (q.v.) eat other warm-blooded vertebrates. Fishes and squids are the chief articles of diet of the toothed whales, while small mollusks and other invertebrates maintain the whalebone whales. Whales are generally timid, inoffensive animals, active and graceful in their movements and very affectionate toward one another. The parents and offspring are especially attached to each other.

Commercially whales are of great importance, although they were much more so in the past. Ambergris, spermaceti, whale oil, whalebone, and ivory are the principal substances supplied by these animals, although leather is made from the skins of some of the smaller species. Before the discovery of petroleum, illuminating oil was derived almost wholly from whale oil, but kerosene has now entirely supplanted the animal oil. Numerous substances have also been discovered or invented for replacing whalebone, which has been steadily increasing in price, and has thus become too expensive for many purposes. Ambergris (q.v.) is only incidentally a product of the whale fishery, but spermaceti is one of the principal productions of the sperm whale. It is a peculiar oily substance, which at the body temperature of the whale is a whitish fluid, but on cooling becomes solidified. After purification by refining it is a white crystalline substance used largely in pharmacy and in making candles. It is nearly odorless and tasteless. Whale oil and whalebone are still widely used. although so generally replaced by cheaper substitutes. Whalebone is exceptionally tough and elastic, and no perfect substitute has yet been found. Whale ivory is derived from the teeth of the sperm whale, which are five or six inches long, very solid, and composed of a superior grade of ivory.



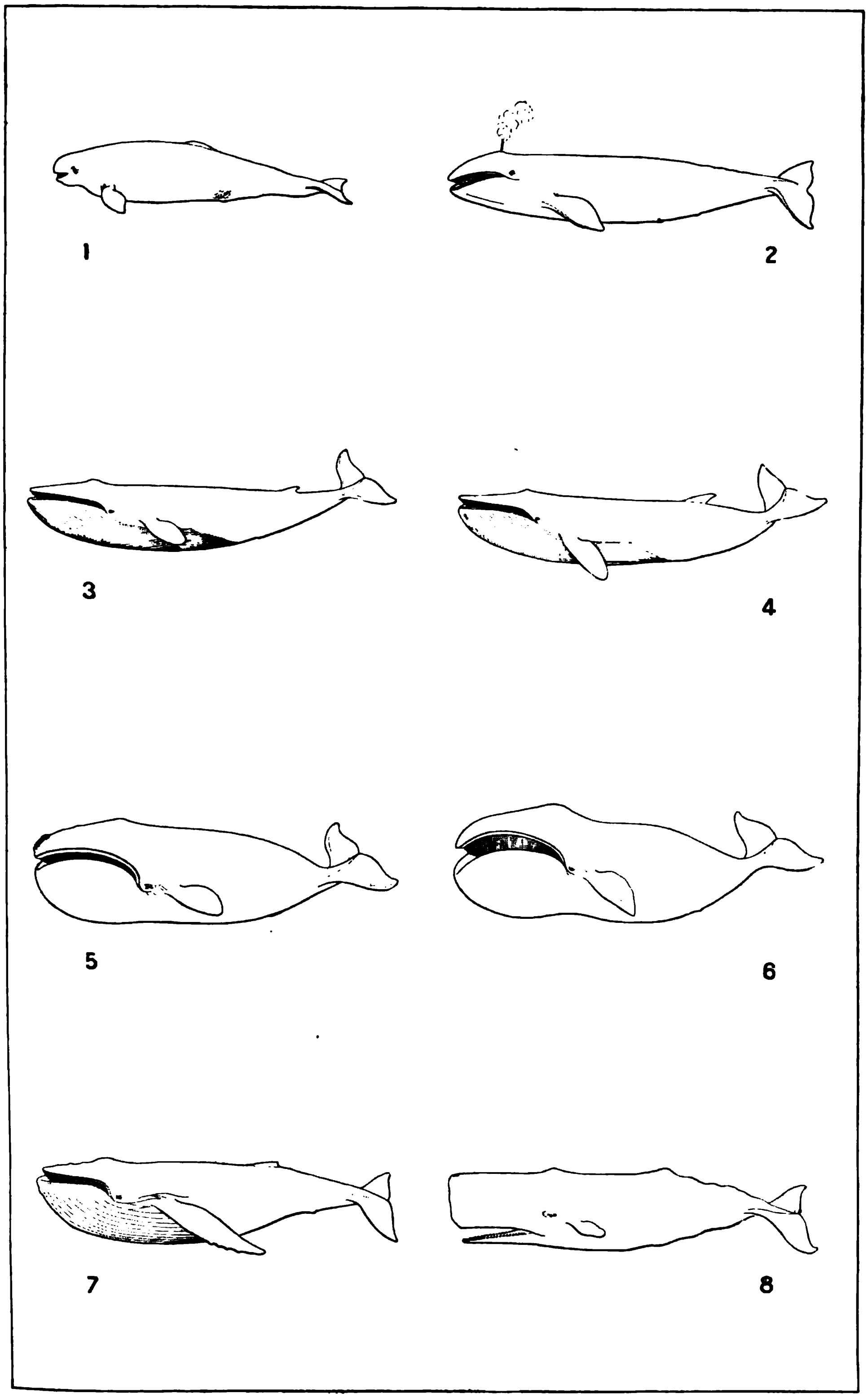
STRUCTURE OF WHALEBONE.

1. Diagram of the matrix of the baleen-plate, the dotted line, a, showing the outline of the pulp which forms *b*, the central fibrous part of the plate; *c*, external layers of firm substance formed by the elastic cementing material. 2. A vertical section of four baleen-plates *in situ*; the transverse bar at the top represents the vascular gum from which the pulps proceed that penetrate the base of the plates. Below this is shown the elastic substance cementing the plates together, beyond which the plates project free and terminate in a fringe of bristles. 3. Transverse section of a portion of a baleen-plate showing the area of the tubular cavities of the coarse central fibres, and the outer, denser substance.

For obvious reasons, the study of the anatomy, development, and natural history of whales is attended with unusual difficulties, and the accumulation of large series of specimens in museums is out of the question. It is therefore a matter of considerable question whether a given species of whale wanders into all parts of the ocean, and the number of species and their geographical distribution is practically unknown. Not more than 25 well-defined species of whale can be recognized, though nearly three times that many have been named. The classification is based primarily on the presence or absence of teeth after birth, the two suborders Denticete and Mysticete being generally accepted, though under varying names.

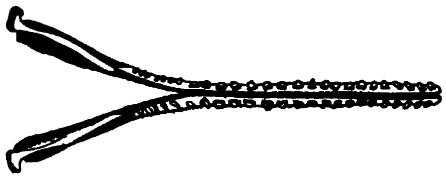
The Denticete (Odontoceti, Delphinoidea) include, besides the toothed whales, all those other cetaceans known as dolphins, narwhals, porpoises, killers, etc. The most important whale in this group is the sperm whale (*Physeter macrocephalus*), also called cachalot and spermaceti whale. It has a very wide geographical range,

WHALES



1. WHITE WHALE or BELUGA.
2. CALIFORNIA GRAY WHALE.
3. SULPHUR BOTTOM (Pacific).
4. FINBACK (Pacific).
5. RIGHT WHALE.
6. BOWHEAD WHALE.
7. HUMPBACK (Pacific).
8. SPERM WHALE.

occurring in all the important oceans, but it is most abundant off New Zealand, in the Sulu Sea, about the Cape Verde Islands, and in the Indian Ocean. It occurs more generally in the tropics and warm temperate seas than elsewhere. The sperm whale reaches a length of sixty feet or possibly more, but the female is much smaller than the male. The head is enormously large, forming about one-half of the entire bulk of the animal and occupying more than one-third of the entire length. From the head, the body tapers to the tail, and at last rather rapidly. The general color is very dark gray, nearly black on the upper parts, lighter beneath. Old bull whales usually have a large gray spot on the front of the head. The muzzle is very obtuse, almost as if squarely cut off in front, the breadth of it almost equaling the thickness of the body. In a protuberance on the upper part of it is the blowhole, which is single, situated a little on the left side, and in form not unlike the letter S elongated. The mouth is very large and wide; and the throat, unlike that of the Greenland whale, is very wide, sufficiently so to admit the body of a man. The upper jaw projects some feet beyond the lower, and is destitute of teeth; the lower jaw has from 20 to 25 teeth on each side, according to the age of the animal. The teeth are conical and slightly recurved, projecting about two inches from the gum. The lower jaw is extremely narrow, the two branches being in contact throughout the greater part of its length; it fits into a groove in the upper, in which are cavities for the teeth. The eyes are small, and placed far back in the head, above the angles of the mouth; the left eye is said to be smaller than the right. Just above the eyes, the dorsal line rises considerably; the dorsal fin is also represented by a protuberance about half-way between the neck and the tail; and these parts are seen above water in the ordinary swimming of the animal, which is at the rate of from 3 to 7 miles an hour, and just under the surface of the water, although when alarmed it swims with greater velocity. The enormous head of the sperm whale is occupied in large part by an aggregation of numerous small chambers separated and divided by connective tissue, in front of the cranium and above the upper jawbones, called by whalers *the case*, which are filled with the spermaceti; sometimes as much as ten barrels of it occurs in a single case. The blubber of the sperm whale is only about a foot thick and is not notably rich in oil, a large whale yielding about 100 barrels. When aroused these whales are dangerous adversaries, and either by biting or striking with the tail they can completely destroy whale boats, while by using the head as a ram they can sink small vessels. The remaining Denticete are mostly of small size and comparatively little importance. See DOLPHIN; PORPOISE; NARWHAL; KILLER.



LOWER JAWS AND TEETH OF A SPERM WHALE.

The Mysticete (Mystacoceti, Balænoidea) include the true whales, those without teeth. They are nearly all of large size, some of them being the largest of living animals. The largest species is probably the sulphur-bottomed whale of the Pacific Ocean (*Sibbaldius sulfureus*), which reaches a length of 90 feet or more, and the weight of which has been calculated to approach 150 tons. Several genera of whalebone whales are recognized, but the most important is Balæna, to which belong those species that supply the most valuable whalebone and oil. The most important species is the Greenland or Arctic right whale (*Balæna mysticetus*), which is circumpolar in its distribution, but does not range far to the southward, preferring the regions of icebergs and ice-floes. It attains a size of sixty or seventy feet in length. The body is thickest a little behind the 'flippers,' or pectoral fins, tapering conically toward the tail, and slightly toward the head. The tail is five or six feet long, and from twenty to twenty-five feet broad, formed of two diverging lobes, broadest almost where they are united, but with a slight indentation. The pectoral fins are eight or nine feet long and four or five feet broad. The mouth is fifteen or sixteen feet long. The eyes, which are situated on the sides of the head, about a foot above and rather behind the angles of the mouth, are not larger than those of an ox; but the sense of sight seems to be acute, at least in the water. The blow-holes are situated on the most elevated part of the head; they are from eight to twelve inches long, but of comparatively small breadth. The upper parts are velvety black, the lower parts white. The upper parts, in very old whales, sometimes become piebald, the black being mixed with white and gray. The period of gestation is uncertain; one young is produced at a birth, and is from ten to fourteen feet in length when born. The mother displays great affection for her offspring, of which whale-fishers sometimes take advantage, harpooning the young one—itself of little value—in order to secure the mother. Suckling is performed at the surface of the water, and the mother rolls from side to side, that she and the young one may be able to breathe in turn. The usual rate of progress in swimming is about four or five miles an hour, and whales often swim not far beneath the surface of the water, with the mouth wide open to take in water from which to sift food. This whale is capable, however, of swimming with much greater rapidity. Its tail is extremely powerful, and a single blow of it is sufficient to destroy a large boat. Whales usually come to the surface to breathe at intervals of eight or ten minutes, but they are capable of remaining under water for half an hour or more. When they come up to breathe, they generally remain on the surface about two minutes, during which they blow eight or nine times, and then descend. The noise which they make in blowing is very loud, and the spout of spray ejected ascends several yards into the air, appearing at a distance like a puff of smoke. They often assume, as if in sport, a vertical position, with the head down, and flap the surface of the water with the tail, making a sound which is heard two or three miles off. The Greenland whale is not properly gregarious, being generally found alone or in pairs, except when numbers are attracted to particular feeding-grounds, as is sometimes the case in the bays and inlets of northern coasts.

A closely related and very important species is the southern right whale (*Balæna australis*), which has a smaller head, shorter baleen, and a differently shaped under lip. It has fifteen dorsal vertebræ and ribs, while the Greenland whale has generally only twelve. The southern right whale is found in all temperate seas in both the northern and southern hemisphere, although generally wanting in the tropics, and is not known to occur in the Antarctic Ocean. The right whales of the North Atlantic have been separated from those of the South Atlantic, and both from the Pacific Ocean forms, as distinct species, but the differences are slight and inconstant. All of the right whales have been, and are still to a certain extent, pursued by whalers, and their numbers accordingly have become greatly reduced during the past century, and the North Atlantic form is now very rare. The smallest of the whalebone whales is the New Zealand right whale (*Neobalæna marginata*), which reaches a length of only about 20 feet. Other whales of this same family are the gray whale (*Rhachianectes glaucus*) of the North Pacific, the baleen of which is very short and coarse; the hump-back whales, of the genus Megaptera, which are nearly as large as the Greenland whale and have black baleen; and the rorquals of the genera Balænoptera and its allies. The rorquals (q.v.) are the largest whales and have a distinct and falcate dorsal fin. The pectoral fins are rather small and the skin of the throat is plicated, as is the case with the hump-backs, which, however, have very large pectoral fins. The rorquals are the most abundant and widely distributed of whales at the present time, as it is only recently that they have been sought by the whalers. The blue whale (*Balæna Sibbaldi*) is the largest of the North Atlantic forms, while the sulphur-bottom, already referred to, replaces it in the North Pacific. The fossil remains of whales occur in the Pliocene and later strata. See CETACEA.

WHALE FISHERY. The beginnings of the whale fishery are obscure, but it appears that in the ninth century the Norwegians sent out vessels in pursuit of whales, perhaps even as far as Greenland. The Biscayans, however, seem to have been the first to make a regular commercial pursuit of whale-hunting, in order to profit by the sale of oil, whalebone, etc. Between about 1300 and 1500 the hunting of whales in the Bay of Biscay and adjoining waters was one of the principal industries of the Basque provinces and Gascony. Whales' tongues were then an important article of commerce, and in 1261 were subjected to a special tax. The Biscayan fishery finally died out through lack of whales, but meanwhile the northern fishery prosecuted by the English, French, Spanish, and Dutch came into prominence. The coasts of Spitzbergen became the centre of a very successful industry carried on mainly by the Dutch, who, it is said, supplied all Europe with oil during the latter half of the seventeenth century. In 1680 they had 260 ships and about 14,000 men employed in the whale fishery, but after that their fishery began to decline. In the eighteenth century Great Britain took the lead, encouraging the sending out of sailing vessels to engage in whale-hunting by a generous bounty, the object being quite as much the training of seamen as the development of the whale fishery. The industry was in its most flourishing condition in 1815, when 164 ships were engaged in it. During the nineteenth century the United States became the great centre of the whale fishery, and it is to-day the principal producer of whale products. Nantucket was the original centre of the American whaling industry, and sent her boats to Newfoundland, the Gulf Stream, West Indies, and even as far as the Cape Verde Islands and Brazil. The Revolutionary War paralyzed the industry and many of the interests were transferred to England and France. The whalers ventured into the Pacific in 1787, but the famous Kadiak ground on the coast of Alaska was not discovered until 1835. New Bedford fitted out her first vessel in 1755 and soon became the centre of the whaling industry. For years she was the greatest whaling port in the world. In 1846 there were 735 vessels engaged in the fishery, valued at more than $20,000,000, and 70,000 people were more or less directly dependent on whaling for their livelihood. With the discovery of the abundance of whales in the Pacific and the growth of San Francisco, that city became a small centre for the whalers, but the universal use of mineral oils and cheap substitutes for whalebone has relegated the whaling industry to a comparatively unimportant place.

The vessels engaged in whaling are usually sailing vessels of three to five hundred tons burden, or screw steamers of somewhat greater tonnage. Each vessel carries from four to seven boats and a crew of 35 to 60 men, each boat requiring at least six. The crew, from captain to cabin-boy, have their wages regulated, at least to a certain extent, by the number of whales taken and the amount of oil brought home. Harpoons and lances were formerly the only means of capture, but in recent times rifles with explosive bullets have been considerably used. The introduction of prussic acid or strychnine into the body of the whale with the harpoon or bullet has been tried, as it results in a more rapid death for the animal and consequently less danger of loss; but it is said that the sailors object seriously to the use of such poisons.

When the ship arrives at the whaling-ground a lookout is stationed at the mast-head. As soon as a whale is discovered, the boats are lowered, and a competition ensues among their crews, all exerting their utmost strength to reach the whale first. The harpooner is ready, as soon as the boat is sufficiently near the whale, to hurl his harpoon with all his force; the crew instantly back the boat, and the whale generally plunges in terror to a great depth, sometimes carrying out more than 200 fathoms of line. It remains below for 20 minutes or more, and when it rises the boats hasten to it again; it is struck with a second harpoon, and probably, instead of at once descending, it strikes violently with its tail, to destroy its enemies, when great caution is requisite. It cannot now remain long below the surface, and when it comes up it often spouts blood through the blow-holes if the lungs have been injured. When it is lanced, it sometimes dies almost at once, but occasionally there is a terrific struggle—the water is lashed into foam and dyed with blood. It not infrequently happens that, instead of dying at the surface of the water, the whale descends, and does not rise again, so that it is lost to the whaler. The carcass of the whale is towed by the boats to the ship, and made fast to the ship's chains. Should the prize prove to be a right whale, the process of 'flensing' is then commenced. Some of the crew, having their boots armed with iron spikes, to prevent them from slipping, descend upon the carcass, and cut into the blubber with 'blubber-spades,' removing a broad strip or 'blanket' of skin, 20 or 30 feet long, which is hoisted to the deck by means of a hook and tackle. Great cubical pieces of blubber, of half a ton or a ton in weight, are then cut out and hoisted on deck. In this way the process is carried on, the whale being turned over and over, that every part may be reached; till in three or four hours the whole mass of blubber is removed from it—probably amounting to 20 or 30 tons. Meanwhile others of the crew have descended into the mouth of the whale and removed the baleen. The remainder of the carcass is then flung adrift, and sometimes sinks, but often floats, in consequence of incipient putrefaction. The blubber, after being hoisted on deck, is cut into smaller cubical pieces, and subjected at leisure to a process by which the cellular tissue is separated from it. This is called 'making off' or 'trying out;' and to accomplish it, the blubber is heated in a large pot, and afterwards strained, the scraps or cracknels from one pot serving as fuel for another, and the ship being made filthy with smoke, soot, and grease. The product is finally stored in casks, to be conveyed home and boiled for oil. A ton of blubber yields nearly 200 gallons of oil. A single whale has often furnished blubber and whalebone to the value of $3500 or $4000.

The pursuit and capture of sperm whales is not essentially different from that of the right whale, but after their capture the carcass is handled somewhat differently, as the head is the most valuable part. The whale is first secured by the head and then the whole 'case' with the attached blubber is cut away and hauled up beside the vessel and made fast. The contents of the 'case' are then bailed out with a bucket and the spermaceti separated from the oil by cooling. The blanket-strips are then removed from the body and the blubber is tried out as in the right whale.

Bibliography. The most recent general work is Beddard's *A Book of Whales* (London and New York, 1900); it contains all necessary references to other authorities on the natural history of the group. Consult also Goode, *Fishery Industries*, sec. i. (Washington, 1884); Scammon, *Marine Mammals* (San Francisco, 1874). For the whale fishery, consult the exhaustive treatise of Temple Brown in the *Annual Report* of the United States Fish Commission for 1883; also Bullen, *Cruise of the Cachalot* (New York, 1900).

See Colored Plate of Mammals; and Plate of Whales.

WHALEBACK. The name applied to a type of freight steamer developed on the Great Lakes and largely used on them. The sides of a 'whaleback' are curved in to meet a narrow flat deck several feet above the water-line. Circular hatchways rise above this deck and support small deck-houses and (in some instances) a flying fore-and-aft bridge. The whaleback is well suited to the lake trade, but the poor accommodations for the crew on long voyages have prevented its general adoption in ocean traffic. The first whaleback to cross the Atlantic was the *Charles W. Wetmore*, of 3000 tons, which made the voyage to Liverpool in 1891. The shape of the 'whaleback' makes it particularly steady at sea, and it is possible that vessels of this type may have increased use in carrying ore and similar heavy cargoes. A modification of the type, called the 'turret-deck,' has been brought out in England. The sides are curved inward as in the 'whaleback,' but at about one-fourth the beam from the side they are curved up again to form a narrow superstructure, which extends from stem to stern. A typical lake 'whaleback' passing through the lock at the Saulte Sainte Marie Canal is shown on the Plate accompanying the article Canal.

WHALEBOAT. A rather narrow boat, sharp at both ends and with considerable sheer (i.e. the ends rise considerably above the middle part), which was much used in the whale fishery. These boats are now carried by many vessels in all trades and by men-of-war. They are suitable for nearly all uses at sea and are very generally fitted as life-boats. The shape of the stern adapts them to use as surf boats or in rough seas, in which case they are steered with a heavy oar working in a crutch on the sternpost. See Boat.

WHALEBONE. The baleen-plates which take the place of teeth in the mouths of the baleen whales (see Whale) constitute the whalebone of commerce. They vary in length from a few inches up to 10, and even in rare instances 12 feet. Chemically they consist of albumen hardened by a small proportion of phosphate of lime. Their color is usually of a bluish black, but in some species they are striped longitudinally with bands of a whitish color; and they terminate at the point in a number of coarse black fibres of the baleen, which fibres are also found more or less down both sides of the blade. These fibres are used by brush-makers. Whalebone before being fit for use is first trimmed—that is, all the hairs are removed from the point and edges of each blade; and generally the surface of each flat side is scraped. The blades are then boiled in water or heated in steam for several hours, until they become soft enough to be cut with a common knife. The workman then cuts them into lengths fitted for the purposes to which they are to be applied. They were formerly extensively used in thin strips, such as staybones and umbrella-ribs, but within recent years steel rods have been largely substituted in these manufactures.

WHALLEY, hwŏl'ĭ, Edward (?-c.1678). An English regicide, born in Nottinghamshire. He fought with distinction under his cousin, Oliver Cromwell, in the Civil War, and afterwards acted as custodian to the King. He served in the Second Civil War under Fairfax; was one of those who signed the King's death warrant; and was wounded in the battle of Dunbar. Afterwards he assisted Lambert in defeating Ker at Hamilton, and also participated in the battle of Worcester. On August 13, 1652, he presented to

Parliament the petition of the army. When the Restoration came, he, as one of the regicides, fled, in company with his son-in-law, Major-General William Goffe (q.v.), to Boston. In 1661 they removed to New Haven, and in 1664 to Hadley. Several attempts were made by the home Government to secure their arrest, but all were unsuccessful. Consult Stiles, *History of Three of the Judges of King Charles I.* (Hartford, 1794).

WHANG-TI. An old spelling of Hwang-ti (q.v.).

WHARF (AS. *hwerf*, breakwater, Icel. *hvarf*, shelter, OSwed. *hwarf*, Swed. *varf*, shipbuilder's yard; connected with Goth. *hwairban*, AS. *hweorfan*, ME. *wherve*, Icel. *hverfa*, OSwed. *hverfra*, OHG. *hwerfan*, *wervan*, *werban*, Ger. *werben*, to turn, go to and fro; probably connected with Gk. καρπαλιμὸς, *karpalimos*, swift). In law, a wharf is a structure on the bank or margin of navigable waters to which vessels can be moored and from which they may be loaded and unloaded. Wharves are usually constructed by driving piles into the bank and bed of a body of water and covering them with a floor of planks, over which a sort of warehouse is sometimes erected if there is sufficient traffic to warrant the expense. A wharf should project out far enough to insure a sufficient depth of water on its front to render it possible for vessels to be moored alongside it at any stage of the tide. On the Western rivers in the United States it is common to build wharf boats which are moored to the banks of the river, and which, of course, are always accessible at any stage of the water. This is rendered necessary by the fact that such rivers are subject to great freshets and extremely low water at different seasons of the year.

Owing to a doctrine of the common law that the soil of tide waters between high and low water mark belongs to the State, a riparian owner along such waters cannot establish a wharf without permission from the State, as such a structure would otherwise constitute a public nuisance. The State may grant to a city the permission to establish wharves upon its water front, as was done by the State of New York to the city of New York. In such cases a city may be authorized by the Legislature to condemn lands for the erection of public wharves, the revenue from which shall be paid into the city treasury. The number of public wharves, their locations, and the rates of wharfage which may be charged are fixed and regulated by statutes in most of the United States.

WHARFAGE. A sum paid for the privilege of mooring a vessel to a wharf and loading or unloading her cargo, or for the storage of goods thereon before or after shipment. Wharfage may be charged for mooring a vessel to a natural landing. In most States the rates of wharfage are fixed by statute, and are a lien upon goods which remain in the possession of a wharfinger, and also upon vessels moored to a wharf if the charges are made for that privilege. Such a lien on a vessel may be enforced in courts of admiralty, and the vessel detained in the custody of a United States marshal unless the charges are paid.

WHARFINGER (for **wharfager*, with epenthetic *n*, from *wharfage*). The owner or keeper of a wharf. The responsibility of a wharfinger for goods in his care is practically that of a bailee. He is only liable to exercise reasonable and ordinary care and diligence for the protection of goods left with him. His responsibility begins when the goods are delivered at the wharf, and ends only when they are delivered to a person duly authorized to receive them. See WHARFAGE.

WHARTON, hwạr'ton, ANNE HOLLINGSWORTH (1845—). An American writer, born at Southampton Furnace, Cumberland County, Pa. She was educated at a private school in Philadelphia, devoted herself chiefly to the study of the social history of the Colonial and Revolutionary periods of the United States, wrote a number of entertaining books and magazine articles in this field, and was chosen historian of the National Society of Colonial Dames of America. Her publications include: *Through Colonial Doorways* (1893); *Colonial Days and Dames* (1894); *A Last Century Maid* (1895); *Life of Martha Washington* (1897); *Heirlooms and Miniatures* (1897); *Salons Colonial and Republican* (1900); and *Social Life in the Early Republic* (1902).

WHARTON, EDITH (JONES) (1862—). An American novelist, born in New York, and educated at home. In 1885 she married George Wharton, of Boston. Her published fiction, largely in the form of short stories, includes: *The Greater Inclination* (1899); *The Touchstone* (1900); *Crucial Instances* (1901); *The Valley of Decision* (1902), a study of the intellectual and social condition of Europe just before the outbreak of the French Revolution; and *Sanctuary* (1903). All Mrs. Wharton's stories are characterized by delicate and subtle psychological analysis, and by a careful and finished style. In 1902 she edited a translation of Sudermann's *Es lebe das Leben*.

WHARTON, FRANCIS (1820-89). An American jurist, born in Philadelphia. After graduating at Yale College in 1839, he practiced law in Philadelphia until 1855. He was professor of English literature, jurisprudence, and history at Kenyon College (Gambier, Ohio) from 1856 to 1863, when he was ordained in the Protestant Episcopal Church and accepted a rectorate at Brookline, Mass. In 1866 he was called to the chairs of ecclesiastical and international law at the Cambridge Divinity School and Boston University. From 1885 he was counsel to the United States Department of State and examiner of international claims, and in 1888 was made editor of the Revolutionary diplomatic correspondence of the United States. This work, in course of publication at the time of his death, superseded Sparks's *Diplomatic Correspondence of the American Revolution*. His best-known original work is *A Treatise on the Criminal Law of the United States* (1846), which was long standard. Among his other valuable legal writings are: *State Trials of the United States During the Administrations of Washington and Adams* (1849); *A Treatise on the Law of Homicide in the United States* (1855); *A Treatise on the Conflict of Laws, or Private International Law* (1872); and various commentaries. He also wrote *A Treatise on Theism and Modern Skeptical Theories* (1859) and *The Silence of Scripture* (1867). Under his editorship was published in 1886 *A Digest of the International*

Law of the United States, a work of great value, "taken from Documents issued by Presidents and Secretaries of State, and from Decisions of Federal Courts and Opinions of Attorneys-General."

WHARTON, PHILIP WHARTON, Duke of (1698-1731). An English politician. He was the son of Thomas Wharton, Marquis of Wharton, one of the leading Whig politicians in the reigns of King William and Queen Anne. He traveled abroad, and returning to England in 1716, showed himself an able debater in the Irish House of Lords. The result was that he was created Duke of Wharton in 1718, and for a while was prominent in the opposition to the Stanhope Ministry. At the same time he dissipated the remainder of his property, and was declared bankrupt. In 1725 Wharton left England for the Continent, and there became a Jacobite. He died May 31, 1731.

WHARTON, THOMAS, Marquis of (c.1648-1715). An English statesman, son of Philip, Baron Wharton, the Puritan statesman, and born at Woburn. His interest in politics was not marked till 1679, when he urged the Exclusion Bill. He was suspected of complicity with Monmouth and was certainly most active in arranging for the reception of William in 1688. The preceding year he composed the satirical ballad "Lilli Burlero, Bullen-a-la," by means of which, as he used to boast, he had sung a king out of three kingdoms. On the accession of William he was rewarded by numerous lucrative offices. In 1702, at the accession of Anne, he was removed from office, but by clever intriguing and the liberal use of money within the next few years he became one of the leaders of the Whig Party. After June, 1706, he was a member of the Whig Junto, Halifax, Orford, Somers, and Sunderland. In 1708 he was made Lord Lieutenant of Ireland, and held the post two years. For part of this time Joseph Addison was his secretary. Wharton was the shrewdest party manager of his day and a sincere if not disinterested Whig. Consult: *Memoirs of the Kit-Kat Club* (London, 1821); and Renke, *History of England*, vols. iv., v., and vi. (Eng. trans., Oxford, 1875).

WHARTON, THOMAS (1735-1778). An American patriot, born in Chester County, Pa. Upon the news of the passage of the Stamp Act in 1765 he joined in the non-importation movement; became a member of the Committee of Correspondence in 1774; and was one of the 25 members of the Committee of Safety in 1775. On July 24, 1776, he was chosen president of the Council of Safety, and from 1777 until his death was President of Pennsylvania.

WHATCOAT, RICHARD (1736-1806). A bishop of the Methodist Episcopal Church. He was born in Quinton, Gloucestershire, England; entered the Wesleyan Conference (1769); and preached extensively in England, Ireland, and Wales. He was sent to America with Coke in 1784 to aid in forming the Methodist Episcopal Church. In 1800, the health of Bishop Asbury being poor, Whatcoat was elected to assist him. Consult Phoebus, *Memoirs of Bishop Whatcoat* (New York, 1828).

WHATCOM. The county-seat of Whatcom County, Wash., 80 miles north of Seattle, on Bellingham Bay, and on the Great Northern, the Bellingham Bay and British Columbia, and other railroads (Map: Washington, C 1). It is the seat of a State normal school. There are a public library, Saint Luke's Hospital, Sacred Heart Hospital, the city hall, and the county courthouse. The section is very fertile, and is engaged in stock-raising, farming, dairying, and fruit-growing. There are stone quarries and deposits of coal. Whatcom is the shipping centre for this region and has a large trade also in fish. The industrial establishments comprise canneries, sawmills, a brewery, and manufactories of barrels, boxes, flour, fish oil, lumber products, etc. Shipbuilding is another important industry. The government is vested in a mayor, chosen annually, and a unicameral council. The water-works are owned and operated by the municipality. Whatcom was settled in 1858. Population, in 1890, 4827; in 1900, 6834.

WHATELY, hwāt'lĭ, RICHARD (1787-1863). An English prelate and scholar. He was born in London, and after some years at a private school, educated at Oriel College, Oxford, where he took his degree in 1808. He took the English essay prize in 1810, and a year later won the blue ribbon of Oxford scholarship of that period, being elected a fellow of Oriel, a member of the brilliant society adorned by Arnold, Pusey, Keble, and Francis Newman. In 1819 he published his first book, *Historic Doubts About Napoleon Buonaparte*, in which he endeavored, with a success popular rather than scientific, to show that Hume's doubts in regard to miracles had equal force with reference to the existence of Napoleon. In 1822 he took the living of Halesworth, in Suffolk, and delivered the Bampton lectures at Oxford, on "The Use and Abuse of Party Feeling in Religion." He was appointed principal of Saint Alban Hall, Oxford, in 1825. About this time he wrote for the *Encyclopædia Metropolitana* articles on logic and rhetoric, which were also published in separate form, *Elements of Logic* (1826), and *Elements of Rhetoric* (1828). He became professor of political economy in 1829, but in 1831 left Oxford for good with his elevation to the Archbishopric of Dublin. In this post he was active in all matters of ecclesiastical and social importance, and showed a deep interest in every question affecting the welfare of Ireland. The success of the national system of education there was in large measure due to him. He belonged to the liberal school both in religion and in politics; but his ability and conscientiousness were admitted even by those who differed most widely from him on such burning questions as catholic emancipation or the doctrine of the atonement. In addition to the works named above, mention should be made of *Lectures on Political Economy* (1831); *Essays on Some of the Peculiarities of the Christian Religion* (1825); *The Search After Infallibility* (1847); and *The Kingdom of Christ Delineated* (1841). Consult his *Life and Correspondence*, by his daughter (London, 1866); Fitzpatrick, *Anecdotal Memoirs of Richard Whately* (ib., 1864).

WHAT YOU WILL. A comedy by John Marston, written about 1601, printed in 1607. The plot, which centres on an error, was common to many old plays.

WHEAT (AS. *hwæte*, Goth. *hwaiteis*, OHG. *weizzi*, Ger. *Weizen*, wheat, from AS. *hwīt*, Goth. *hweits*, OHG. *wīz*, Ger. *weiss*, white; connected with Lith. *szvaityti*, to brighten, OChurch Slav. *svĕtŭ*, light, Av. *spaēta*, Skt. *śvēta*, white, from *śvit*, to be white). The best known and the most valuable of all the cereal crops. Under the name wheat are included nearly all the forms of the genus Triticum producing seeds, or grain used for human food. The original home of wheat is unknown, but the evidence at hand seems to indicate that it is probably a native of Western Asia. The cultivation of wheat antedates history, as the most ancient monuments show that at the time of their erection it had already been domesticated. The ancient Egyptians and Greeks attributed its origin to some of their deities, among them to Demeter (Latin, Ceres), the goddess of agriculture. It was cultivated as early as the Stone Age by the lake-dwellers of Switzerland, and in China, where it was considered a direct gift of heaven, it was grown 2700 years before the Christian Era. It is one of the five species annually sown by the Chinese in a public ceremony. Wheat was not grown in America prior to Columbus's discovery. The hypothesis that cultivated wheat was a modification of Triticum ovatum, a grass of the Mediterranean regions and of Western Asia, led to some interesting studies of the subject by French and English investigators from about 1840 to 1860. While this wild grass underwent considerable change when cultivated for a series of years, and while the results of this work further show that blossoms of Ægilops can be fecundated with wheat pollen, there was neither evidence nor indication that this grass could ever have been developed into wheat. Although none of the various species of wheat known to agriculture are found in a wild state, some botanists consider that the species of one-grained wheat (*Triticum monococcum*) has a wild representative which occurs on the plains of Bœotia and in Servia.

Wheat was an important crop in ancient Egypt and Palestine, and it continues to be a most important crop in our own days in all the temperate parts of the globe. It is cultivated to a considerable extent in India, and vast areas in the United States and Canada are admirably adapted to it. Wide regions in South America are equally suitable, and wheat of the finest quality is produced in Australia. In the torrid zone wheat does not succeed except in elevated situations, and although extensively grown in some cases in warm climates, as in California, Egypt, and India, the greater part of the world's supply is obtained in regions of cold winters.

Wheat is a hardy plant, and when covered by snow will endure even quite severe freezing. It is successfully cultivated from 39° to 60° north latitude, and from the Tropic of Capricorn to 40° south latitude. Its cultivation does not extend so far north as that of barley, oats, or rye. It requires a mean temperature of at least 55° Fahr. for 3 or 4 months of the year. As it is an annual, its capacity of enduring the cold of winter is of importance only in connection with growing winter wheat, which is sown in the fall. The quality of the grain varies much in different soils and climates, and particular varieties are also distinguished by differences in quality as well as by external characters. Wheat grown in comparatively dry climates is superior in quality to that grown in humid regions, as is shown by the difference in quality of the hard spring wheats of the Dakotas, for instance, and the soft winter wheats produced on the Pacific coast. A prevalence of dry weather with bright sunshine from the time the plants begin to head until they are ripe is everywhere of the greatest importance. The different varieties are classified by farmers as spring and winter wheats, bearded and beardless or bald varieties, soft and hard wheats, and also according to the color of the grain, as red, white, amber, etc. In consequence of long cultivation in various climates and on different soils, the varieties of wheat are very numerous, more so than in any other kind of grain. New varieties, the results of plant breeding and selection carried on by farmers, seedsmen, and the agricultural experiment stations, are continually coming into notice.

Botanists have classified the cultivated varieties of the genus Triticum into eight species and subspecies. The most important species, *Triticum vulgare*, comprises the common bread wheats, by far the most valuable and widely distributed group, containing more varieties than all the other species put together. This species includes soft and hard winter wheats, hard spring wheats, white wheats, and early wheats. The soft winter wheats are grown in the Eastern United States, Western and Northern Europe, Australia, Argentina, and in portions of Asia. The hard winter wheats are produced in the Rocky Mountains and the Mississippi River regions of the United States, in Southeastern Europe, and Western Asia. These wheats are usually grown on good black soils in regions of hot and dry summers. The hard spring wheats are distributed over the northern portion of the great plains in the United States, in Western Canada, Eastern Russia, and Western and Southern Siberia. The white wheats are cultivated along the Pacific coast in both North and South America, in Australia, and Western Asia. The early wheats occur in the Southern United States, Australia, India, and Japan. Only a few varieties are grown in the United States. The club or square-head wheats are by some botanists named *Triticum compactum*, but they are generally considered only a subspecies. The heads of this group are generally short and frequently square. Club wheats are grown chiefly along the Pacific coast, and in Turkestan, Abyssinia, and in scattered districts of Europe. *Triticum turgidum*, or poulard wheat, is a subspecies of Triticum vulgare, distributed in the Mediterranean and the Black Sea regions. Some varieties of this group are used in making macaroni. These wheats are sometimes mixed with the bread wheats in the manufacture of flour. *Triticum durum* is similar to Triticum turgidum, and, like it, a subspecies of Triticum vulgare. They are the hardest-grained of all the wheats grown, and are popularly known as the durum or hard wheats. They are specially valuable for the manufacture of macaroni, for which purpose they are mostly used. They are cultivated in the Mediterranean and Black Sea regions, and to some extent in Mexico, Chile, and Argentina. *Triticum polonicum*, or Polish wheat, is a distinct species, similar in quality to Triticum durum, but much less frequently cultivated. *Triticum Spelta*, or spelt, although very different from the preceding groups, is considered a subspecies. Its striking characteristic is that the chaff adheres to the grain and is not removed in threshing. Spelt is grown in Central and Southern Europe, and to a very small extent in America. Emmer (*Triticum dicoccum*) resembles the preceding group and is often erroneously called spelt, from which it differs mainly in the very compact heads and harder grain of a deeper red color. Its distribution is about the same as that of spelt. *Triticum monococcum*, or Einkorn, is a very distinct species. The spikelets of this species usually have but one grain. It is grown to a limited extent in Central and Southern Europe.

Wheat requires a fertile and well-prepared soil. The fact that it makes a poor growth on light, humid, and acid soils shows the necessity of fertility and proper drainage. The most favorable soils are those which are permeable and deep, a little clayey and of medium fertility. Gravelly and sandy soils are not suited to its culture. It grows well on alluvial soils, and, in fact, on most soils which may be classed as heavy but which do not possess a very great tenacity. Since young wheat plants are readily injured by the heaving of the soil, due to the action of frost, perfect drainage is essential. Rolling the land before sowing winter wheat leaves the soil in a drier condition and thus minimizes the action of frost. Although the character of the soil mainly affects the yield, and the character of the climate the quality, friable, fertile, calcareous soils produce a softer, plumper, and starchier grain than a less fertile, light, clayey soil. This latter class of soils has a tendency to produce elongated, hard, glutinous grains, or a wheat having the qualities of a good bread wheat. The preparation of the land for winter wheat consists in plowing the soil about four or five inches deep as early in the season as possible, to allow it to become somewhat compact before the seed is sown. The seed is sown broadcast or in drills. When broadcasted, usually by a machine made for the purpose, it is harrowed in. Drilling, however, is the most popular method and has the advantage of evenly distributing the seed and covering it at a uniform depth. The drill leaves the soil in small ridges, which tend to hold the snow and protect the soil to a certain extent against the alternate thawing and freezing so injurious to the crop. Spring wheat is usually grown on fall-plowed land, and in the United States also frequently follows a corn crop without plowing the soil. It is generally sown as soon as the soil is capable of being worked in the spring. Since wheat grows best and makes most of its growth during the cool part of the year, it should be sown as soon as conditions will permit. A moist soil at sowing time, provided it is not so moist that it cannot be properly worked, is the desirable condition. Where wheat follows a corn crop (maize) without an intervening plowing of the soil, it is sown broadcast among the corn stalks and the field then cultivated with a corn cultivator and the surface smoothed down by repeated harrowings. Sometimes the corn stalks are cut into short pieces with a stalk-cutter before the seed is sown, which makes the cultivating and harrowing easier and more effective, but frequently the stalks are simply broken down by means of the harrow. If the stalks are not broken down flat to the ground they cause trouble in cutting the grain by machine.

Wheat is generally harvested before it has become dead ripe in order to prevent the grain from shattering during the different manipulations from the time it is cut until it is stacked or threshed. In California, however, where this precaution is not so necessary, the harvest lasts for several weeks, and wheat is often left standing for a week or more after it is ripe enough for cutting. The time of harvesting wheat, like the time of sowing, varies with the latitude. In the United States the harvest begins in Texas early in May and ends in some of the Northern States in August. Harvesting is usually done with the self-binder, although in regions where labor is cheap the reaper is still largely used. After the grain has been bound into sheaves it is set up into shocks and left to dry and cure. Round shocks are made if the main object is to protect the sheaves against the rain, but long shocks are required if the sheaves are wet or the grain is cut quite green. This expedites drying and curing. When the work of cutting and shocking is done the sheaves are hauled and stacked, remaining so until threshing time. The principal point to be observed in building a stack is that the sheaves, and especially the outer tier, must have an outward slant in order to shed the rain. In some countries, especially those of Europe, the stacks are built with great care and the grain is frequently not threshed until the following spring. In the United States threshing is usually completed in the fall. In sections of the United States where wheat is grown on an extensive scale, and the straw consequently has little value, the grain is often harvested with headers, or machines which cut the grain just below the head. Some of these machines, propelled by either horse or steam power, cut the heads and thresh out the grain at the same time. At the present day wheat is threshed with improved and perfected machines operated by horse, steam, or electric power. The old method of flail threshing is now even less common than hand sowing. In Europe, where the straw represents a greater value than in the United States, machines are used which thresh the heads, but allow the straw to pass through straight and be rebound into sheaves for more convenient storage.

In the United States the place of wheat in the rotation is generally after corn, since corn leaves the soil in clean condition. Where wheat is sown without previously plowing the ground it necessarily follows corn. The method of sowing wheat among the corn stalks and working it in with cultivator and harrow is practicable only on comparatively new soils or lands in a very good condition. It is largely practiced in regions newly opened up to cultivation. In Europe wheat is preferably grown after clover. In the Eastern United States the use of commercial fertilizers in wheat-growing is quite common, but in the western part of the country no fertilizers are applied. Barnyard manure is rarely applied directly to wheat, but usually to a preceding corn crop.

The wheat crop of the world in 1900 amounted to 2,586,025,000 bushels. Of this amount Europe supplied 1,475,472,000 bushels. The total crop of the United States in 1899, according to the Twelfth Census, was 658,534,252 bushels, which was produced on 52,588,574 acres, or at an average rate of 12.5 bushels per acre. In 1898 the United States produced over 675,000,000 bushels, the largest crop ever produced. The chief wheat-growing States and their production in 1899 as given by the Twelfth Census were: Minnesota, 95,279,660 bushels; North Dakota, 59,888,810 bushels; Ohio, 50,376,800 bushels; and South Dakota, 41,889,380 bushels. Kansas, California, and Indiana in descending order of product produced over 30,000,000 bushels, and Nebraska, Missouri, Iowa, Washington, Pennsylvania, and Michigan 20,000,000 bushels. The progress of wheat cultivation in the Western States has been extremely rapid, due to the increase in wheat culture in previously unsettled regions. In 1821 the total exports of wheat from the United States were valued at $178,314, and of wheat flour at $4,298,043; in 1900, $73,237,080 and $67,760,886, respectively. The largest average yield of wheat per acre is produced by Great Britain, followed by Germany, France, Hungary, Austria, the United States, and Russia, in the order mentioned. In total yield the United States leads all other countries.

The most common diseases to which wheat is subject are rust (*Puccinia graminis*), stinking smut, or bunt (*Tilletia fœtens*), and black or loose smut (*Ustilago tritici*) (see RUST; SMUT; FUNGICIDE), and the most common insect enemies are the chinch bug and the Hessian fly (qq.v.).

FOOD VALUE. The wheat grain consists mainly of a large starchy mass surrounding an embryo and surrounded by six layers of tissue, known to the miller as 'bran,' which forms about 13 per cent. of the seed by weight. The innermost layer of the bran, averaging about 8 per cent. of the entire seed, contains cerealin or aleurone, a nitrogenous substance. The bulk of the seed within this layer consists of starch, nitrogenous substances (especially gluten), and fat. Wheat flour of various sorts is used almost universally for making bread and various kinds of pastry. From wheat rich in gluten, macaroni and other Italian pastes are made. These are common articles of diet in most countries, and staple articles in some, notably Italy. In recent years the consumption of breakfast foods made from wheat has increased very greatly. In some of these the grain is more or less finely ground; in others it is rolled or flaked. Some of these foods are cooked in the process of manufacture. Cereal breakfast foods are also made from the parched grain. The average composition of wheat and some of its products is shown in the following table:

COMPOSITION OF WHEAT, FLOUR, BREAD AND OTHER PRODUCTS

	Water	Protein	Fat	Carbohydrates		Ash
				Starch, etc.	Crude fibre	
(Average values).	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Wheat as it enters the mill	9.66	14.18	2.61	69.94	1.70	1.91
First break	8.23	14.18	2.68	71.56	1.62	1.73
Sixth break	7.66	16.28	5.34	59.42	5.60	5.68
Bran	10.91	16.28	5.08	56.21	5.98	5.59
Tailings from reduction No. 5	12.12	16.63	3.85	63.93	1.18	2.29
Second germ	8.75	33.25	15.61	35.19	1.75	5.45
Entire-wheat flour	11.4	13.8	1.9	71.0	0.9	1.0
Graham flour	11.3	13.3	2.2	70.5	0.6	1.8
Patent roller process flour:						
Baker's grade	11.9	13.3	1.5	72.0	0.7	0.6
Family and straight grade	12.8	10.8	1.1	74.6	0.2	0.5
High grade	12.4	11.2	1.0	74.7	0.2	0.5
Low grade	12.0	14.0	1.9	70.4	0.8	0.9
Milling products from same lot of hard Scotch fife spring wheat:						
First patent flour	10.55	11.08	1.15	76.85		0.37
Second patent flour	10.49	11.14	1.20	76.75		0.42
Straight or standard patent flour	10.54	11.99	1.61	75.36		0.50
First clear grade flour	10.13	13.74	2.20	73.13		0.80
Second clear grade flour	10.08	15.03	3.77	69.37		1.75
"Red dog" flour	9.17	18.98	7.00	61.37		3.48
Shorts	8.73	14.87	6.37	65.47		4.56
Bran	9.99	14.02	4.39	65.54		6.06
Entire-wheat flour	10.81	12.26	2.24	73.67		1.02
Graham flour	8.61	12.65	2.44	74.58		1.72
Wheat	8.50	12.65	2.36	74.69		1.80
White bread	35.3	9.2	1.3	53.1		1.1
Graham bread	35.7	8.9	1.8	52.1		1.5
Whole-wheat bread	38.4	9.7	0.9	49.7		1.3
Crackers (or biscuits)	6.8	10.7	8.8	71.9		1.8
Parched wheat breakfast food	8.6	13.6	2.4	74.5		0.9
Crushed and cracked breakfast food	10.1	11.1	1.7	75.5		1.6
Flaked breakfast food	8.7	13.4	1.4	74.3		2.2
Macaroni	10.3	13.4	0.9	74.1		1.3

As shown by analyses, the different sorts of flour do not vary very greatly when ground from the same lot of wheat, although the amount of mineral matter and protein is somewhat larger in the whole wheat and Graham flour than in the higher-grade flour. Digestion experiments with healthy men have shown that the fine-flour bread is more digestible than the breads made from the coarser grain. The average coefficients of three sorts of bread made from flours ground from the same lot of wheat, obtained experimentally by Snyder, are stated in the table on p. 677.

It has been calculated that wheat-flour bread and crackers, pastry, and similar products constitute 19 per cent. of the total food of the average American family, furnishing about 27 per cent. of the total protein, 6 per cent. of the

COEFFICIENTS OF DIGESTIBILITY OF BREAD OF DIFFERENT SORTS

	Protein	Fat	Carbohydrates	Energy
	Per cent.	Per cent.	Per cent.	Per cent.
Whitebread (standard patent)	85.3	56.4	97.5	90.1
Entire-wheat bread	80.4	55.8	94.1	85.5
Graham bread	77.6	58.0	88.4	80.7

total fat, and 46 per cent. of the total carbohydrates. They contain a high percentage of starch and may be profitably combined with materials rich in protein, meat, eggs, etc., to form a well-balanced diet.

Wheat is ordinarily so valuable for human food that it is not used for feeding farm animals. But when the crop is very abundant and the market value correspondingly low, it may be profitably fed. Several milling products of wheat such as bran, shorts, and middlings are important feeding stuffs, as are also various by-products obtained in the manufacture of wheat breakfast foods. Wheat straw is a well-known feeding stuff, and is also used for bedding. The unthreshed wheat is sometimes fed under the name of sheaf wheat. The green wheat is occasionally cut and cured as hay. Shrunken or damaged wheat is very often more valuable as a feeding stuff than for marketing, while wheat screenings (inferior grains and weed seeds) are also fed. The average composition of winter and spring wheat and several wheat products is shown in the following table:

THE COMPOSITION OF WHEAT AND WHEAT PRODUCTS

	Water	Protein	Fat	Nitrogen-free extract	Crude fibre	Ash
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Wheat, spring	10.4	12.5	2.2	71.2	1.8	1.9
" winter	10.5	11.8	2.1	72.0	1.8	1.8
" bean spring wheat	11.5	16.1	4.5	54.5	8.0	5.4
" bean winter wheat	12.3	16.0	4.0	53.7	8.1	5.9
" middlings	12.1	15.6	4.0	60.4	4.6	3.3
" shorts	11.8	14.9	4.5	56.8	7.4	4.6
" screenings	11.6	12.5	3.0	65.1	4.9	2.9
" straw	9.6	3.4	1.3	43.4	38.1	4.2

As regards composition, wheat grain is very nutritious. It contains somewhat more starch, less fat, and more protein than corn, and thus is a better balanced feeding stuff. Winter and spring wheat do not differ materially in composition. Low-grade flour of dark color and not very satisfactory for baking has a high feeding value, especially for growing pigs, hard-worked horses, and milch cows. Stale bread is sometimes fed to farm animals. The terms middlings and shorts are often used interchangeably. Occasionally shorts consist of reground bran, almost free from floury particles, with the sweepings and dirt of the mill added. Such material is very inferior for stock and should not be used. Good middlings do not have a very high content of crude fibre and are especially useful for feeding pigs and horses. For the latter, middlings should be mixed with corn meal, oats, or other feeding stuffs, as this material is rather concentrated. Digestion experiments with middlings have shown that about 75 per cent. dry matter, 80 per cent. protein, 33 per cent. crude fibre, and 81 per cent. nitrogen-free extract are digestible. Bran contains a high percentage of crude fibre, and in this respect somewhat resembles straw. Although it contains considerable nutritive material, it is given by many horsemen only as an occasional food. It is especially useful for feeding dairy cows, as it gives the desired bulk to the ration and supplies a considerable amount of protein and ash, which are needed for the production of milk. Digestion experiments have shown that on an average about 62 per cent. of the total dry matter, 78 per cent. protein, 29 per cent. crude fibre, and 69 per cent. nitrogen-free extract, of wheat bran are digestible. See Colored Plate of CEREALS.

BIBLIOGRAPHY. Morrow and Hunt, *Soils and Crops of the Farm* (Chicago, 1892); *Bulletin No. 24* of the United States Department of Agriculture (Washington, 1900); Goodfellow, *Dietetic Value of Bread* (London, 1892); Jago, *Text-Book of the Science and Art of Bread-Making* (ib., 1895); Kick, *Flour Milling* (ib., 1888); *Cereals and Cereal Products*, United States Department of Agriculture, Division of Chemistry, Bulletin 13, pt. 9; *The Chemical Composition of American Food Materials*, United States Department of Agriculture, Office of Experiment Stations, Bulletin 28 (revised); Snyder and Voorhees, *Studies on Bread and Bread-Making*, United States Department of Agriculture, Office of Experiment Stations, Bulletin 67; Woods and Merrill, *A Report of Investigations on the Digestibility and Nutritive Value of Bread*, United States Department of Agriculture, Office of Experiment Stations, Bulletin 85; Snyder, *Studies on Bread and Bread-Making*, United States Department of Agriculture, Office of Experiment Stations, Bulletin 101; Atwater, *Bread and the Principles of Bread-Making*, United States Department of Agriculture, Farmers' Bulletin 112. See PLOW AND PLOWING; REAPERS; REAPING; etc.; also BREAD; MACARONI; FLOUR.

WHEATEAR (variant of *white-ear*, corrupt supposed singular of *whitearse*, in allusion to its white rump; influenced by popular etymology with *wheat* + *ear*). A small European migratory song-bird (*Saxicola œnanthe*) of the thrush family, which now and then occurs on the north coasts of Asia and America. Its colors are gray, black, and white, with the under parts buffy. Its form is slender and its wings and legs are long. It is terrestrial in habits, and feeds on worms and insects. The wheatear makes its nest in an old wall, or in a crevice of a quarry or gravel-pit, often in a deserted rabbit-burrow, and generally lays six pale-blue eggs. The male has a pleasant, but not loud song, and sings well in confinement, in winter as well as in summer.

WHEAT GRASS. See AGROPYRON.

WHEAT INSECTS. In Europe fifty-three species of insects are recorded by Kaltenbach to feed upon wheat; in North America the number is surely much larger. Except the chinch-bug and the Hessian fly (qq.v.), which are the most dreaded, the following are the most important species.

The wheat-midge (*Diplosis tritici*) was probably imported into the United States from Europe, first into the Province of Quebec, spreading gradually through the New England States into New York and westward throughout the Mississippi Valley. The orange or yellow adult insect, which appears in early summer and is one-tenth of an inch long, lays small and pale-red eggs singly or in clusters in the crevices in the wheat-heads, from the kernels of which the small orange-yellow larvæ extract the milky juice, causing the grain to shrivel and the heads to blight. When full-grown the larvæ, which live about three weeks, descend to the ground and form small cocoons, in which they hibernate. Deep plowing of wheat fields and the prompt burning of chaff and screenings after threshing are the best remedies.

The joint-worm of wheat (*Isosoma tritici*), a true gall-insect of the family Chalcididæ, most species of which are parasites, is a small, black, four-winged fly, a little over an eighth of an inch long. Its eggs are laid in the wheat-stalk, where the larvæ produce little oblong galls, usually in groups of three or four, at or near the joints. (See JOINT-WORM.) The wheat straw-worm (*Isosoma grande*), a close relative which produces no galls, but lives on the inner surface of the stems, is of great interest, since it has an alternation of the generations, the sexual generation being wingless and rather small and the summer generation large, winged, and composed entirely of parthenogenetic females. Burning the stubble during the fall or winter is recommended as a control for both these species. Several species of plant-lice are occasionally found upon wheat; the wheat plant-louse (*Nectarophora cerealis*), probably a European species, is frequently troublesome.

The wheat bulb-worm (*Meromyza Americana*) is, in the adult stage, a small, greenish, black-striped fly of the family Oscinidæ, which also attacks other cereals, timothy, and the blue grass throughout the wheat belt, where it develops three or more generations annually. The flies lay their eggs upon the young plants, and the pale-green maggots work their way down to the crown and feed upon the central part of the stem, cutting it off and causing the central blade to wither. Prompt burning of the straw and stubble after harvest and rotation of crops are recommended.

The army-worm and the grass-worm (qq.v.) are dangerous enemies of the wheat crop, and there are several sawflies which do a lesser amount of damage.

The principal European insect enemies of the crop are the frit-fly (*Oscinis frit*), the Hessian fly, the wheat-midge, and a stem-borer—one of the sawflies (*Cephus pygmæus*) just mentioned, which appears as an adult in April and deposits eggs in the stems of young wheat. The larvæ bore through the joints and work up and down the stem, and when full-grown cut and almost saw the straw circularly on the inside near the ground, forming a cocoon in which they pass the winter as larvæ, transforming to pupæ and issuing as adults the following summer. This insect has been imported, and is known in Canada and New York, but is rather scarce and does little damage; in Europe it is ranked as one of the principal enemies.

Stored wheat suffers from the attacks of several insects. The granary weevil, the rice weevil, the Angoumois grain moth, the wolf moth, the Mediterranean flour moth, the Indian-meal moth, the meal snout-moth, and several species of flour-beetles and meal-worms, as well as certain of the grain-beetles (qq.v.), feed upon wheat in storage and after it is ground. The remedies for all of these insects are practically identical, and comprise cleanliness and the treatment of bins or establishments with the vapor of bisulphide of carbon, or with hydrocyanic acid gas, both of which, however, should be applied with great care, and in accordance with specific rules laid down by economic entomologists.

Consult: Marlatt, *The Principal Insect Enemies of Growing Wheat* (Department of Agriculture, Washington, 1901); Chittenden, *Some Insects Injurious to Stored Grain* (ib., 1897).

WHEAT'LEY, HENRY BENJAMIN (1838—). An English scholar and bibliographer, born at Chelsea, London, May 2, 1838. He was educated privately. He was clerk of the Royal Society (1861-79); took an active part in founding the Early English Text Society (q.v.), of which he has been honorary secretary; was appointed assistant secretary to the British section of the Chicago Exhibition; and became, in 1879, assistant secretary to the Society of Arts. For the Early English Text Society, he edited Alexander Hume's *Of the Orthographie and Congruitie of the Britain Tongue* (1865); the prose romance of *Merlin* (1865-69); the *Manipulus Vocabulorum* of Peter Levins (1868). He was also one of the founders of the Index Society, whose publications began with his *What Is an Index?* (1879). He compiled a *General Index to the Works of De Quincey* (1863), and edited Wraxall's *Historical and Posthumous Memoirs* (5 vols., 1884), and, most important of all, *Pepys's Diary*, including *Pepysiana* (9 vols., 1893-99). He is also the author of *On Anagrams* (1862); *Round About Piccadilly and Pall Mall* (1870); *Samuel Pepys and the World He Lived In* (1880); *How to Form a Library* (1886); *Remarkable Bindings in the British Museum* (1889); *London Past and Present* (1891); *Literary Blunders* (1893); and *Historical Portraits* (1897).

WHEATLEY, PHILLIS (c.1753-84). An American negro poet, born in Africa. She was brought to the United States in 1761 and purchased by John Wheatley, of Boston. He had her well educated, and she soon showed remarkable intellectual quickness. When still a girl, she wrote many verses, and in 1773, a year before she visited England, her *Poems on Various Subjects, Religious and Moral, by Phillis Wheatley, Negro Servant to Mr. John Wheatley, of Boston, in New England*, were published in London with the indorsement of several distinguished men.

She was made much of by the Countess of Huntington's set, and in America drew forth a complimentary letter from Washington. Of real poetic ability she was totally destitute. In 1775 the family to which she belonged was broken up, and three years later she made an unfortunate marriage with a colored man named John Peters. There were at least four posthumous editions of her poems, and her letters were printed in 1864.

WHEAT'ON, Frank (1833—). An American soldier, born in Providence, R. I. He received a public school education, and was a civil engineer in California until 1855, when he was commissioned lieutenant in the First United States Cavalry. In March, 1861, he was promoted to the rank of captain. Four months later he was appointed lieutenant-colonel of the Second Rhode Island Volunteers, and before the end of the year he was commissioned colonel. He participated in the first battle of Bull Run and in the Peninsular and Maryland campaigns. In November, 1862, he was promoted to be brigadier-general of volunteers, and was brevetted major-general in both the volunteer and the regular service. At the battles of the Wilderness and Spottsylvania his troops were engaged in some of the most desperate fighting. In 1864 he commanded a division in the Shenandoah Valley and at the battle of Cedar Creek he was one of the first to rally his forces. During the last year of the war he served under Grant and took part in the campaign which ended at Appomattox. In 1866 he was commissioned lieutenant-colonel of the Thirty-ninth Infantry and rose to the rank of major-general in the Regular Army before his retirement in 1895.

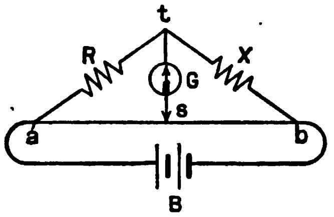
WHEATON, Henry (1785-1848). An American lawyer, diplomat, and publicist, born in Providence, R. I. He graduated at Brown University in 1802, was admitted to the bar in 1805, and studied for several years in Paris and London. He then practiced for some time in Providence, and in 1812 settled in New York City, where for three years he edited *The National Advocate.* In 1814 he became a judge advocate of the army, and in 1815-19 was a justice of the Marine Court of New York City. From 1816 to 1827 he was reporter of the United States Supreme Court, and the *Reports* published by him in twelve volumes are of exceptional value. In 1821 he was a member of the New York Constitutional Convention, in 1823 of the State Assembly, and in 1825 of the commission appointed to revise the statute law of New York. In 1827 he was sent as chargé d'affaires to Denmark, in which country the United States had never before been regularly represented. In 1835 he was appointed Minister Resident to the Court of Prussia and from 1837 to 1846 was Minister Plenipotentiary there. A treaty successfully negotiated by him in 1844 was rejected by the United States Senate, but formed the basis upon which future German treaties were drawn up. His best work is his *Elements of International Law* (1836), which remains one of the greatest authorities on the subject in any language. It has been republished in many editions in America, of which that of Lawrence (1855), with a biographical memoir, and that of Dana (1866) are the most valuable. It has also been republished in London, and translated into French, Chinese, and Japanese. Among his other publications are: *A Digest of the Decisions of the Supreme Court of the United States from Its Establishment in 1789 to 1820* (1820-29); *Life of William Pinkney* (1826), abridged for Sparks's "American Biographies;" *History of the Northmen* (1831; French trans. 1844); *Histoire du progrès des gens en Europe depuis la paix de Westphalie jusqu'au congrès de Vienne, avec un précis historique du droit des gens européens avant la paix de Westphalie* (1841; Eng. trans. 1846); and *An Enquiry into the Validity of the British Claim to a Right of Visitation and Search of American Vessels suspected to be engaged in the Slave Trade* (1842).

WHEATON, Loyd (1838—). An American soldier, born in Fairfield, Calhoun County, Mich. He entered the Federal Army as a first sergeant in the Eighth Illinois Infantry on the outbreak of the Civil War, and became successively a captain in March, 1862, a major in August, 1863, and a lieutenant-colonel in November, 1864, in the volunteer service. He also received the brevets of colonel of volunteers, major in the Regular Army, and lieutenant-colonel in the Regular Army. In July, 1866, he entered the Regular Army as a captain, and in October, 1871, was instrumental in suppressing a Fenian raid from United States territory upon the Province of Manitoba. He was then engaged for some years in frontier duty; took part, in July and August, 1874, in Custer's expedition to the Black Hills; and became a major in 1891, and a lieutenant-colonel in 1895. In May, 1898, during the Spanish-American War, he was made a brigadier-general of volunteers, and for a short time commanded the First Division of the Seventh Army Corps in Cuba. He was sent to the Philippines early in 1899, there served with great ability against the insurrectionary forces, commanded temporarily the pacified provinces in Southern Luzon, and in April, 1900, became commander of Northern Luzon. He was made major-general of volunteers in June, 1900, brigadier-general in the Regular Army in February, 1901, and major-general in the Regular Army in March, 1901, and in July, 1902, was retired from the service.

WHEAT'STONE, Sir Charles (1802-75). An English physicist and inventor. He was born at Gloucester, and when twenty-one years of age entered into business in London as a maker of musical instruments. The scientific principles involved in their construction largely occupied his attention, and in 1833 he communicated his first paper, *On Acoustic Figures,* to the Royal Society, which was a discussion of the figures produced in Chladni's well-known experiment. This was followed in 1834 by *Experiments to Measure the Velocity of Electricity,* in which, with a mirror revolving 800 times in a second, he demonstrated its velocity. (See Chronoscope.) In the same year he was appointed professor of experimental physics in King's College, London. In the course of experiments at the college on the velocity of electricity he devised an electric telegraph for the transmission of messages. In May, 1837, a patent was taken out in the joint names of Cooke and Wheatstone, "for improvements in giving signals and sounding alarms in distant places by means of electric currents transmitted through metallic circuits." From this instrument, which had five needles, grew the system of electric telegraphs which was extensively used in Great Britain.

After the five-needle telegraph came apparatus where but two needles were employed, then the letter-showing dial telegraph, the type-printing telegraph, the magneto-electric dial telegraph, and the automatic telegraph system, in which great speed of transmission was obtained. In a paper on binocular vision before the Royal Society in 1838, he explained the principle of the stereoscope (q.v.), an instrument of his invention subsequently improved by Brewster. The polar clock (q.v.), another invention of Wheatstone, was an interesting application of Brewster's discovery that the plane of polarization of the light of the sky always made an angle of 90° with the sun. In 1840 he showed that by means of electro-magnetic regulating devices a number of clocks far apart could be kept going synchronously from a central clock. Wheatstone's bridge (q.v.), though not the invention of this famous electrician, but of Hunter Christy, was first brought into general use through his efforts in 1843, and has proved a fundamental method in the measurement of electrical resistance. Wheatstone was one of the first to recognize the importance of Ohm's law and to apply it in electrical measurements. He also had a share in the development of the dynamo, devising a method for making the magneto-machines then in use self-exciting by employing a shunt circuit passing around the field magnets. Wheatstone was far more successful as an experimenter and inventor than as a professor, and, though he held his chair for a number of years, he rarely lectured in public, owing to his great diffidence. In fact, many of his important discoveries were communicated to the Royal Society by Faraday. This characteristic did not prevent his contributing many interesting papers to scientific journals and the *Proceedings* of various learned societies, and these were collected and published in 1879 by the Physical Society of London under the title of *Scientific Papers of Sir Charles Wheatstone.*

WHEATSTONE'S BRIDGE. An important and much used method for the measurement of electrical resistance. Employing a battery, a galvanometer, and auxiliary resistances, it is possible to determine the resistance of a conductor with a high degree of accuracy. The principle of the method will be readily understood by reference to the accompanying diagram. Let B be a battery whose terminals are connected with the ends of a straight wire of German silver, *ab*, which is stretched along a scale. The current flowing from *a* to *b* divides at *a*, a part of it traversing the bridge wire, as *ab* is termed, and a part flowing through R and X, the former being a resistance whose value is known and the latter the material whose resistance is to be measured. The two branch circuits unite at *b* and return to the battery. At *t*, the junction of R and X, one terminal of the galvanometer, G, is attached, while the other, S, is connected with a slider which can be moved along the wire so as to make contact at any desired point. Let the current at *a* be at a higher potential than at *b*. then according to Ohm's law there will be a fall of potential along the wire depending upon the resistance, and, since *ab* is a uniform conductor on the length, this will be proportional to the length. The same fall of potential as along the wire *ab* must also take place through R and X. consequently some point on *ab* will be found which is at the same potential as *t*. Where there is a difference of potential, there must result a flow of electricity which will deflect the needle of the galvanometer. We can determine when the two points are at the same potential by moving the sliding contact until there is no deflection of the needle on closing the circuit. Consequently there must be the same fall of potential from *a* to *t* and from *t* to *b* as from *a* to S and from S to *b*. It has been shown that the fall of potential along *a*S and S*b* is proportional to the distances of these parts from the ends of the wire, which we can denote by A and B, therefore the resistance R must be to the resistance X as A is to B. In practice R is selected so that the measurement will be made when the point of contact is at the centre of the wire rather than at the ends, for, as can be readily seen, the degree of accuracy is far greater when A and B are of nearly the same value than when one is large with respect to the other. The wire bridge, as the apparatus is termed, is useful for many purposes and answers well in explaining the principle, but the apparatus is generally constructed with a series of resistance coils in the form known as the Post-Office box (so called from the fact that the operation of the telegraph lines in England is under the control of the Post-Office). In this arrangement there is a series of fixed ratios formed by coils of wire taking the place of the stretched wire used above and other coils so arranged as to give R any value between 1 and 10,000 ohms. The ratio coils generally have their resistances 10, 100, and 1000 ohms, which permits a range of measurements from $\frac{1}{1,000,000}$ to 1,000,000 ohms. See Resistance, Electrical. Consult: Kempe, *Electrical Testing* (6th ed., London, 1901); Thompson, *Elementary Lessons in Magnetism and Electricity* (rev. ed., New York, 1901).



WHE'DON, Daniel Denison (1808-85). A Methodist Episcopal minister. He was born at Onondaga, N. Y.; graduated from Hamilton College in 1828, and studied law. He was professor in Cazenovia Seminary, 1830; tutor in Hamilton College, 1831-32; professor of languages in Wesleyan University, Middletown, Conn., 1833-43; professor of rhetoric in Michigan University, 1845-54; editor of the *Methodist Review*, New York, 1856-84. He wrote a *Commentary on the New Testament* (1860-80); *The Freedom of the Will as the Basis of Human Responsibility* (1864); *Essays, Reviews, and Discourses* (1887).

WHEEL (AS. *hwēol, hwīol, hweowol, hweohl*, Icel. *hjōl*, E. Frisian *wēl*, wheel; connected with

Gk. κύκλος, *kyklos*, circle, Skt. *cakra*, wheel). Part of the apparatus for steering a large ship. It consists of a horizontal barrel on which the tiller ropes are wound in opposite directions—one on the forward end and one on the after—and one or more wheels with eight to twelve radial spokes which project beyond the rim of the wheel six or eight inches to form handles. The difference in diameter of the wheel and barrel is a measure of the gain in power that the wheel affords. In vessels steered by steam the wheel is used, but it is smaller than in hand-steered ships, and either connects to the steering engine by means of shafts and gearing or operates small wire ropes which lead to the engine valve.

WHEEL, Breaking on the. A mode of inflicting the punishment of death, which existed among the Greeks and Romans, and was used in Western Europe until the end of the eighteenth century for assassins, incendiaries, highwaymen, and pillagers of churches. It was first instituted in France by an edict of 1534. There was considerable variety in the mode in which this punishment was inflicted, at different times and in different places. The accused was sometimes extended on beams formed like an X and his bones were broken by blows with an iron bar. Then the body was placed on a wheel, bent round, with its arms and legs behind the back and its head turned up to the sky. The culprit was then left to die, and his sufferings sometimes continued for twenty-four hours or more. By way of terminating sooner the suffering of the victim, the executioner was sometimes permitted to deal two or three severe blows on the chest or stomach, known as *coups de grace;* and occasionally, in France at least, the sentence contained a provision that the criminal was to be strangled after the first or second blow. Bodies of persons who had been beheaded were often exposed on the wheel. The punishment of the wheel was abolished in France in 1789, and in Prussia in 1811.

WHEEL AND AXLE. A machine which is a modification of the lever (q.v.). Its most primitive form is a cylindrical axle, on which a wheel concentric with the axle is firmly fastened. When employed for raising heavy weights, the weight is attached to a rope which is wound round the axle, and the force raising the weight is applied to a rope wound round the grooved rim of the wheel. The wheel and axle is neither more nor less than a lever whose extremities are not points as in the normal form, but the circumferences of circles. Accordingly the raising force and weight are not attached to particular points in these circumferences, but to cords wound round them, and thus the imaginary simple lever (formed by joining the points where the cords become tangents to the circles) is preserved unaltered in position and magnitude. The conditions of equilibrium are, that F (the force required to raise the weight) × R (the radius of the wheel) = W (the weight) × the radius of the axle, or, since the circumferences of circles are proportional to their radii, that F : W :: circumference of axle : circumference of wheel. When there is no wheel, but only a winch, the circumference described by the power in one revolution is substituted for the circumference of the wheel. The *capstan* and *windlass* are simple and common examples of this mechanical power, and combinations of toothed wheels, or of wheels from one to another of which motion is communicated by an endless band, are compound illustrations of the same.

WHEEL ANIMALCULE. See Rotifera.

WHEEL BUG. See Pirate Bug.

WHEE'LER, Andrew Carpenter (1835-1903). An American author. He was born in New York City, and became a reporter on the *Times*. As a young man he went to Milwaukee, Wis., and remained there till the outbreak of the Civil War, when he went to the front as correspondent. In 1865 he returned to New York and was connected with the *Leader* and the *World*. While dramatic critic of the latter paper he began the publication of essays and sketches under the pseudonym of Nym Crinkle. These were widely read, and many of them were afterwards collected in book form. Afterwards he wrote under the name of J. P. Mowbray (sometimes J. P. M.). As Nym Crinkle he produced between 1870 and 1885: *The Chronicles of Milwaukee; The Primrose Path of Dalliance; The Iron Trail; Easter in a Hospital Bed;* and a play, *The Twins*, which was an adaptation of Dickens's *Tale of Two Cities*. As J. P. Mowbray he published: *A Journey to Nature* (1901); *The Making of a Country Home* (1902); *Tangled Up in Beulah* (1902); and *The Conquering of Kate* (1903).

WHEELER, Benjamin Ide (1854—). An American educator, born at Randolph, Mass. He graduated at Colby Academy in 1871, and at Brown University in 1875; taught in the classical department of the Providence High School in 1875-79; was an instructor in Brown in 1879-81; and then studied for four years in the universities of Leipzig, Heidelberg, Jena, and Berlin; also traveled in Greece; and received the Ph.D. from Heidelberg. Upon his return to America he was for one year an instructor in Harvard, but in 1886 became professor of comparative philology in Cornell University, and two years later professor of Greek. In 1899 he became president of the University of California. Among his published works are: *Der griechische Nominalaccent* (1885); *Analogy, and the Scope of Its Application in Language* (1887); *Introduction to the Study of the History of Language*, in collaboration with H. A. Strong and W. S. Logeman (1891); *Principles of Language Growth* (1891); *The Organization of Higher Education in the United States* (1897); and *Life of Alexander the Great* (1900), in the "Heroes of the Nations Series."

WHEELER, Joseph (1836—). An American soldier, born at Augusta, Ga. He graduated at West Point in 1859, was commissioned a second lieutenant of dragoons, and served at the cavalry school at Carlisle, Pa., until April, 1861, when he resigned his commission and entered the Confederate service. In the following September he was appointed colonel of the Nineteenth Alabama Infantry, and was actively engaged in the earlier campaigns in Kentucky and Tennessee. At Shiloh, in April, 1862, he commanded a brigade, and later in the year was transferred to the cavalry and participated in the battle of Perryville and other engagements of General Bragg's Kentucky campaign. On October 30, 1862, he was promoted to the rank of brigadier-general, and covered the retreat of Bragg's army to the southward. In January, 1863, he was commissioned major-general. He commanded the Confederate cavalry at Chattanooga and at Chickamauga, and covered Bragg's rear after the defeat at Lookout Mountain and Missionary Ridge. He harassed Sherman's flank during the march to Atlanta. In August, 1864, he led a successful raid in Sherman's rear northward as far as the Kentucky line. Subsequently he opposed Sherman's advance on Savannah, and in February, 1865, was promoted to the rank of lieutenant-general, and continued in command of the cavalry division of General Johnston's army until its surrender. After the war he became a lawyer and cotton-planter. In 1880 he was elected to Congress as a Democrat and was a member continuously until 1899. In May, 1898, he was appointed by President McKinley a major-general of volunteers, and was assigned to the command of the cavalry division of the Army of Santiago in the Spanish-American War. He commanded the troops in the engagement of Las Guasimas, was senior field officer in the battle of San Juan Hill, and subsequently was one of the American commissioners to arrange for the surrender of Santiago. In 1899-1900 he commanded a brigade in the Philippine Islands, was commissioned a brigadier-general in the Regular Army in June, 1900, and retired in the September following. He published *The Santiago Campaign, 1898* (1899).

WHEELER, William Adolphus (1833-74). An American lexicographer, born at Lester, Mass. A graduate of Bowdoin (1853), Wheeler, after teaching for several years, assisted Joseph E. Worcester in preparing his *Dictionary,* and contributed to the revision of Noah Webster's *Dictionary* (1864), for which he prepared an "Explanatory and Pronouncing Vocabulary of the Names of Noted Fictitious Persons and Places, including Familiar Pseudonyms, Surnames, etc." This was published separately in 1865. Wheeler then joined the staff of the Boston Public Library, became superintendent of the catalogue department, and made collections for a Shakespearean cyclopædia. He revised the abridgment of Webster's *Dictionary* and Hole's *Brief Biographical Dictionary* (1866), and edited *Mother Goose Melodies* (with antiquarian and philological notes, 1869) and a *Dickens Dictionary* (1873).

WHEELER, William Almon (1819-87). An American legislator, Vice-President of the United States from 1877 to 1881. He was born at Malone, Franklin County, N. Y. He taught a district school for several seasons after completing the course at the public schools, and studied for two years at the University of Vermont. He then studied law at Malone, was admitted to practice, and met with considerable success in his profession. From 1847 to 1849 he was district attorney of Franklin County, and in 1850 and 1851 was a Whig member of the New York State Assembly. In 1851 he abandoned his law practice for banking, and was also interested in railroads. In 1857 he was chosen, as a Republican, to the State Senate, and was elected president *pro tempore.* In 1860 he was elected a member of the Thirty-seventh Congress. In 1867 he was a member of the New York Constitutional Convention, of which he was elected president. From 1869 until 1877 he was again a member of Congress, serving as chairman of the important committees on Commerce, the Pacific Railroads, and Southern Affairs, and taking a leading part in legislation affecting the reconstructed Southern States. In 1875-76, while chairman of the Committee on Southern Affairs, he originated and effected the compromise, known by his name, between the warring political factions in Louisiana. From 1877 to 1881, during the administration of President Hayes, he was Vice-President of the United States.

WHEEL'ING. The largest city of West Virginia and the county-seat of Ohio County, 63 miles southwest of Pittsburg, Pa., on the Ohio River, and on the Pennsylvania, the Pittsburg, Cincinnati, Chicago and Saint Louis, the Baltimore and Ohio, the Cleveland, Lorain and Wheeling, the Wheeling and Lake Erie, and other railroads (Map: West Virginia, D 1). It is situated on ground rising gradually from the river. A steel railroad bridge spans the Ohio, and there is a suspension bridge, 1010 feet long, which is one of the chief attractions of the city. Noteworthy features include also the Krugar Monument, the site of Old Fort Henry, the customhouse and post-office, the city hall, and the county courthouse. The Public Library has 17,200 volumes. Among other institutions are Linsley Institute, Wheeling Female Academy, and Haskins Hospital. Owing to its excellent transportation facilities, Wheeling is an important wholesale and jobbing centre, and is also of considerable industrial prominence, being known especially for its iron and steel interests. The manufacture of glass, pottery, smoking tobacco, and cigars is extensive. The smaller establishments comprise lumber mills, canneries, breweries, and manufactories of carriages and wagons, boxes, leather, etc. In the census year 1900 the capital invested in all industries was $13,224,577, and their output was valued at $16,747,544.

The government is vested in a mayor, chosen every two years, and a bicameral council. Of the subordinate officials, the water board, board of public works, and gas board are elected by the council, and the school board is chosen by popular vote. The water-works, which represent an expenditure of $803,092, the gas plant, and the electric-light plant are the property of the municipality. For maintenance and operation the city spends annually about $438,000, the chief items being: schools, $94,000; gas plant, $80,000; water-works, $51,000; fire department, $42,000; police department, $36,000; and interest on debt, $26,000. Population, in 1890, 34,522; in 1900, 38,878.

Settled by Colonel Ebenezer Zane in 1770, Wheeling was the first town established on the Ohio River. It was laid out in 1793, was incorporated as a town in 1806, and was chartered as a city in 1836. In 1774 Fort Henry, named in honor of Governor Patrick Henry, was built here, which, in September of the same year, was fiercely attacked by a force of 300 Indians, who killed 23 out of a garrison of 42. In 1781 the Indians made another attack, and in 1782 a force of English and Indians unsuccessfully besieged the place for several days. In 1861 the Wheeling Convention, representing the people of Virginia opposed to secession, met here and established the 'restored government,' and here the Constitutional Convention of West Virginia met in 1861-62. From 1863 to 1870 and again from 1875 to 1885 Wheeling was the capital of the State.

WHEEL LOCK. See SMALL ARMS.

WHEELOCK, hwē′lok, ELEAZAR (1711-79). An American educator, born at Windham, Conn. He graduated at Yale in 1733, was ordained pastor of the Congregational Church at Lebanon, Conn., in 1735, and there established a school for the education of Indian and white youths. In 1770 he removed to Hanover, N. H., and there reestablished his school, for which an endowment of $50,000 had been obtained, under the name of Dartmouth College (q.v.). During the remaining nine years of his life Dr. Wheelock was president of the new college, and despite privation and hardship succeeded in putting it on so firm a basis that it survived the disasters of the Revolution. He published a number of sermons and a *Plain and Faithful Narrative of the Indian School at Lebanon.* Consult: Baxter P. Smith, *History of Dartmouth College* (Boston, 1878); Chase, *History of Dartmouth College and the Town of Hanover* (Cambridge, 1891); and McClure and Parish, *Memoirs of the Rev. Eleazar Wheelock, D.D.* (Newburyport, 1811).

WHEELOCK, JOHN (1754-1817). An American educator, born at Lebanon, Conn., the son of Eleazar Wheelock (q.v.). After three years in Yale, he attended Dartmouth for a year, and in 1771 graduated with the first class that went out from that college. He then tutored for four years in Dartmouth; served in the Patriot Army during the Revolutionary War, and attained the rank of lieutenant-colonel; and in 1780, soon after the death of his father, succeeded him as president of Dartmouth. Four years later he went to Europe to secure assistance for that institution, but on his return in 1784 was shipwrecked and lost all the money he had collected. He then succeeded in getting aid from the State, and was able to enlarge the institution. In 1815, owing to friction between him and the board of trustees, he was removed from the presidency; but the Legislature created a new corporation, which in 1817 restored him. Out of this dispute grew the famous Dartmouth College Case (q.v.). Wheelock died in 1817 before the case was decided. Among his published works may be mentioned *Sketches of the History of Dartmouth College* (1816).

WHEELWORK. See GEARING; POWER, TRANSMISSION OF.

WHEEL′WRIGHT, JOHN (1592-1679). A New England clergyman. He was born in Lincolnshire, England, graduated at Cambridge in 1614, and was vicar of Bilsby (1623-31); suspended by Laud for nonconformity, he came to America in 1636, and became pastor at Braintree, Mass. His adoption of the religious views of his sister-in-law, Anne Hutchinson (q.v.), alienated Wilson, pastor of the Boston church; this and a sermon in her defense, considered seditious, caused his banishment from the colony by the General Court (1638). He went to New Hampshire, founded the town of Exeter, and organized a church; in 1643 he removed with a part of the church to Wells, Maine. His sentence of banishment having been revoked on his declaration that he had erred, at least in part, he returned to Massachusetts and was minister at Hampton, 1646-54; went to England in 1657 and was well received by Oliver Cromwell, who had been his classmate; he returned in 1660 and became minister at Salisbury, N. H. (1662). The sermon alluded to above is in the *Collections of the Massachusetts Historical Society,* ed. by C. Deane (Boston, 1867). Wheelwright's writings with memoirs by Bell were published by the Prince Society (Boston, 1876). The chief are *Mercurius Americanus* (1645), a reply to Thomas Welde's *Rise, Reign and Ruin by the Familists . . . in New England,* and his *Vindication* (1654).

WHEELWRIGHT, WILLIAM (1798-1873). An American capitalist, born at Newburyport, Mass. He was United States consul at Guayaquil, in Ecuador, from 1824 to 1829, when he removed to Valparaiso, in Chile, where he established a line of passenger vessels along the coast. He founded a line of coasting steamships to connect all the ports between Valparaiso and the Isthmus of Panama, and in 1840 the first two vessels of the Pacific Steam Navigation Company reached the west coast. Wheelwright also built a number of railroads in South America, established the first gas and water-works, and strung the first telegraph line on that continent. He wrote *Statements and Documents Relative to the Establishment of Steam Navigation in the Pacific* (1838) and *Observations on the Isthmus of Panama* (1844). Consult: Alberdi, *La Vida y los trabajos industriales de William Wheelwright en la America del Sud* (Paris, 1876), which was translated into English by Caleb Cushing (Boston, 1877); and Codman, *Biographical Sketch of William Wheelwright, of Newburyport, Mass.* (Philadelphia, 1888).

WHELK (AS. *weluc, weoluc, wiluc,* whelk, probably from *wealcan,* to roll, walk, OHG. *walkan,* to roll, wallow, Ger. *walken,* to full cloth, to felt hats, and ultimately connected with Skt. *valg,* to hop, spring). The popular name of many prosobranch gastropod mollusks, of the family Buccinidæ. In the true whelks (Buccinum) the shell is ovate, turreted, and more or less ventricose, its mouth ovate, emarginate, or produced into a very short canal below. The animal has a broad head, with two tentacles, with the base of which the stalks bearing the eyes are united; the proboscis is large, and the tongue armed with teeth, which are used for the purpose of rasping substances used for food—almost any animal substance being welcome for this use—or for perforating the shells of other mollusks in order to prey upon them. There are numerous species, chiefly found on the coasts of the colder parts of the world. The coasts of the North Atlantic produce several species, of which the most abundant is the 'common whelk' (*Buccinum undatum*). It occurs from low-water mark to a depth of 600 fathoms, is sometimes three inches in length, grayish or brownish white, with numerous raised ridges and spiral striæ. On the American coast it is common as far south as Cape Cod. It is much used in Europe as an article of food.

WHETSTONE. See HONES; ABRASIVES.

WHET′STONE, GEORGE (1544?-87?). An English author, of a wealthy Lincolnshire family. He was born probably in London. From his father he seems to have inherited a competence which he quickly squandered. He served in the Low Countries in 1572 and was present at the battle of Zutphen (September 13, 1586), when Sir Philip Sidney was slain. He also accompanied Sir Humphrey Gilbert on the disastrous voyage to Newfoundland (1578-79). Whetstone is mainly of interest because his *Promos and Cassandra*, a play in rhymed verse (1578; reprinted by Collier and Hazlitt's *Shakespeare's Library*, 1875), and the prose tale with the same title, in his *Heptameron of Ciuill Discourses* (1582; also reprinted by Collier and Hazlitt), furnished the plot for Shakespeare's *Measure for Measure*. Among his other works are the *Rocke of Regard*, verse tales mostly from the Italian (1576; reprint by Collier, 1870); *A Remembraunce*, an elegy on George Gascoigne (1577; in Arber's reprints of Gascoigne's works, 1868); and *A Mirour for Magestrates of Cyties*, a prose treatise (1584).

WHEWELL, hū′el, WILLIAM (1794-1866). A distinguished English scholar and philosopher. He was born at Lancaster, graduated with high honors at Trinity College, Cambridge, in 1816, and became a fellow, and later a tutor, of Trinity. In 1820 he became a fellow of the Royal Society, and in 1827 of the Geological Society. He spent much time in traveling and studying architecture and natural science. From 1828 to 1832 he was professor of mineralogy at Cambridge, and from 1838 to 1855 Knightbridge professor of moral philosophy. He became master of Trinity in 1841, and in the same year was president of the British Association. In his earlier literary career he produced several textbooks on mathematical subjects which have now been superseded, and also contributed a variety of papers to scientific journals and to the *Transactions* of learned societies. Later in life he concentrated his powers mainly on the production of large works. Among the more important of his books are: *Astronomy and General Physics Considered with Reference to Natural Theology* (the third Bridgewater treatise, 1833); *History of the Inductive Sciences* (1840); *Philosophy of the Inductive Sciences* (1840); and *The Elements of Morality, Including Polity* (1845). His treatise on *The Plurality of Worlds* (1853) had a considerable popularity from its subject; his *Lectures on the History of Moral Philosophy in England* (1852), and *The Platonic Dialogues for English Readers*, a selected translation, may also be mentioned. He died at Trinity in consequence of injuries sustained through a fall when riding. He was a man of the most varied acquisitions, a clear-headed student, a vigorous and independent thinker and writer. It was said of him that science was his forte, omniscience his foible. His chief ambition was to grasp, survey, and coördinate the sciences. He did excellent service to both science and history in his endeavor to gratify it. He took a prominent part in the reorganization of the course of study at Cambridge, and left his mark as one of the most efficient masters of Trinity, besides twice holding the office of vice-chancellor. He became wealthy through two marriages, and was very generous in the use of his money; his gifts to the university alone are estimated at over £100,000. In philosophy he was an intuitionist, and is now best remembered as an opponent of J. S. Mill. Consult the biographies by Todhunter (London, 1876) and Mrs. Douglas (ib., 1881).

WHEY (AS. *hwæg*, MDutch *wey*, *huy*, *hoy*, *hui*, Dutch *wei*, whey, of unknown etymology). A by-product obtained in the manufacture of cheese (q.v.). When milk is curdled with rennet or any similar substance, the curd separates from the liquid portion of the milk, and the latter is termed whey. If skillfully manipulated, the curd contains the casein and holds most of the fat of the milk mechanically. In continuing the process, the whey is drawn off from the curd, and later more completely removed by pressing. For every pound of Cheddar cheese made, there is nearly nine pounds of whey as a by-product, or a total of about two and a half billion pounds, equivalent to seven million barrels, in the United States annually. Its principal use is as a feed for pigs, calves, and sometimes for cows. It is less valuable for this purpose than skim milk or buttermilk, for the casein, which contributes largely to the value of both of these, is lacking in whey. It contains about 93 per cent. of water (only 7 per cent. of solids), 5 per cent. of milk sugar, 0.9 per cent. of casein and albumin, 0.3 to 0.5 per cent. of fat, and about 0.5 per cent. of ash. Hence its principal constitutent is sugar. It is, in reality, a very thin feed, and as it spoils quite readily, causing disturbances in young animals, some factories prefer to throw it away rather than incur the risk of feeding it. It should be kept and fed in clean vessels, and, being a carbohydrate food, should have grain added to it. In large factories whey is used for making milk sugar. (See SUGAR.) Whey cheese, made in some of the countries of Northern Europe, is practically evaporated whey, with some cream added. Butter has been made from whey, by running it through a separator, but in good cheese-making practice whey contains very little butter fat. Wheyn is a nourishing, mildly stimulating beverage prepared from whey. The whey of goats' milk is regarded by some as especially beneficial in the treatment of certain diseases, and in Switzerland and elsewhere there are large establishments for carrying out the whey-cure, either alone or associated with the grape-cure.

WHICKHAM, hwĭk′am. A manufacturing town in Durham, England, 3 miles west-southwest of Newcastle. It has iron foundries, chemical works, timber yards, and saw mills. Population, in 1901, 12,851.

WHIDAH or **WHYDAH BIRD.** Mistaken spellings of *widow-bird* (q.v.).

WHIG AND TORY (Whig, probably abbreviated from *whiggamore*, a nickname for the Presbyterian peasantry of the western lowlands of Scotland, from *whiggam*, apparently a word to urge on a horse, from *whig*, to jog along; Tory, from Ir. *toridhe*, *tornidhe*, *tornighe*, pursuer, plunderer, from *torighim*, to fancy, pursue). The names which for about two centuries were popularly applied to the two great political parties in Great Britain. Both were at first names of reproach. Whig was meant to imply that those who were thus designated were no better than the Presbyterian rebels of Scotland, while the name

Tory was intended to imply some connection with Irish brigands, who were supposed to desire a Catholic king. The names came into use about 1680. In general, the Tories were adherents of the ancient Constitution of England, and the supporters of regal and ecclesiastical authority, while the Whigs as a rule favored reform in the direction of a more democratic government. In the eighteenth century, however, the Whigs represented to a great extent the aristocratic oligarchy which ruled England. In 1832, when the Reform Bill was passed through the efforts of a wing of the Whig Party, the two old parties really disappeared, the Tories being ultimately succeeded by the Conservatives and the Whigs by the Liberals.

WHIG PARTY. In American history, the name first applied to those who during and immediately preceding the Revolutionary War opposed the measures of the British Government, in contradistinction to the Loyalists or Tories. The name came to be synonymous with patriot in America, and is believed to have made its appearance first in New York in 1768. After the Revolution the word disappeared as an American party term until about 1834, when it came to be applied to a new political party opposed to the Democratic Party. After the close of the War of 1812 the Federalists as a party disappeared, and with the absence of any well-defined political issues an 'era of good feeling' followed. During the administration of John Quincy Adams party lines were again drawn, those who supported the Administration and favored a system of internal improvements, a protective tariff, and a national bank, together with a broad construction of the Constitution generally, being designated as National Republicans, while their opponents were known as Democrats or Democratic-Republicans. (See DEMOCRATIC PARTY.) In the Presidential election of 1828 those of the former belief voted for Adams, while the latter supported Jackson. Nullifiers, whose enmity President Jackson had incurred by his measures in 1832 (see NULLIFICATION), Anti-Masons, the followers of Hugh L. White (q.v.) in Tennessee, and the States Rights Party in Georgia constituted in addition to the National Republicans some of the elements of the opposition, and by 1833 these were drawing together on the basis of their common dislike for Jackson. In 1834 the opposing elements became fused into a new party, which was called 'Whig,' in allusion to its opposition to executive usurpation, by Col. James Watson Webb, editor of the New York *Courier and Enquirer*. By 1836 the party had not become sufficiently well organized to enter successfully into a Presidential contest. No national convention was held, but Gen. W. H. Harrison was put forward as their candidate by numerous mass meetings and by several Whig State conventions in 1835. Several other candidates appeared in opposition to the Democratic nominee, Martin Van Buren, who was elected. In 1840 the parts passed over its real leaders, Clay and Webster, renominated General Harrison, and went before the people with no platform except the personal popularity of the candidate. After a remarkable campaign, the Whigs triumphed, but their rejoicing was soon cut short by the death of the President and the accession of a Vice-President, Tyler, who was not of their political faith and whose policy of opposition demoralized and weakened the party. In 1844 the Whig Party, true to itself for the first time, nominated its leader, Henry Clay, and likewise for the first time adopted a platform of principles, summed up in the following words: "A well-regulated national currency; a tariff for revenue to defray the necessary expenses of the Government, and discriminating with special reference to the protection of the domestic labor of the country; the distribution of the proceeds from the sales of the public lands; a single term for the Presidency; a reform of executive usurpations." The hopes of the party were destroyed by the injection of the 'Texas question' into the campaign, for the 'trimming' attitude of their candidate caused many anti-slavery Whigs in the North to refuse their support. The question of the annexation of Texas did not sever the bond between the Northern Whigs and Southern Whigs, although it was the first of the series of causes which ultimately led to the disruption. The Whigs of both North and South supported the war with Mexico after it was once declared, but the question of admitting or excluding slavery from the territory acquired thereby (see WILMOT PROVISO) clearly revealed that Northern and Southern Whigs could not much longer stand together. The anti-slavery or 'Conscience' wing of the Whig Party in Massachusetts now arose in opposition to the so-called 'Cotton Whigs.' In the Presidential election of 1848 the Whigs, with Gen. Zachary Taylor as their candidate, were for the second and last time successful. It was chiefly through the efforts of Henry Clay that the passage of the Compromise Measures of 1850 was effected. The Whig National Convention at Baltimore in 1852, by a vote of 212 to 70, recognized this compromise as a finality. The election of that year resulted in the overwhelming defeat of the Whig candidate, General Scott. The Kansas-Nebraska Bill (q.v.) of 1854 led to the disruption of the Whig Party and to the formation of a new party in the North (see REPUBLICAN PARTY), which was finally joined by most of the Northern Whigs, many of whom were at first also affiliated with the Know-Nothing movement. In the South most of the Whigs for a time acted with the Know-Nothing Party. In 1856 a convention representing what was left of the Whig Party indorsed the nomination of Fillmore, the candidate of the Know-Nothings, for the Presidency. In the Presidential election of 1860 remnants of the old Whig and Know-Nothing parties under a different name, the Constitutional-Union Party (q.v.), supported Bell and Everett for President and Vice-President, but upon the outbreak of the Civil War the last trace of the Whigs disappeared, the Southern Whigs having become absorbed by the Democratic Party. Consult: Gordy, *History of Political Parties in the United States* (New York, 1900—); Hopkins, *History of Political Parties in the United States* (New York, 1900); Ormsby, *History of the Whig Party* (Boston, 1859); McKee, *National Conventions and Platforms* (Washington, 1892). For the Whig Party in Great Britain, see WHIG AND TORY.

WHIMBREL, or WHAUP. See CURLEW.

WHIN. See FURZE.

WHINCHAT (from *whin*, furze, gorse, from Welsh *chwyn*, weed + *chat*, on account of its chattering note). A small, ground-keeping European bird (*Pratincola rubetra*), seen in Great Britain in summer, wherever furze (or 'whin') bushes grow. Compare Stonechat.

WHIP (from ME. *whippen*, *whyppen*, probably a variant of *wippen*, from MDutch, Dutch *wippen*, to move up and down, shake; connected with Lat. *vibrare*, Skt. *vip*, to tremble). A term used in English politics to designate the party representative whose duty it is to notify members of Parliament belonging to his party of the near approach of a division and to compel their attendance while the vote is being taken. The whip of the party in power is appointed a junior lord of the Treasury, with some minor patronage, in order to increase his influence.

WHIPPING. Corporal punishment meted out to petty offenders by the criminal law of various countries. It is still used in Russia, England, and Delaware in the United States. It is sometimes administered in private, but more often in public, the culprit in some cases being tied to a so-called whipping-post. In early English times this form of punishment could not be inflicted on a gentleman, but was frequently inflicted upon the villein, tenant, and laborer. Until within a century whipping was even more common in Scotland than in England, but by the act 25 Vict., ch. 18, no person above the age of sixteen can now be whipped in that country. The act of 26 and 27 Vict., ch. 44 (not applicable to Scotland), authorizes whipping in addition to penal servitude for various crimes in England, and this sentence is still in favor with many English magistrates. In both England and Scotland the whipping of juvenile offenders is regarded as a salutary discipline by a public opinion which is no longer quite in favor of the similar treatment of adults. In Russia the terrible punishment of the knout is inflicted on both common criminals and political offenders. Many penologists believe that a substitution of whipping for imprisonment in a large class of cases would be wise. For corporal punishment in the army and navy, see Flogging.

WHIPPLE, Abraham (1733-1819). An American naval officer, born at Providence, R. I. He was captain of the privateer *Gamecock* in the French and Indian War, and on one cruise took twenty-three prizes. On the night of June 8-9, 1772, he commanded the eight long-boats that surprised and destroyed the British revenue vessel *Gaspée*. In 1775 he was put in command of two vessels belonging to Rhode Island, and soon afterwards captured one of the tenders of the frigate *Rose*. He did much damage to British shipping, as captain successively of the *Columbus*, of the schooner *Providence*, and of the frigate *Providence*. In the last he slipped through the blockade of Rhode Island and carried important dispatches to France. In July, 1779, with the *Providence* and two other vessels, he fell in with a British merchant fleet of nearly 150 sail, convoyed by a seventy-four and some smaller vessels, and succeeded in capturing ten vesesls, eight of which reached Boston, where they were sold for about $1,000,000. At the defense of Charleston, S. C., in 1780, he commanded the naval forces, was captured, and remained a prisoner until the end of the war. In 1788 he settled in Marietta, Ohio.

WHIPPLE, Edwin Percy (1819-86). An American critic, born at Gloucester, Mass. He was educated at Salem, Mass., and soon went into banking. By 1837 he devoted much of his time to debating and reading. He won notice in 1843 by a panegyric upon Macaulay and soon began a long and distinguished career as a lecturer on literary and biographical topics. His first book was *Essays and Reviews* (1848), which was followed by *Literature and Life* (1849); *Character and Characteristic Men* (1866); *Literature of the Age of Elizabeth* (1869); *Recollections of Eminent Men* (1886); *American Literature and Other Papers* (1887). Whipple, in his day, attained a high position as a critic, and was a formative force in American literature; and some of his work, for example, the *Age of Elizabeth*, is still read.

WHIPPLE, Henry Benjamin (1822-1901). A bishop of the Protestant Episcopal Church in the United States, born in Adams, N. Y. Because of ill health he gave up his college course and engaged in business. In 1847 he began to study theology privately, was ordained priest in 1850, and became rector at Rome, New York. In 1857 he removed to Chicago. Two years later he was elected and consecrated Bishop of Minnesota. He was a warm friend and defender of the Indians, among whom he established successful missions. He also distinguished himself as an advocate of free churches. He wrote much for current periodicals, and also an autobiography, *Lights and Shadows of a Long Episcopate* (New York, 1899).

WHIPPLE, Squire (1804-88). An American civil engineer, born at Hardwick, Mass. He graduated at Union College in 1830; became a civil engineer on the Baltimore and Ohio Railroad; in 1840 designed a successful scale for weighing canal boats; in the same year patented an iron bridge truss; and after 1852 erected several important bridges of the 'Whipple trapezoidal' type. He was sometimes called the 'father of iron bridges.' In 1872 he patented a lift drawbridge, and in the following year built one over the Erie Canal at Utica. He published *Treatise on Bridge Building* (1847; enlarged ed. 1873) and *The Doctrine of Central Forces* (1866).

WHIPPLE, William (1730-85). A signer of the Declaration of Independence, born at Kittery, Maine. He became the captain of a merchant vessel before he was twenty-one years of age, and engaged in the West India trade and in slave-trading voyages to Africa. At the age of twenty-nine he withdrew from the sea, and entered business at Portsmouth, N. H. In 1775 he was a delegate to the New Hampshire Provincial Congress; was elected a member of the Provincial Council of Safety; and was elected to the Continental Congress in January, 1776. He continued to be a member of the Congress until September, 1779; in 1777, as brigadier-general of militia, he commanded one of the New Hampshire brigades in the operations against Burgoyne, and helped negotiate the terms of surrender; and in 1778 commanded the New Hampshire troops in the operations against the British in Rhode Island. In 1780 he was elected to the State Assembly and was several times reëlected. He was superintendent of finance for New Hampshire from 1782 until 1784, and was president of the commission that settled the dispute between Pennsylvania and Connecticut over the Wyoming Valley. In 1782 he became a judge of the Superior Court of Judicature.

WHIPPOORWILL. A North American nightjar (*Antrostomus vociferus*), famous for the call which has given it this name, but which might be more nearly expressed by the syllables *whup'peree"*. It is common in summer throughout the eastern part of the United States. It is about ten inches long, the plumage very much mottled and indistinctly marked with small transverse bands of black, white, and buff, the top of the head streaked with black, a narrow white collar on the throat. The bristles at the base of the bill are very stiff, and more than an inch long. This bird is seldom seen during the day, but seeks its food by night, catching moths, beetles, and other insects on the wing. Its flight is near the ground, zigzag, and noiseless. Its notes are heard only during the night, especially just after sunset in the early summer, when the notes are rapidly reiterated, often several hundred times with hardly an apparent pause for breath, and are clear and loud, so that when several of these birds are close at hand the noise is such that those unaccustomed to it cannot sleep. The whippoorwill makes no nest, but the female deposits her eggs, two in number, on the ground or leaves in the woods. The eggs are perhaps the handsomest of any American bird, white, prettily marked with lilac and brown. In the more southern parts of the United States the whippoorwill is replaced by a larger species, the chuck-will's-widow (q.v.), and on the upper Missouri and to the west by a smaller one, the poor-will (q.v.).

WHIP-SNAKE. One of the long, slender, whiplash-like green tree-serpents of the family Dryophidæ of India and the Malay countries. They are poisonous, and one species (*Dryophis nasutus*) of India is said by the natives to dart at the eyes of men passing it. Wallace remarks that the ease and rapidity with which these snakes glide through the bushes almost without disturbing a leaf is very curious; and they are so well protected by their color that they may often be touched before they are seen.

The same name is given in the United States to a slender, swift, brownish 'blacksnake' (*Zamenis flagelliformis*) of Texas and westward, usually called 'coach-whip snake.' The Indians and negroes believe it will whip or lash its adversary with its tail, and fear it, but it is quite harmless, though ready to fight when cornered.

WHIP-TAIL SCORPION. See SCORPION.

WHIRLIGIG BEETLE. See WATER-BEETLE.

WHIRLIGIG MULLET. A curious little mullet (*Querimana gyrans*) of the southeastern coast of the United States, often found swimming round and round in great schools at the surface like whirligig beetles; usually mistaken for young mullet or bluefish.

WHIRLPOOL RAPIDS. A remarkable series of rapids in the Niagara River, three miles below Niagara Falls. The central portion of the current is forced by the narrowness of the channel (300 feet) to a height of 20 to 30 feet above the edges. In spite of the dangerous character of the rapids, they have several times been passed by persons in barrels and once by a steamer, the *Maid of the Mist* (q.v.). A short distance below is the whirlpool from which the rapids take their name.

WHIRLWIND. A term specifically applied to small whirls or eddies of winds that continue only a few seconds, seldom longer than a minute; the diameter of the whirl is correspondingly small, and is made visible principally by dust, leaves, or light objects flying in the air. The most extensive dust whirls occur on hot, dry plains, as in India, Texas, and the eastern slope of the Rocky Mountains, and especially in the Desert of Sahara, where heaps of sand, sufficient to cover a caravan, are said to fall to the ground occasionally as the whirling simoom passes over. In the smaller whirls the rotation of the eddy may be either positive or negative, but in the larger whirls the direction, like that of the tornado, is always the same as that of the storms attending areas of low pressure, namely, from the west, by the south, to the east in the Northern Hemisphere, and the reverse in the southern. Whirlwinds acquire different names according to the circumstances attending them. Thus the hot dry air over a dusty plain rising because of its high temperature gives rise to the dust whirl. The burning of prairies and forests and the eruptions of gases from volcanoes cause the smoke whirls; the ascent of air drawn from the ocean up to the cloud gives rise to the waterspout, properly so called; the most violent ascending and rotating clouds constitute the tornado. Formerly hurricanes and typhoons were spoken of as whirlwinds, but the present tendency is to use those distinctive terms. Consult: Baddely, *Whirlwinds and Dust Storms of India* (London, 1860); Reye, *Die Wirbelstürme* (Hanover, 1880); Ferrel, *On Cyclones, Tornadoes, and Waterspouts* (Washington, 1882).

WHISKERANDOS, DON FEROLO. The mock hero of the mock drama, *The Spanish Armada*, contained in Sheridan's farce, *The Critic*. He is a captured Spaniard with whom the jail-keeper's daughter is in love, and is meant as a caricature of the heroes of Restoration tragedy.

WHISKY (probably a variant of *usquebaugh*, from Gael., Ir. *uisgebeatha*, water of life, from *uisge*, OIr. *usce*, water; connected with Gk. *ὕδος*, *hydos*, water, Skt. *utsa*, spring, or with AS., OHG. *wascan*, Ger. *waschen*, Eng. *wash*, both groups probably ultimately akin + *beatha*, OIr. *beothu*, *bethu*, life, connected with Lat. *vita*, Gk. *βίος*, *bios*, OChurch Slav. *životŭ*, Skt. *jīva*, life; cf. for meaning Fr. *eau-de-vie*, water of life, brandy). A distilled liquor, chiefly obtained from the fermented mash of different varieties of grain. The term is sometimes used to designate liquors obtained from starchy or saccharine substances other than grain, as, for example, potato spirits; but its specific meaning is best expressed by the name given it in medicine, *spiritus frumenti*, spirits of grain. By far the greater part of the distilled liquors consumed in the United States is sold under this designation.

Although it is customary to use a mixture of different kinds of grain in the preparation of a mash for the production of whisky, still the classification of different varieties is based mainly upon the kind of grain forming the major part of the infusion. Thus *rye* whisky is made from a mash composed chiefly of rye; *corn* whisky, chiefly from corn or maize; *wheat* whisky, from wheat; *malt* whisky, from malted barley, etc. Each variety has its own peculiar aroma derived from the grain, modified somewhat by the character of the ferment used. Rye whisky, sometimes called 'Monongahela,' is produced largely in Pennsylvania; corn whisky is chiefly made in Kentucky, and is frequently called 'Bourbon,' from the county in Kentucky of that name. Malt whisky is not extensively produced in the United States, but a small percentage of malt is used in the mash of all whiskies, in order to secure its diastatic action on the starch of the grains forming the principle part of the mash.

As grain, particularly maize, is the cheapest source of either starch or sugar in the United States, distilled liquors, including both alcohol and whisky, are principally made from it; consequently, the processes and methods of production for the latter are covered, as to the main features, by descriptions of the ordinary procedure followed in the manufacture of a strong alcoholic liquor from a starchy or saccharine mash. (See DISTILLED LIQUORS.) But, while the chief constituent of whisky is alcohol, and a large quantity of factitious liquor is sold under this name which is simply rectified alcohol, colored and flavored to resemble whisky, yet genuine whisky is very far from being merely a 50 per cent. mixture of alcohol and water. The pharmacopœia definition is: "An alcoholic liquor obtained by the distillation of the mash of fermented grain (usually a mixture of corn, wheat, and rye), and *at least two years old.*" This recognizes one very important distinction between whisky and alcohol, namely, the process of 'ageing,' to which the former is subjected in order to fit it for beverage purposes. It will be sufficient to point out here the other points of dissimilarity between the methods used in the manufacture of the two products. In the first place, the fermentation is not carried to the same degree of attenuation in the production of whisky as in the production of alcohol, where the highest possible spirit yield is desired. Two different methods of fermentation are in use for whisky, the products of which are known, respectively, as sweet-mash and sour-mash whiskies.

In a sour-mash distillery no fermenting agents are used except the spent mash or slop taken from a tub previously fermented, the method being sometimes called 'yeasting back.' Where this procedure is employed the fermentation is not so complete, and the yield not so great, as in sweet-mash distillation, where beer yeast is used. The usual fermentation period for sweet-mash whisky is 72 hours; for sour-mash, 96 hours. The yield in the one case is about 3½ to 4 gallons of proof spirits to the bushel of grain; in the other, it is from 4 to 4½ gallons.

Passing to the distillation and rectification processes, the aim in alcohol production is to obtain a highly concentrated alcoholic liquor, freed from all volatile impurities, and, so far as possible, chemically pure; very elaborate rectifying stills are used, therefore, and the operation is completed by filtration through wood or bone charcoal.

In the production of whisky the conservation of alcohol is not so important an object, and it is not desirable to eliminate all other volatile constituents, as some of them, when modified and mellowed with age, eventually impart to the liquor its fine flavor; consequently, while the greater part of the fusel oil impurities are removed, the rectifying process is not pushed so far, and the char filtration may be omitted entirely. Patent stills wherein fractionation is effected, like the Coffey still, produce a whisky which does not give the best results on maturing. This explains also why whisky made by crude and obsolete methods, such as Scotch and Irish 'pot-still' whisky, often far surpasses in quality the product of the most modern and best equipped distilleries.

The importance of the operation of ageing in the production of whisky has already been alluded to, and constitutes the final and most important difference in the treatment of the two products. Alcohol is ready for sale and use as soon as it leaves the rectifying still and char filter; it is warehoused in barrels or casks which have been coated with glue or paraffin inside to prevent contact with the wood, and is withdrawn tax-paid as soon as possible after it is warehoused, as it tends to deteriorate in time by dissolving coloring matter from the wood, notwithstanding these precautions. Whisky, on the other hand, is entirely unfit for consumption when first produced, being fiery and unpalatable; it requires a long period of storage in wooden casks to bring about the changes in the secondary constituents which develop its aroma. It is sometimes sent on long sea voyages, stored in the holds of vessels, this being supposed to have a favorable effect upon its maturing. Various quick ageing processes have been devised and some patented, but none has so far proved a satisfactory substitute for the natural method. Chemically, the change which occurs in a matured liquor is considered as a process of oxidation, promoted by the porosity of the wooden cask (a liquor does not age in a glass or metal container), whereby the alcohols present, amyl, butyl, propyl, etc., are converted into the corresponding fragrant ethers, and possibly in part still further oxidized and eliminated. The liquor also acquires some new constituents from the wood of the cask, which is often charred inside, with the idea of promoting chemical action. Freshly distilled whisky is, of course, colorless, and contains no solid matter whatever; after being stored in wood several years it has the amber tint familiar to every one, and contains perhaps 100 grains of solid matter per gallon—tannin, extractive and coloring matter—all derived from the oak wood commonly used in the barrels.

The importance of the maturing process is also recognized in the United States laws governing the production of whisky, and provided for by the privilege accorded distillers of deferring the payment of the gallon tax until the liquor is 'withdrawn from bond;' the bonded period may be extended as long as eight years with allowance for loss by evaporation, during which time the whisky remains in a bonded warehouse under Government control. The Government stamp on whisky withdrawn from bond is practically a guarantee of its age and purity, and the act of March 3, 1897, known as the 'Bottling in Bond

Act, is intended to enable the purchaser of even so small a quantity as a quart to secure a product which comes direct from Government control and has, therefore, suffered no addition or adulteration. The internal revenue strip stamp over the cork of the bottle is imprinted with the age and quantity of the contained whisky.

Whisky, in common with other kinds of distilled liquors, bears a heavy burden of taxation in the United States. (See INTERNAL REVENUE SYSTEM.) The gallon tax has been $1.10 since 1894, which is at least four times the cost of production, and a yearly license, called special tax, is exacted from distiller, wholesaler, and retailer. The entire process of manufacture is subject to supervision by Government officers, and the distiller is held to a rigid accounting for all materials used; he must pay tax upon not less than 3½ gallons of proof spirits for every bushel of grain mashed, whether he obtains that yield or not, and heavy penalties are provided for fraud or evasion of tax. In proportion to alcoholic content the rate of tax upon distilled liquors is much higher than upon any form of fermented liquors. See LIQUORS, FERMENTED AND DISTILLED, STATISTICS OF.

WHISKY INSURRECTION. The term popularly applied to the organized opposition among the farmers and distillers of the four western counties of Pennsylvania in 1794 to the enforcement of the Federal law of March, 1791, imposing an excise tax on whisky. The law was exceedingly unpopular in this part of the country, where whisky was the chief article of manufacture, and from which, by reason of the remoteness of the country, grain could not well be shipped to the East except in the more portable form of whisky. The frontier inhabitants regarded the law as an unjust discrimination against them, and vigorously opposed its enforcement. The Government at once instituted prosecutions against some of the chief offenders, but when the marshal undertook to serve the necessary processes he was compelled by a body of armed men to desist. In pursuance of an act passed by Congress in May, 1792, President Washington issued a proclamation commanding the insurgents to disperse, and warning others against abetting them. On August 14, 1794, a convention of more than 200 delegates, representing the western counties of Pennsylvania and one county in Virginia, assembled at Parkinson's Ferry on the Monongahela, with Albert Gallatin (q.v.) as secretary of the meeting. Three commissioners who had been appointed by the President, together with commissioners appointed by the Governor of Pennsylvania, appeared at the convention, and offered a general amnesty, conditioned upon submission to the laws, but no promises or pledges could be secured from the convention. The commissioners thereupon returned to Philadelphia, and on the basis of their report the President issued a second proclamation on September 25th, commanding submission and announcing the march to the scene of disturbances of a force of militia, a requisition for 15,000 militiamen having already been made upon the Governors of Pennsylvania, New Jersey, Virginia, and Maryland. Upon the approach of the troops the ardor of the insurgents was somewhat dampened, and David Bradford, the prime mover in the insurrection, fled to New Orleans. Meantime another convention assembled at Parkinson's Ferry and passed resolutions pledging submission and obedience to the laws. Thereupon Governor Henry Lee of Virginia, who was acting as commander of the militia, issued a proclamation of amnesty, requiring an oath of allegiance to the United States, and ordered the arrest of those offenders who refused to make a declaration of submission. A number of suspected persons were seized. Some were dismissed for want of evidence, and others were bound over to appear for trial. Two were convicted of treason, but were pardoned by the President. As a precautionary measure, 2500 troops under the command of General Morgan were retained in the disaffected community throughout the winter to serve as a police force. The real significance of the disturbances, which never rose to the dignity of an insurrection, was that it was the first instance in which the strength of the new Federal Government to maintain domestic tranquillity and enforce laws was put to the test. The promptness with which the resistance was put down won respect for the Government and established valuable precedents with regard to its power and duty on similar occasions in the future.

WHISKY RING. In American history, a term popularly applied to an association of internal revenue officers and distillers formed during the administration of President Grant for the purpose of defrauding the Government of the excise on distilled spirits. The ring orginated in Saint Louis. Distillers who refused to pay the assessment were entrapped into technical violations of the law and were forced to contribute or submit to prosecution. Finally it was discovered that the revenue returns were far short of the average, but the criminals could not be reached, on account of the prompt information which they received from members of the ring in the Treasury Department. In 1875, through the active efforts of Benjamin H. Bristow, the Secretary of the Treasury, the frauds were discovered. On May 10th sixteen distilleries in Saint Louis, Milwaukee, and Chicago were seized and indictments were promptly found against some 240 distillers and revenue officials, besides the chief clerk in the Treasury Department, Avery, and O. E. Babcock, the private secretary of the President. The trials began at Jefferson City, Mo., in October, 1875, and resulted in the conviction of a Treasury agent and a supervisor. Babcock was tried at Chicago in February, 1876, but was acquitted. Most of the other offenders either pleaded guilty or were convicted. The leading defendants who were convicted were pardoned after a short interval. A select committee appointed by the House of Representatives made an exhaustive investigation of the subject. The report with the testimony taken is published in the *House Miscellaneous Document*, No. 186, first session, Forty-fourth Congress. It was shown that during the ten months ending May 1, 1875, the Government had been defrauded of $1,650,000 in taxes

WHISPERING GALLERY. The name given to a number of galleries on the interior of domed buildings which from their construction possess a peculiar echo, transmitting sounds with great intensity to distant points. The most noted of such whispering galleries is in the cupola of Saint Paul's, London, where a low whisper uttered near one wall may be distinctly heard at the opposite wall 108 feet away.

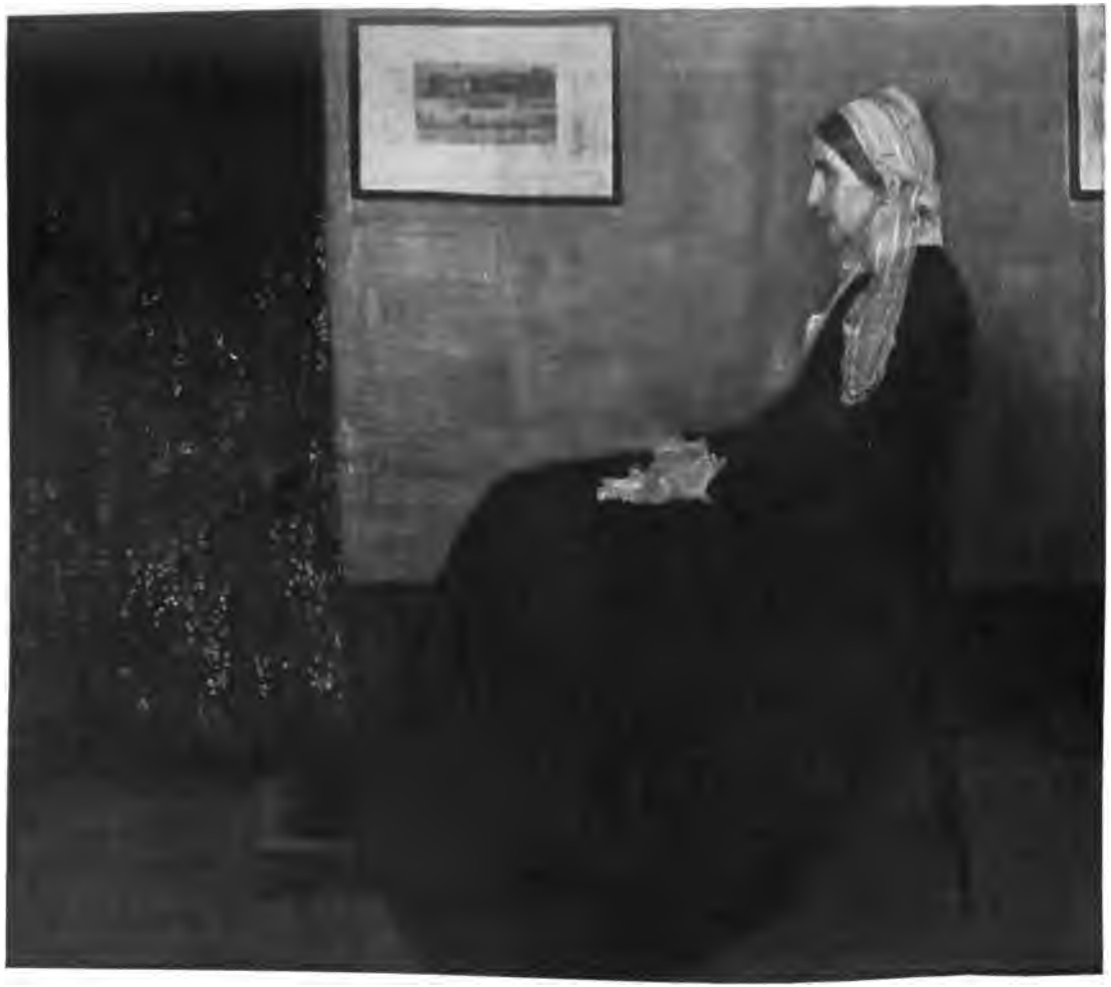
WHIST (variant of *whisk*, so called from the whisking or sweeping of the tricks from the board, from Icel. *visk*, wisp of hay, rubber, OHG. *wisc*, Ger. *Wisch*, whisk; perhaps connected with Lat. *virga*, rod, switch). A game of cards played with a full pack by four persons, two in partnership against the other two. Its origin, like that of most card games, is very obscure. Under its old name of 'triumph' it had become so commonly understood that when Bishop Latimer preached the Christmas sermon at Cambridge in 1529, he had no doubt his hearers could follow his allegories based upon it. Its first serious study and the formulation of its rules came about by the frequent meetings of a party of whist-players at the Crown Coffee House in Bedford Row, London, of whom Edmond Hoyle (q.v.) was one. Up to this time it had been usual to discard the deuces, so that the tricks were often even, six on each side. By bringing the entire pack of cards into play they added the potent factor of the odd trick. In 1760 the laws were revised by the members of two celebrated London clubs, Whites and Saunders, and the rules so revised remained in existence until 1862, when 'Cavendish' published his celebrated treatise, of which more than thirty editions have since been issued. The next important change in the methods of play was the adaptation by 'Cavendish' of the 'American leads,' a method suggested by Nicholas B. Trist of New Orleans, in 1883-84, to classify the various scattered rules for leading, so as to make it possible to establish general principles. This system involves a systematic course of play when opening, and the continuing of leads from strong suits. The rules revised by the Portland Club of London govern whist, except where it is necessary to adopt those of the American Whist League, or where 'German whist,' or 'bridge' (q.v.) is played. The two pairs of partners sit facing each other, and the entire fifty-two cards are dealt face down, thirteen to each player, the last card being turned face upward and its suit determining trumps; the player at the left of the dealer leads first, and the succeeding player must follow suit if he can. The highest card of the suit led (unless some player not having a card of that suit has played a trump) wins the trick. The winner of the trick then leads, playing any card of any suit he chooses, and so on in turn, until all the cards, making thirteen tricks, have been played.

Long whist, a game of ten points in which honors are scored, is now seldom played. *Short whist*, a game of five points, where honors are scored, is popular in England. The American game is of seven points without honors. *Dummy whist* is a game played by three persons, the fourth hand, called the dummy, being exposed on the table. The dummy deals at the beginning of each rubber, and is not liable to a penalty for a revoke, neither is the dummy's partner liable to any penalty for an error from which he can gain no advantage, but otherwise the laws are the same as those of whist proper. *Double dummy* is played by two persons, each player having a dummy or exposed hand for his partner. In this game there is no misdeal and the laws are the same as for dummy whist. In *duplicate whist* the deal is played but once by each player, but in order to bring the play of teams, pairs, or individuals into comparison each hand is played over again. When it comes the turn of a player to play, he is required to place his card face up before him and let it remain until the others play to the trick, after which he turns it over with the ends toward the winners of the trick. When the deal is played, each player places his hand in the tray or whatever device is employed, face downward, and the trump card is placed face upward on top of the dealer's hand. *Russian Whist* closely resembles the American game, except that there are no trumps and the scoring varies according to agreement, although it is generally as in long whist.

There is a very large bibliography of whist which is easily accessible. The standard work is Cavendish, *Principles of Whist, Stated and Explained* (21st ed., London, 1902).

WHISTLER, JAMES ABBOTT MCNEILL (1834-1903). An American painter and etcher, of French training, the most original and gifted artist of American lineage. The events of his early life are difficult to ascertain, owing to his own contradictory statements and desire to veil them in mystery; but it seems certain that he was born at Lowell, Mass., July 10, 1834. His father, Major George Washington Whistler, of the United States Army, was a distinguished engineer. His mother, a Baltimore lady of refinement, was the constant companion and instructor of his boyhood. In 1837 the family removed to Stonington, Conn., and in 1842 to Saint Petersburg, Russia, Major Whistler having been intrusted by the Czar with an important commission in the construction of the railroad between Saint Petersburg and Moscow. After the Major's death (1849) the family returned to Stonington and the lad was sent to school at Pomfret, near by, preparatory to entering West Point in 1851. Military discipline and attention to detail were very odious to him, and although he distinguished himself in drawing, his record in other subjects was such that he was dismissed from the academy. He was, however, assigned to the United States Coast Survey, in which he did not remain long, because of a prank in engraving caricatures on the margin of a plate executed in that service. In 1856 he became a pupil of the classicist Gleyre in Paris, but was not perceptibly influenced by this master. He was for some time a follower of Courbet, whose sincere realism he deeply admired. The low tones and the grand lines of his works remind somewhat of Velazquez, though he never saw the best of the great Spaniard's works in Madrid. From the Hiroshige and Hokusai he probably learned most of all—subtle decorative effects and the principles of selection. But none of these elements dominate his art to such an extent that he can with propriety be called any man's pupil. His individuality was from the beginning entirely unique.

From 1857 to 1863 his pictures were refused at the Salon; but in the latter year his "Little White Girl" achieved a signal success in the Salon des Refusés. As an etcher he found earlier recognition. His *Little French Series* (1858) representing Parisian views, some of a genre character, established his reputation, and the wonderful *Thames Series* (1871) placed him



WHISTLER

PORTRAIT OF THE ARTIST'S MOTHER, FROM THE PAINTING IN THE LUXEMBOURG GALLERY, PARIS

in the first rank. Being executed with considerable detail, these plates met with greater approbation than those of his later life, when he had carried the process of selection to its logical conclusion. His later subjects were taken from Holland, France, and other localities which he visited, but the best known are the *First Venice Series* (1880) and the *Second Venice Series* (1881). They are the culmination of his etching, and place him in the same rank with Rembrandt, the world's greatest etcher, whom he even excels in selection and subtlety of execution. In the rendition of color and of light and shade, in the subtle grouping of line, these works are unique. Whistler was also highly successful in dry-point etching and lithographic drawing, in which media he executed a number of plates. Some 300 of his etchings have been published with comments by Frederic Wedmore (1899), and good examples may be found in the print-rooms of the Venice Academy, Dresden Gallery, Bibliothèque Nationale, British Museum, Lenox Library, New York, and elsewhere.

The eccentricities of Whistler and his quarrels with English artists and critics during his long stay in London (1858-90) were, for a long time, better known than his paintings. He was of a very combative disposition, and profoundly impressed with the importance of his own views. His central idea was that painting should appeal only to the eye, and that it was not a medium for the expression of ideas or emotions, the subject being absolutely irrelevant. Emphasizing the analogy with music, he called his paintings arrangements, symphonies, nocturnes, and the like, pitching them in one or two related color tones. For him the public and the critics were a set of ignoramuses, who had no right to an opinion whatever. He quarreled indiscriminately with friend and foe, chiefly by means of public letters, in which he gave vent to an inimitable wit and satire. Especially well known is his quarrel with John Ruskin, who in his *Ars Clavigera* (1877) had given vent to his feelings over one of Whistler's "Nocturnes" in the following language: "I have seen and heard much of cockney impudence before now; but never expected to hear a coxcomb ask two hundred guineas for flinging a pot of paint in the public's face." The artist promptly sued for damages, and in the celebrated trial which followed he was awarded one farthing, which coin he triumphantly wore as a watch charm ever afterwards. To propagate his ideas he turned increasingly to literature, developing a style as well balanced as it is clear and incisive. *Ten o'Clock* (1888), a lecture delivered at that hour of night, is a statement of his artistic theories; his other works are *The Gentle Art of Making Enemies* (1890), in which he was past master, and the *Baronet and the Butterfly* (1890), an account of a celebrated quarrel. No artist ever had a more interesting signature than Whistler's butterfly, by the action of which he endeavored to render a sentiment of the letter to which it was affixed.

From 1858 till 1889 Whistler resided chiefly in London, making frequent journeys to Paris, and it was at this period that he executed most of his principal works. Best known among them is the portrait of the "Artist's Mother" (Luxembourg)—an arrangement in gray and black, executed with rather more detail than most of his works. It is impossible to conceive of a more charming picture of placid domesticity than this dear, old-fashioned lady. Of equal merit is his portrait of Carlyle (1872, Glasgow Museum), in which he has immortalized the grand old thinker. His portrait of the little Miss Alexander, an arrangement in gray and green, is infinitely delicate and subtle in execution. These portraits are not mere faces or figures, but rather figure paintings, in which the well-arranged backgrounds are as masterful and as essential as the images. Other celebrated examples of female portraits are Rose Whistler (1862, Boston Museum), Lady Archibald Campbell (1888, Philadelphia), Miss Rosa Corder (Richard Canfield), "Lady in a Fur Jacket," and Lady Meux, an arrangement in pink and gray. His portraits of men include those of his friend Theodore Duret, Comte de Montesquieu (Richard Canfield), and the violinist Sarasate, an arrangement in black (Pittsburg Academy). Among his celebrated figure subjects are "At the Piano" (1867), showing the passing influence of his friend Rossetti; "La princesse du pays de la porcelaine" (1868); the "Music Room," a harmony in green and gold; the "Balcony;" and the wonderful "Symphony in White, No. 3," almost Hellenic in spirit.

Few artists had as broad a range of subjects as Whistler. His landscapes portray the mysterious beauty of the night and the majesty of the ocean; who before him saw the splendor of the London fog? He discovered beauty in all about him, in the squalid quarters of London and in the commonplace of the drawing-room as well as in the magic canals of Venice. Among his principal 'Nocturnes' are the "Falling Rockets" (black and gold); "Saint Mark's, Venice" (blue and gold); "Battersea Beach" (blue and silver); and "Chelsea Snow" (gray and gold). Among marine views are "Valparaiso Harbor," a twilight scene in flesh color and green; "Blue Wave, Biarritz;" and "The Ocean" (gray and green). To these must be added some of the many views of London, like "Trafalgar Square," "Last of Old Westminster," and "Westminster Bridge." He also executed many fascinating water-colors, and his Venetian pastelles certainly equal, in delicacy and refinement, anything that has yet been done in that medium.

As a decorator Whistler was equally important, and his soft restful colors have exercised a wide influence upon household decoration. Among his best known decorations are the music-room of his friend Sarasate in white and clove color (Paris); the celebrated "Peacock Room" in Mr. Leyland's house (London), in blue and gold, the motive of which is derived from the eye in the feathers of a peacock's tail; and his own beautiful house in London.

For a long time Whistler did not meet with deserved recognition. In 1887 he was elected president of the Royal Society of British Artists; under his administration the quality of art exhibited by the society greatly improved, but its finances declined, and in 1889 Whistler and his following withdrew. He himself said, "The artists have come out, and the British remain." At the close of 1889, when he received the Cross of the Legion of Honor (Officer, 1891), he removed to Paris, residing there until a short time before his death in London, July 17, 1903. The appreciation so long denied him was in his last years fully meted out to him. He was made honorary member of the academies of Munich, Dresden, Rome, etc., Knight of the Bavarian Order of Saint Michael, and in 1900 he received the gold medal at the Paris exposition. He became the head of an important school, composed chiefly of young Americans. During the last period, though his works were not frequently exhibited, his brush was by no means idle. Not the least interesting of these last works are the portraits of himself seated in his studio, and of his sister-in-law.

It is perhaps too early to estimate Whistler's position in the development of art. He was essentially modern, and something of all the most modern tendencies of art centred in him, and yet he was absolutely independent of them all. An avowed realist, he differed from others in that nature merely supplied him the material for color harmonies. His paintings were often impressions, but, unlike the so-called Impressionists, he was not primarily a painter of light, preferring sad colors. He resembled the Japanese in the peculiar decorative character of his work, especially in the matter of detail, and in a wonderful power of selection. The effect of his work is subtle and dreamy, like that of a vision rather than of bald reality. Although he was a fine draughtsman, color was to him the chief factor in painting, and not even Velazquez was a greater master of color values. His brush work was careful and painstaking, although in the finished painting no trace of effort can be seen. The full extent of his influence is at present difficult to estimate; but it has already materially affected the French, British, and American schools. It is no exaggeration to say that Whistler was one of the greatest painters of the later nineteenth century, if not of all times.

Whistler's theories of art were so essentially cosmopolitan that it is surprising to learn from his friend Pennell, the etcher, that his ambition was for America, and that he greatly wished his pictures to come into American hands. This wish was gratified—for in the public galleries in Boston, Philadelphia, and Chicago, and in private possession in Connecticut, New York, Philadelphia, and elsewhere, may be seen fine examples of his work.

BIBLIOGRAPHY. *A Life of Whistler*, authorized by himself, is being written by his friends, Mr. and Mrs. Joseph Pennell. Of the numerous magazine articles published since his death mention should be made of those in the *North American Review, Les Arts, Gazette des Beaux-Arts, Magazine of Arts, Art Journal,* and *Brush and Pencil*—all in 1903.

WHISTLER, or SIFFLEUR. A large marmot (q.v.) of the Rocky Mountains, which dwells mostly in the open region above timber-line and is noted for its clear whistling note. It is closely related to the woodchuck, and, like other marmots, burrows deeply, and hibernates. Two species are recognized, *Arctomys flaviventer* from Texas to Northern Montana, and *Arctomys pruinosus* from the Columbia River to Arctic America. The latter is the 'siffleur' of the old fur-hunters.

WHISTLER, or WHISTLEWING. See GOLDENEYE.

WHIS'TON, WILLIAM (1667-1752). A clergyman of the Church of England. He was born at Norton, in Leicestershire. He studied at home and in a school at Tamworth until 1686, when he went to Cambridge, where he greatly distinguished himself, chiefly as a student of mathematics. In 1690 he took his degree, and obtained a fellowship in 1691. In 1693 he became chaplain to John Moore, Bishop of Norwich, and in 1698 was presented to the living of Lowestoft, in Suffolk. Meantime, in 1696, had appeared his *New Theory of the Earth*, a work which procured him a considerable reputation. In 1701 he was appointed deputy to Sir Isaac Newton, and in 1703 he was appointed to succeed him in the Lucasian professorship at Cambridge. In addition to the duties of his chair, he engaged in clerical work with much success as a preacher. The development of his theological opinions, however, led him into Arian heresy, and his avowal of his views at once in his preaching and his writings led, in 1710, to his expulsion from his professorship and the university. In the next year appeared the most noted of his original writings, *An Historical Preface to Primitive Christianity Revived.* His subsequent prosecution in the Church courts dragged along for five years, and in the end Whiston was permitted to remain formally a member of the Church of England. By many of the clergy, however, much dissatisfaction was expressed. Having no regular means of livelihood, Whiston was frequently reduced to great straits; but in the dissemination of his religious opinions he continued unwearied, and his publications on the subject were numerous. He also busied himself with scientific investigations, and he was one of the first persons to give lectures with experiment in London. In 1715 he instituted a society in London for promoting primitive Christianity, and the meetings were held at his home. He died August 27, 1752. Of his many works his translation of Josephus is best known (1737; many subsequent editions). His *Memoirs* (1749) appeared during his life.

WHIT'AKER, NATHANIEL (1732-95). A New England minister. He was born on Long Island, graduated at Princeton College (1752), and was pastor of a church at Chelsea, near Norwich, Conn., until 1761. In 1765-66 he visited Great Britain with the Rev. Samson Occom (q.v.) to procure funds for the support and enlargement of the school at Lebanon, Conn., under the care of the Rev. Eleazar Wheelock (q.v.); the foundation of Dartmouth College (q.v.) was one of the results. He was minister at Salem, Mass. (1769), and Norridgewock, Maine (1784). After 1790 he lived in Virginia. He published a number of sermons.

WHIT'AKER, OZI WILLIAM (1830—). A Protestant Episcoal Bishop of Pennsylvania. He was born at New Salem, Mass.; graduated at Middlebury College, Vermont, 1856, and at the General Theological Seminary, New York, 1863. He was rector at Gold Hill, Nev., 1863-65; Englewood, N. J., 1865-67; and Virginia City, Nev., 1867. In 1868 he was elected Missionary Bishop of Nevada and Arizona; in 1886 Assistant Bishop of Pennsylvania, and became Bishop in 1887.

WHITBY. A seaport and favorite watering-place in the North Riding of Yorkshire, England, on both sides of the mouth of the Esk, where it enters the North Sea, 50 miles northeast of York (Map: England, F 2). The old town, anciently called Streoneshalh, with its picturesque houses, rises in terraces on the cliff crowned by the noble ruins of the Benedictine abbey founded by Saint Hilda about 657. Here lived and died Cædmon (q.v.). In 867 the abbey was burned by the Danes, who renamed the town Whitby (White-town). In 1078 it was rebuilt by William de Percy as a monastery for men only. Hence the nuns of Whitby described by Sir Walter Scott in *Marmion* are a pure fiction. The magnificent ruins we now see belong of course to the second abbey, for the old buildings of wood and thatch must have been utterly destroyed. The new portion of the town is on the west cliff. A swivel bridge connects the two parts of the town, and admits vessels into the inner harbor. There are shipbuilding and repairing docks, rope and sailmaking works, an active import and export trade, important herring fisheries, and a specialty is the manufacture of jet ornaments from a variety of petrified wood found in the vicinity. Population, in 1891, 13,075; in 1901, 11,748. Consult Robinson, *Whitby and Its Abbey* (London, 1860), and see WILFRID.

WHITCHER, FRANCES MIRIAM (BERRY) (1811-52). An American humorist, born at Whitestown, N. Y. She contributed poems and sketches to the newspapers and won much celebrity for her humorous creation, "The Widow Bedott." She married the Rev. Benjamin W. Whitcher, of Elmira, N. Y., in 1847, and it is said that the claims of people who thought she had used them as models drove her and her husband from his charge. Her chief book, *Widow Bedott Papers*, was gathered from her writings in 1855, and a coarsely amusing play was afterwards made from it by D. R. Locke.

WHITE, ANDREW DICKSON (1832—). An American educator, diplomat, and author, born at Homer, N. Y. He graduated at Yale in 1853; studied for some time in Paris; was attaché to the United States Legation at Saint Petersburg during part of the Crimean War; studied in the University of Berlin; and in 1857 became professor of history and English literature in the University of Michigan. Five years later bad health compelled him to go abroad, and while there he published in London *A Word from the Northwest* in reply to William H. Russell's *American Diary*. In the following year he was elected to the New York Senate, and was later reëlected. In 1867 he became president of Cornell University (q.v.), which he had helped to found, and occupied that position, together with the professorship of history, until 1885. In this year he resigned, and two years later endowed the new school, which in his honor was called the President White School of History and Political Science, with his historical library, consisting of about 30,000 volumes and 10,000 pamphlets and manuscripts. The cost of this library had been more than $100,000, and in addition he had already given the university about $100,000 in money. In 1871 he was one of the commissioners sent to study the desirability of annexing Santo Domingo; in 1876 he was chairman of the jury of public instruction at the Centennial Exposition; in 1878 was honorary commissioner to the Paris Exposition, and received the officer's cross of the Legion of Honor; and from 1879 until 1881 was Minister to the German Empire. From 1892 until 1894 he was Minister to Russia; in 1896 he was appointed a member of the commission to investigate the Venezuelan-Guiana boundary line; from 1897 until 1902 was again Minister to Germany, and in 1899 was made chairman of the American delegation to the Hague Peace Conference. In addition to the work mentioned he published *Outlines of a Course of Lectures on History* (1861); *Syllabus of Lectures on Modern History* (1876); *The Warfare of Science* (1876), very greatly enlarged as *History of the Warfare of Science Against Theology* (1898); *Paper Money Inflation in France* (1876; several times republished under various titles); and many articles, monographs, and lectures. In 1903 his reminiscences of diplomatic life were published in the *Century Magazine*.

WHITE, CHARLES ABIATHAR (1826—). An American geologist, born at North Dighton, Mass. From 1866 to 1870 he was State Geologist of Iowa; from 1867 to 1873 professor of natural history in the University of Iowa, and from 1873 to 1875 held a similar chair in Bowdoin College. He was geologist and paleontologist of the United States Geographical Survey of the Rocky Mountain region in 1875-76, in 1876-79 was a member of the geological survey of the territories, and from 1878 to 1894 was in charge of the paleontological collection of the National Museum. In 1883-84 he was president of the Biological Society of Washington, was elected a vice-president of the American Association for the Advancement of Science in 1888, and traveled extensively in field work and explorations. His publications include 211 titles, catalogued (from 1860 to 1885) by J. B. Marcott (1885).

WHITE, DAVID (1862—). An American geologist, born at Palmyra, N. Y. He graduated at Cornell University in 1886 and became a member of the United States Geological Survey. He was also appointed honorary custodian of Paleozoic fossil plants in the Smithsonian Institution. His numerous papers on geological and paleontological subjects were published in Government reports and scientific reviews.

WHITE, EDWARD DOUGLASS (1845—). An American jurist, associate justice of the United States Supreme Court. He was born in La Fourche Parish, La.; was educated at Mount Saint Mary's College (Emmitsburg, Md.), Georgetown College (Georgetown, D. C.), and the Jesuit College at New Orleans; and served in the Confederate Army during part of the Civil War. In 1868 he was admitted to the Louisiana bar, and soon attained considerable prominence in his profession. He was a member of the State Senate from 1874 to 1878, was an associate justice of the Supreme Court of Louisiana from 1878 to 1891, was then a Democratic member of the United States Senate for three years, and in February, 1894, was appointed an associate justice of the United States Supreme Court.

WHITE, EDWIN (1817-77). An American historical and genre painter, born at South Hadley, Mass. He began to paint portraits at a very early age, and studied in Paris under Picot, and subsequently in Rome, Florence, and Düsseldorf. Returning to the United States in 1875, he settled in New York City. His genre paintings are marked by a fine feeling for color and a delicate and refined sentiment. His historical pictures deal principally with subjects of American history. Among the best are "Washington Resigning His Commission" (State House, Annapolis, Md.); the unfinished picture of the "Signing of the Compact on the Mayflower" (Yale College); "Thoughts of Liberia, Emancipation," and an "Old Woman Spinning" (Lenox Library, New York); and "The Antiquary" (Metropolitan Museum).

WHITE, Gilbert (1720-93). An English naturalist. He was born July 18, 1720, at Selborne, a secluded village of Hampshire, and grew up in Selborne, at the house known as 'The Wakes,' famous as his life-long home. He attended school for a short time at Farnham, and was afterwards sent to the Basingstoke Grammar School. Late in 1739 he was admitted to Oriel College, Oxford, where he graduated in 1743, and was elected fellow. Ordained to the priesthood, he became curate at Swarraton, and subsequently at Selborne and Faringdon, a neighboring parish. He lived mostly at 'The Wakes,' which he inherited in 1763. In 1752 he was made dean of Oriel. He died and was buried at Selborne.

In 1751 White began a *Garden Kalendar*, which was afterwards elaborated into a *Naturalist's Journal*, wherein was recorded the temperature, the wind, and the weather for each day, the trees first in leaf, the plants first in flower, and the birds first to appear or disappear. The manuscripts of these diaries, from which extracts have been published, are in the British Museum. In 1767 White made the acquaintance of Thomas Pennant, one of the most distinguished naturalists of the eighteenth century, and the two men carried on a correspondence for nine years. White's part of this correspondence and a series of letters to Daines Barrington, another naturalist, formed the basis of the famous *Natural History and Antiquities of Selborne* (1789). The book opens with a careful description of the parish of Selborne, followed by quaint and delightful accounts of trees, flowers, birds, and insects. Since this little volume made its appearance, scores of treatises on natural history have appeared, but this alone has become a classic. Indeed, White struck the exact mean between science and literature. Darwin praised the *Natural History* for its accurate observations, and Lowell liked it because it took him out of doors. Others have been fascinated by the style, which is at once precise and natural. Editions of the *Natural History* are numerous. Perhaps the best is that by Thomas Bell (London, 1877), who bought 'The Wakes' in 1840. The standard biography is *The Life and Letters of Gilbert White of Selborne*, edited by his great-grandnephew, Rashleigh Holt-White (London, 1901).

WHITE, Gleeson (1851-98). An English writer on art, born at Christ Church, in Hampshire. He was educated at Christ Church School and afterwards became a member of the Art Workers' Guild. In 1890 he came to New York City, where he conducted the *Art Amateur* (1891-92). Returning to England in 1893, he founded the *Studio*, which he edited for about a year, and to which he contributed up to the time of his death, November 14, 1898. Among his publications relative to art are: *Practical Designing* (1893; 3d ed. 1897); *Salisbury Cathedral* (1896); *English Illustrations in the Sixties* (1897); and *Master Painters of Great Britain* (4 vols., 1897-98). He also edited during his last years the "Ex Libris Series;" the "Connoisseur Series;" the "Pageant;" and with E. T. Strange, Bell's "Cathedral Series." He was himself a designer of repute. In 1887 he edited *Ballades and Rondeaus*, a selection from Lang, Dobson, and other adepts in these French forms of verse, prefaced with a valuable essay. In the various styles he also wrote with much grace.

WHITE, Henry (1850—). An American diplomat, born in Baltimore. He was educated by tutors at private schools in the United States and France. He was secretary of legation at Vienna in 1883-84, was then transferred to London as second secretary, and was promoted secretary in 1886. President Cleveland recalled him in 1893, and in 1897 President McKinley appointed him secretary of embassy at London.

WHITE, Henry Kirke (1785-1806). An English poet, born March 21, 1785, at Nottingham. At the age of fifteen he was apprenticed to an attorney; and here he began to study by himself Latin and other languages. He also became a member of a literary society in Nottingham, and showed ability as a speaker. To the *Monthly Mirror* he sent several poems which attracted the attention of the proprietors. Acting on their advice, he published *Clifton Grove, a Sketch in Verse, with Other Poems* (1803). It secured him influential friends, notably Robert Southey and Charles Simeon of King's College, Cambridge. The latter obtained for him a sizarship in Saint John's College, Cambridge. At the university he highly distinguished himself in the classics; but overstudy soon ruined his health. He died in his college rooms, October 19, 1806. The next year two volumes of his *Remains* were published by his friend Southey, to whom his manuscripts had been intrusted, prefaced by a memoir. Byron ranked White next to Chatterton. This position time has not confirmed. Several of his hymns are still in use.

WHITE, Horace (1834—). An American journalist, born at Colebrook, N. H. He graduated at Beloit College in 1853, and in 1854 became city editor of the Chicago *Evening Journal*. In 1856 he was appointed assistant secretary of the National Kansas Committee, and when its work was finished in the following year he resumed the work of a journalist in the office of the Chicago *Tribune*. As a reporter he accompanied Abraham Lincoln in 1858 in his campaign against Stephen A. Douglas. His account of this celebrated contest is published in Herndon's *Life of Lincoln*. In 1865 he became editor-in-chief of the Chicago *Tribune*, which place he filled for the succeeding nine years. In 1877 he removed to New York City. A few years afterwards he bought an interest in the New York *Evening Post*, and in conjunction with Carl Schurz and Edwin L. Godkin assumed the control of its columns. In 1899 he succeeded Godkin as editor-in-chief and he held that position till 1903, when he retired. Mr. White became widely known for his able discussions of currency and banking problems, and for his writings on other financial subjects. His publications include: *Money and Banking* (1895; revised ed. 1902) and a translation from the Greek of Appian's *Roman History* (1899).

WHITE, HORATIO STEVENS (1852—). An American educator, born in Syracuse, N. Y. He graduated at Harvard in 1873, studied for several years in Europe, and was admitted to the New York bar in 1878. From 1876 to 1878 he was assistant professor of Greek and Latin at Cornell University, where he successively became assistant professor of German in 1878, professor of the German language and literature in 1883, head of the German department in 1891, and dean of the general university faculty in 1896. In 1902 he became professor of German at Harvard University. Besides writing a number of magazine articles, he edited: *Selections from Lessing's Prose* (1888); *Selections from Heine's Poems* (1890); *Selections for German Prose Composition* (1891); and *Deutsche Volklieder* (1892). He was also the general editor of Appleton's "Twentieth Century Series of German Classics."

WHITE, HUGH LAWSON (1773-1840). An American political leader, born in Iredell County, N. C. He served against the Indians in Tennessee in 1792-93, and became private secretary to Governor Blount in the latter year, but soon went to Philadelphia to study. In 1796 he began the practice of law at Knoxville. In 1801 he became judge of the Superior Court, and was a member of the State Senate in 1807 and 1809. From 1809 to 1815 he was judge of the Supreme Court, and from 1812 to 1827 was president of the Bank of Tennessee, which for a time was the only bank in the West which did not suspend specie payments. He was again a State Senator in 1817, and from 1821 to 1824 was a commissioner on the part of the United States to settle disputes growing out of the Spanish occupation of Florida. He succeeded General Jackson in the United States Senate in 1825, and served continuously until 1840, though offered the Secretaryship of War in 1831. He soon became a leader in the Senate, opposed internal improvements by the Federal Government, was instrumental in preventing the re-charter of the United States Bank, and in 1829-30 was the author of the bill to remove the Indians west of the Mississippi. He was at first a strong supporter of Jackson, but by his independent course in favoring the bill to limit executive patronage, and especially by his opposition to Van Buren's succession to the Presidency, the friendship was broken. In October, 1835, he was nominated for President by the Legislature of Tennessee, and in spite of President Jackson's vigorous personal efforts, carried the State in 1836 by more than 10,000 majority. He also carried Georgia and received altogether 26 electoral votes. He refused to vote for the resolution to expunge the Senate resolutions of censure against President Jackson, but was willing to rescind. By 1838 he declared himself a Whig. When the Democratic Legislature of Tennessee instructed him to vote for the Sub-Treasury Bill, he refused and resigned. Judge White's stern sense of rectitude earned for him the appellation 'The Cato of the United States.' Consult Scott, *Memoir of Hugh Lawson White* (Philadelphia, 1856).

WHITE, JOHN BLAKE (1781-1859). An American painter and author, born at Eutaw Springs, S. C. He began the study of law, but in 1800 he went to London, where he studied under Benjamin West. In 1804 he returned to South Carolina, but not receiving sufficient encouragement as a painter, he returned to the practice of law, achieving considerable success in both professions. His best known painting was the "Unfurling of the United States Flag in the City of Mexico," destroyed during the Civil War. Other paintings by him include the "Battle of New Orleans," "General Marion Inviting the British Officer to Dinner" (1836), besides portraits of Charles Pinckney, Calhoun, and Governor Middleton. White was repeatedly elected to the State Legislature of South Carolina, and is also well known as an essayist and as the author of several dramas.

WHITE, JOHN WILLIAMS (1849—). An American classical scholar, born at Cincinnati, Ohio. He was educated at Ohio Wesleyan University and at Harvard University. After teaching at Willoughby College and Baldwin University in Ohio from 1868 to 1871, he studied and traveled in Europe for a year, and then was called to Harvard University as tutor of Greek; from 1877 to 1884 he was assistant professor, and in the latter year became professor of Greek. In 1879 he was one of the prime movers in organizing the Archæological Institute of America and in establishing afterwards an American School of Classical Studies at Athens, in which he was twice professor. In 1895 he became president of the Archæological Institute. He was author of a number of philological papers and editor of a number of Greek texts for schools.

WHITE, JOSEPH BLANCO (1775-1841). A British poet and writer on theological themes. He was born in Seville, Spain, of Irish and Spanish parentage. In 1800 he was ordained priest in the Roman Catholic Church. But his views changed, and in 1810 he went to England. He settled in London, where for some years he conducted a monthly Spanish paper called *El Español.* On the cessation of the Peninsular War (1814), this publication came to an end; but meanwhile its services to the Government secured for its editor a life pension of £250 per annum. For some time White lived at Oxford, where he qualified for the English Church, but finally declared himself a Unitarian. Though in literary circles recognized as a man of fine talent, and known as a contributor to the *Quarterly* and to the *Westminster,* and to other high-class periodicals, he scarcely succeeded in making a permanent impression on the public by any of his more formal publications. Of these the most important were: *Letters from Spain* (1822); *Practical and Internal Evidence Against Catholicism* (1825); *Poor Man's Preservation Against Popery* (1825); and *Second Travels of an Irish Gentleman in Search of a Religion* (1833). He died on May 20, 1841, in Liverpool. In 1845 appeared, under the editorship of J. H. Thom, his most striking work, *The Life of the Rev. Joseph Blanco White, Written by Himself, with Portions of His Correspondence.* White is likely to be longest remembered for a magnificent sonnet entitled "Night and Death."

WHITE, Percy (1852—). An English journalist and novelist, born in London. He was educated privately and on the Continent, and taught the English language and literature in a French college. After taking private pupils for a time, he turned to journalism in 1880, and was for ten years editor of *Public Opinion*. As a novelist he has won success for brilliant social satire. His writings include: *Mr. Bailey-Martin* (1893); *A King's Diary* (1894); *Corruption* (1895); *Andria* (1896); *A Passionate Pilgrim* (1897); *A Millionaire's Daughter* (1898); *The Infatuation of the Countess* (1899); *The Heart of the Dancer* (1900); *The West End* (1900); *The Grip of the Bookmaker* (1901); and *The New Christians* (1902).

WHITE, Peregrine (1620-1704). The first English child born within the limits of New England. He was born on the *Mayflower*, in Cape Cod Harbor. After his father's death his mother married Governor Edward Winslow, this being the first marriage in New England. Josiah Winslow (q.v.), first native Governor of Plymouth Colony, was his half-brother. He held several military and civil offices.

WHITE, Peter (1830—). An American manufacturer, born in Rome, N. Y. In 1835 he was taken by his parents to Green Bay, Wisconsin Territory, where he was educated. At the age of fifteen he became a sailor on the Great Lakes, and early in 1849 settled on the site of the present city of Marquette, in the Northern Peninsula of Michigan. There he later became connected with the Marquette Iron Company, was largely interested in developing the copper and iron deposits of the region, and acquired a large fortune. He gave largely to education, endowed a fellowship in the University of Michigan, and made large bequests to the Northern Michigan State Normal School. To the city of Marquette he presented a public library building and a statue of Père Marquette.

WHITE, Richard Grant (1821-85). An American Shakespearean scholar and linguistic critic, born in New York. A graduate of New York University (1839), he studied medicine, then law, was admitted to the bar (1845), became a journalist, and during the Civil War wrote a remarkable series of letters for the London *Spectator*, signed 'A Yankee,' and an influential satirical parody, *The New Gospel of Peace*. He was for many years chief of the United States Revenue Marine Bureau in the district of New York. His chief books were: *Shakespeare's Scholar* (1854); an acutely critical edition of *Shakespeare's Works* (1857-65); *Essay on the Authorship of the Three Parts of Henry VI.* (1859); *Memoirs of William Shakespeare* (1865); *Studies in Shakespeare* (1885); and in the field of linguistics, *Words and Their Uses* (1870); *Every-Day English* (1880); and *England Without and Within* (1881). He edited also *The Riverside Shakespeare* (1883), and contributed frequently to literary periodicals. His novel, *The Fate of Mansfield Humphreys*, appeared the year before his death. White was dogmatic and inclined to controversy, but his acute critical ability and remarkable versatility received high praise.

WHITE, Stanford (1853—). An American architect, son of Richard Grant White (q.v.). He was born in New York City, was educated in private schools and by private tutors, studied architecture under Charles D. Gambrill and Henry H. Richardson, and was chief assistant to the latter in the construction of Trinity Church, Boston. He continued his studies in Europe in 1878-80, and in 1881 united with Charles F. McKim and William R. Mead to form the architectural firm of McKim, Mead & White. He designed the Madison Square Garden, the buildings of the Century and Metropolitan clubs, and the Washington Arch, in New York City; buildings of New York University and the University of Virginia; pedestals for a number of statues; and numerous private residences.

WHITE, Stewart Edward (1873—). An American author, born at Grand Rapids, Mich. He was educated at the University of Michigan, where he graduated in 1895 and at the Columbia Law School. His published stories, which deal understandingly with the rough life of the unsettled regions, include: *The Westerners* (1901): *The Claim Jumpers* (1901); *The Blazed Trail* (1902); *Conjurer's House* (1902); and *The Forest* (1903).

WHITE, William (1748-1836). An American bishop of the Episcopal Church. He was born in Philadelphia and educated at what was then known as the College of Philadelphia. After making his theological studies, he went to England and was ordained deacon in 1770 and priest in 1772. Returning to America, he became rector of Christ Church and Saint Peter's, Philadelphia, and was chaplain to Congress in 1777. On the formal organization of the Episcopal Church, he presided over the first General Convention (1785), and was the principal author of the Constitution then adopted. In 1876 he was elected Bishop of Pennsylvania, and in the following year consecrated by the Archbishop of Canterbury at Lambeth Palace. During the rest of his life he held a commanding influence in the development of the Church, and had much to do with the form finally assumed by the Book of Common Prayer. His chief publications were *Memoirs of the Protestant Episcopal Church* (1820; revised 1880) and *Lectures on the Catechism* (1813). For his biography, consult Wilson (Philadelphia, 1839); and see Episcopal Church.

WHITE, William Allen (1868—). An American journalist, born in Emporia, Kan., and educated at Emporia College and the University of Kansas. Upon leaving the university in 1890 he became city editor of the Eldorado *Daily Republican*. Subsequently he was engaged as an editorial writer on the Kansas City *Journal* and the Kansas City *Star*, and in 1894 bought the Emporia *Gazette*. An editorial published in that paper in August, 1896, entitled "What's the Matter with Kansas?" was reprinted throughout the country and won him a wide reputation. He published: *The Real Issue* (1896), a volume of short stories; *The Court of Boyville* (1889); and *Stratagems and Spoils* (1901), a striking collection of short stories of American political life.

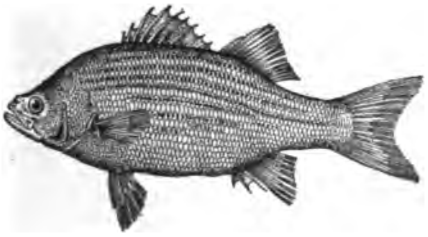
WHITE, Sir William Arthur (1824-91). An English diplomat, born at Pulawy, Poland. He was educated at King William's College, Isle of Man, and Trinity College, Cambridge, in 1857 entered the British consular service as clerk to the consul-general at Warsaw, was frequently acting consul-general, and in 1861 became vice-consul. In 1864 he was appointed consul at Danzig, and in 1875 was transferred to Belgrade as British agent and consul-general. In this capacity he displayed wide knowledge of the Eastern question, and in 1879 was appointed Envoy Extraordinary and Minister Plenipotentiary at Bucharest, Rumania. In 1886 he was confirmed as Envoy Extraordinary at Constantinople. He exerted himself greatly to obtain the acceptance by the Great Powers of the annexation of Eastern Rumelia to Bulgaria. At Constantinople his knowledge of languages and of Oriental diplomacy made him very successful. In 1888 he received the G.C.B. and membership in the Privy Council.

WHITE, Sir William Henry (1845—). An English naval constructor, born at Devonport. He was educated at the Royal School of Naval Architecture; entered the construction department of the Admiralty; was professor of naval architecture at the Royal School of Naval Architecture and at the Royal Naval College in 1870-81; organized and directed the department for building warships of the Armstrong Company in 1883-85; and in 1885-92 was director of naval construction and assistant controller of the navy. As director he became the responsible designer of all English vessels of war. His works include: *A Manual of Naval Architecture* (5th ed. 1900); *Architecture and Public Buildings* (1884); and *A Treatise on Shipbuilding.*

WHITE ANT. See Termite.

WHITEAVES, Joseph Frederick (1835—). An English paleontologist. He was born at Oxford, was educated there, and at London and Brighton, and made a special study of zoölogy and invertebrate paleontology. In 1861 he removed to Canada. From 1863 to 1874 he was scientific curator and recording secretary of the Natural History Society of Montreal, and from 1867 to 1873 made five deep-sea dredging expeditions to the Gulf and River of Saint Lawrence. He became a member of the Canada Geological Survey in 1874, paleontologist and zoölogist to the survey in 1876, and subsequently an assistant director. His publications include important articles on marine invertebrates, on the invertebrate fossils of the upper Cretaceous rocks of Vancouver, and other similar subjects.

WHITEBAIT. The young of any kind of herring or related fish, much in request in Great Britain as a delicacy.



THE WHITE BASS.

WHITE BASS, or White Perch. A striped bass (*Roccus chrysops*) of the Great Lakes and Upper Mississippi region, which is silvery, tinged with golden below, and marked with narrow dusky lines on the sides. It remains in deep waters, and is good food. See Plate of Bass.

WHITE BAY. See Magnolia.

WHITEBOYS. The name given to peasant associations in Ireland, formed after 1760, for the purpose of visiting revenge on landlords, tax collectors, and the clergy. The members committed many outrages on the property and persons of those against whom they entertained grievances. Their depredations took place at night and those engaged in them were protected by blackened faces and white garments. Similar organizations of a somewhat later period assumed the names of 'Hearts of Steel,' 'Hearts of Oak,' and 'Rightboys.' This form of popular justice was personified under the name of 'Captain Rock.'

WHITECAPS. A general name, derived from their disguise, for bodies of men in the United States who assume the function of administering punishment for real or fancied offenses against the community. Their irresponsible acts range from warnings to leave a neighborhood to outrage and violence.

WHITE CEDAR. See Libocedrus.

WHITECHAPEL. An eastern Parliamentary district of metropolitan London, England, originally named from a certain chapel within its limits. In early times all distances east of London were measured from this chapel. It is one of the poorest and most congested districts of the city. It is traversed by Whitechapel Road, and London Hospital and the Tower of London are within its limits. Population, in 1901, 78,758.

WHITE CINNAMON. See Canella.

WHITE COMPANY, The. A name assumed by various bands of thirteenth and fourteenth century freebooters. The first was organized and led by Folquet, Bishop of Toulouse, for the purpose of slaughtering heretics in France. A second commanded by Du Guesclin received its name from the white cross worn upon each member's shoulder. In 1366 he led his marauding company into Spain to support Henry of Trastamara against Pedro the Cruel. A third crossed from France into Italy, and under the banners of Milan and Florence, or as independent freebooters under the command of Sir John Hawkwood, plundered the country until disbanded in 1391.

WHITE CROSS SOCIETY, The. An organization formed in England in 1883, having for its object the cultivation of social purity and the practice of Christian morality. The movement was introduced into New York City during the winter of 1883-84 in connection with the Protestant Episcopal Church of Saint John the Evangelist by the rector, B. F. De Costa. The extension of the influence of White Cross principles has been widely advocated by the heads of the American Church, and is at the present time closely associated with church work all over the United States. A form of pledge promising to treat women with respect and preserve them from wrong and degradation and to maintain the law of personal purity is given by members joining the society.

WHITE DEVIL, The, or Vittoria Corombona. A tragedy by Webster, originally performed probably at the Curtain by the Queen's company in the winter of 1608, published in 1612, and revived in 1625 at the Phœnix by Queen Henrietta's servants, and in 1682 at the Theatre Royal by Betterton. It was probably drawn from Italian sources, but bears a striking resemblance to Tourneur's *Revenger's Tragedy* (1607). In this play and *The Duchess of Malfi* (acted 1616), Webster pushes the devices of physical horror which characterize the 'tragedy of blood' to their utmost limit.

WHITE EAGLE, Order of the. A Servian order with five classes commemorating the establishment of the Servian kingdom, founded by King Milan I. in 1882. The decoration is a double-headed eagle of white enamel surmounted by a crown. The oval medallion is red and bears a white cross with flames. On the reverse are the initials M. I. crowned and the date of foundation. See Plate of Orders, under Orders.

WHITE ELEPHANT. An infrequent Albino type of Asiatic elephant which from its rarity is highly esteemed. Owing to the costly honors paid to such an animal, the term has become proverbial with the meaning of an expensive or unwelcome possession. The 'Land of the White Elephant' is Siam.

WHITE ELEPHANT, Order of the. A Siamese order with five classes, founded in 1861. The decoration, which varies slightly for the different classes, is a circular medallion with the elephant in white enamel, surrounded by three wreaths of yellow, red, and green lotus blossoms. See Plate of Orders under Orders.

WHITE-EYE, or Glass-Eye. The wall-eyed pike. See Pike-Perch, and Plate of Perches.

WHITE-EYE, or Silver-Eye. A general name for a large group of small, plainly dressed, titmouse-like birds of the genus Zosterops, the many species of which are scattered over the tropics of the Old World, especially in the East, where several species are confined to single islands. Nearly all are yellow on the under surface. They are somewhat doubtfully classified with the honey-eaters (Meliphagidæ), and take their English name from the ring of white glistening feathers around the eye in most species. All are sociable, going about in merry flocks, and they have many interesting characteristics. Though mainly insectivorous, they also feed upon fruits, and some are known to the Australians as 'grape-eaters.' Consult Newton, *Dictionary of Birds* (New York, 1896), and authorities there cited. See Plate of Wrens, Warblers, etc.

WHITE-EYED VIREO. See Vireo.

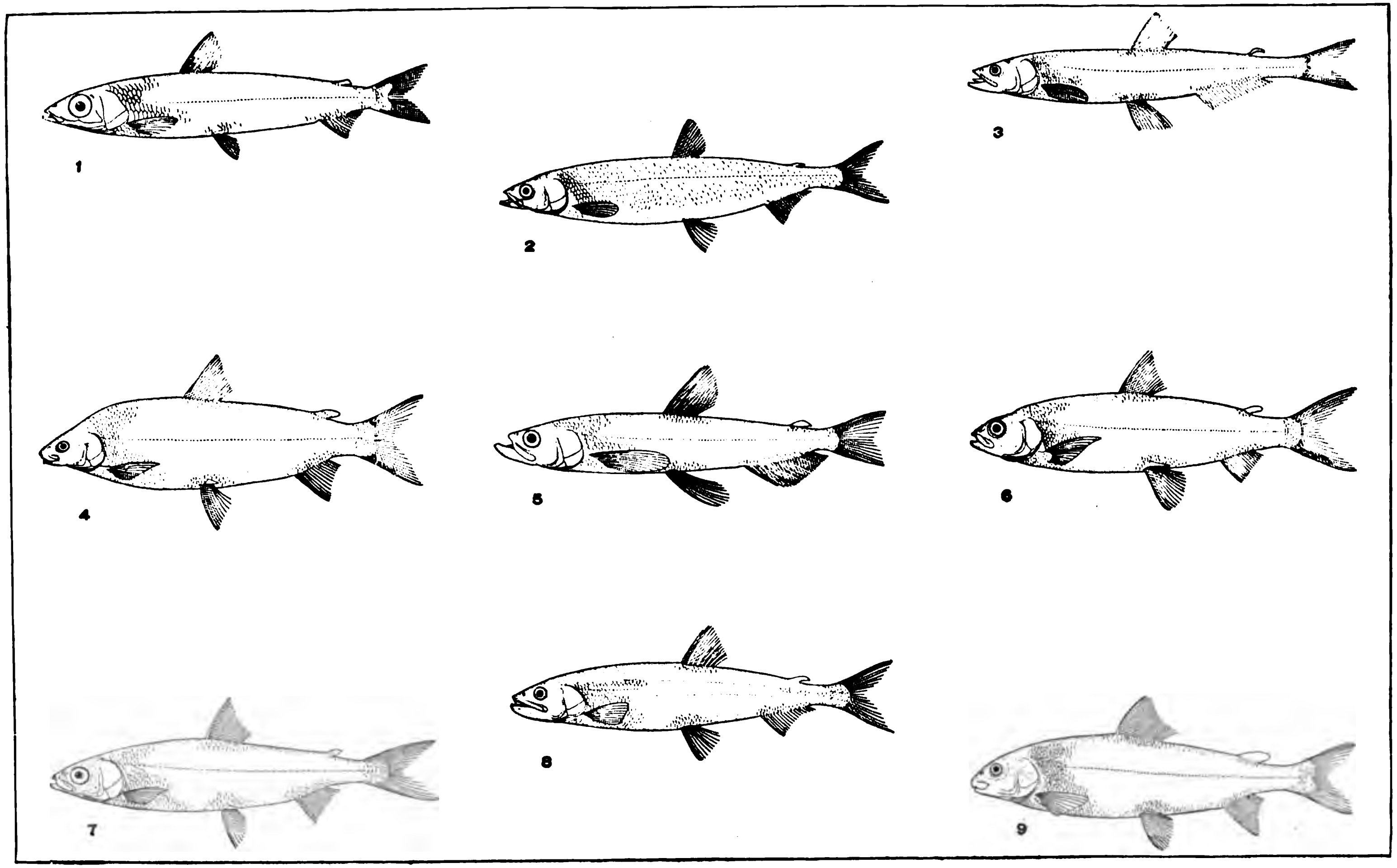
WHITE-EYELID MONKEY. See Mangabey.

WHITE FALCON, Order of the. A grand-ducal order of Weimar, founded by Duke Ernest Augustus in 1732, and renewed in 1815 by Charles Augustus. In its present form it has four classes and a silver cross, added in 1878. The decoration, a green star of eight points, with red stars between the arms, bears a white falcon, and the motto, *Vigilando Ascendimus*, on a blue ground.

WHITEFIELD, whĭt'fēld, George (1714-70). An English evangelist and founder of the Calvinistic Methodists. He was born at the Bell Inn, Gloucester, and was sent to a classical school for three years, where he distinguished himself more by his histrionic achievements than by zeal for study. In 1732 he was admitted as a servitor at Pembroke College, Oxford, and graduated B.A. in 1736. At Oxford he met the Wesleys and with them founded the 'Holy Club.' He was ordained deacon in 1736, and soon went to London. In 1738 he followed the Wesleys to the Georgia Plantations and remained four months, when he returned to England for his priest's orders and to collect money for an orphanage which he had founded in the colony. He found that his association with the Wesleys had raised prejudice against him; nevertheless he was ordained priest by Bishop Benson (1739). He began open-air preaching at Moorfields, Kensington, Blackheath, and elsewhere, and after this seems to have preached by preference in the open air. Great crowds came together to hear him. In 1739, having collected more than £1000 for his orphanage, he returned to America. He landed at New York and proceeded thence to Georgia, preaching with great success on the way. The first brick of the orphan asylum was laid in March, 1740, and the name of Bethesda was given to the institution. He preached to large audiences in Savannah and also in Philadelphia and Boston, which he visited in 1740. His association with dissenters and unconventional ways of preaching and conducting services brought him into strained relations with the Church, and about this time doctrinal differences led to his separation from Wesley. The two men differed widely in theology, Whitefield being a rigid Calvinist. Nevertheless they continued friends nearly all their lives. In 1741 Whitefield returned to England and preached with his usual zeal and eloquence, making tours into Wales and Scotland. He presided at the first conference of Calvinistic Methodists held at Watford in 1743, and at the second conference a few months later was chosen perpetual moderator in England.

In 1744 he again sailed for New York, and was again enthusiastically received in America, although his irregular ways stirred up opposition. Hoping to benefit his health, in 1748 he visited the Bermudas and preached twice each day on the various islands of the group. On his return to England in 1748 he found his congregation scattered. He was also in pecuniary difficulties, as he had sold most of his property for the benefit of the Georgia orphanage. With the help of his friends, however, he gradually paid off his debts. About this time the Countess of Huntingdon (q.v.) made him her chaplain and gave him the opportunity of preaching to certain of the nobility at her house. She helped him materially in all his enterprises and built and endowed chapels to maintain his doctrines. In 1751 Whitefield visited Ireland and Scotland and made a fourth voyage to America. On his return to London he took up the project of a new tabernacle, which was opened June 10, 1753. After preaching in it a few times he went on another evangelistic tour, traveling 1200 miles and preaching many times. In 1754-55 he was again in America. In September, 1756, he opened a new chapel at Tottenham Court Road. He visited America for the sixth time in 1763-65. His

WHITEFISH, SMELTS, ETC.



1. EUROPEAN ARGENTINE (Argentina silus).
2. SURF SMELT (Mesopus pretiosus).
3. CANDLE-FISH or OOLACHAN (Thaleichthys Pacificus).
4. COMMON WHITEFISH (Coregonus clupeiformis).
5. CAPELIN (Mallotus villosus).
6. BLACKFIN (Argyrosomus nigripinnis).
7. CISCO or LAKE HERRING (Argyrosomus Artedi).
8. AMERICAN SMELT (Osmerus mordax).
9. ROCKY MOUNTAIN WHITEFISH (Coregonus Williamsoni).

health was poor at this time and his power of preaching somewhat impaired. In October, 1765, he dedicated the Countess of Huntingdon's chapel at Bath, opened her college at Trevecca in August, 1768, and dedicated the chapel at Tunbridge Wells in July, 1769. Two or three months later he sailed for the seventh time for America. He went to Savannah, and preached much in Pennsylvania and New England. On September 29, 1770, after preaching for two hours at Exeter, N. H., he went to Newburyport, Mass., where he died the next morning. He is buried in the Church of Newburyport. Whitefield is said to have preached more than 18,000 sermons. His great power was due to his delivery rather than to the matter of his discourses, and his writings do not sustain the impression derived from the accounts of his preaching. He was not an organizer, and his congregations scattered as soon as he left them. Many of his converts united with the Methodists. A number of his sermons and journals were collected and published in six volumes, with a seventh volume of *Memoirs* by John Gillies (London, 1771-72). Of the many later biographies, that by Tyerman (London, 1876-77) is the most complete.

WHITEFISH. One of the many important fishes of the genus Coregonus, of the salmon family, of which about fifteen species inhabit the lakes and streams of Northern Europe, Asia, and America. They have an elongated, compressed body, with a conical head, projecting snout, and a small, toothless mouth. The scales are larger than in the other salmon, the caudal fin is deeply forked, and the dorsal fin is followed by an adipose dorsal. They are bluish olivaceous above, silvery on sides and below. The most familiar species is the common whitefish (*Coregonus clupeiformis*), which exists throughout the Great Lakes and adjacent waters, and is the most important fresh-water fish in America. The annual catch of whitefish in Canada and the United States is about 30,000,000 pounds, representing a value of $1,500,000. Whitefish reach a size of twenty pounds in rare cases, the average weight being about four pounds. They remain in deep water for the most part, but during the spawning season, which is in autumn, and at certain other times, for purposes which are not yet clear, they migrate to shallower water in great shoals. They live mainly on small crustaceans, mollusks, insects, and larvæ. A single fish will yield from 25,000 to 75,000 eggs, which are extensively propagated artificially by the United States Fish Commission.

The Rocky Mountain whitefish, or 'mountain herring' (*Coregonus Williamsoni*), is an excellent species numerous in clear streams from the Rocky Mountains to the Pacific coast; it is a favorite of anglers, as it will take a fly. The broad whitefish or 'muksun' (*Coregonus Kennicotti*) is the best known of several Arctic species. The 'humpback' (*Coregonus Nelsoni*) is Alaskan. The 'Sault' whitefish (*Coregonus Labradoricus*) is a fine species numerous in all clear lakes and streams from Lake Winnipeg to Labrador and southward into the Adirondack and White Mountains, where it is known as the 'whiting of Lake Winnipisiogee.' The lakes from New England northeastward to Alaska contain a valuable species of dark color (*Coregonus quadrilateralis*) called 'roundfish,' 'shadwaiter,' 'Menominee whitefish,' 'pilot-fish,' etc. The ciscoes (q.v.) constitute another and closely related group (the genus Argyrosomus) containing several useful species, as the cisco, bluefin, tullibee, and others (qq.v.). The inconnu is another 'whitefish,' of the genus Stenodus.

Consult Jordan and Evermann, *Fishes of North and Middle America* (Washington, 1896). See SALMON; and Plate of WHITEFISH, ETC.

WHITEFRIARS. A region in London near Fleet Street, where a monastery of the Carmelites, dating from the thirteenth century, formerly stood. Until the end of the seventeenth century it formed a place of sanctuary for debtors and criminals. See ALSATIA.

WHITE GOAT. See ROCKY MOUNTAIN WHITE GOAT.

WHITEHALL. A former palace in London, once the residence of Hubert de Burgh. In the middle of the thirteenth century it was the London residence of the archbishops of York, and was known as York Place. After the death of Wolsey it became Crown property, and was called Whitehall. Henry VIII. enlarged the palace and James I. planned to replace it after a fire in 1615 from designs by Inigo Jones, but only the banqueting hall was built, and is the only existing portion of the palace, the remainder having been destroyed by the fires of 1691 and 1697. The hall, a fine specimen of Palladian architecture, 111 feet in length and 55½ feet in breadth and height, has ceiling paintings by Rubens representing the apotheosis of James I. and scenes from the career of Charles I. Whitehall was the scene of Wolsey's disgrace, Henry VIII.'s death, the execution of Charles I., who was led to the scaffold from the banqueting hall, and the deaths of Cromwell and Charles II. The hall was converted by George I. into a royal chapel. The street leading from Trafalgar Square to Westminster, in which the palace stood, is known as Whitehall. It contains a number of public buildings, including the Horse Guards, Treasury, and new public offices.

WHITE'HALL. A village in Washington County, N. Y., 24 miles west by south of Rutland, Vt., at the head of Lake Champlain, on the Champlain Canal, and on the Delaware and Hudson Railroad (Map: New York, G 2). It has large lumber interests, and is engaged in the manufacture of silk. There are also railroad shops and several smaller industrial establishments. The government is vested in a president, chosen annually, and a board of trustees. The water-works are owned and operated by the municipality. Population, in 1890, 4434; in 1900, 4377. Whitehall was settled in 1761 by Major Philip Skene, at the head of about thirty families, and in November, 1763, it was incorporated by patent. On the approach of the Revolutionary War Skene became a Loyalist, and in 1775 the Americans took possession of his property, at the same time that they seized Ticonderoga. An American garrison was stationed here from 1776 until the approach of Burgoyne's army, when the fort was blown up and the houses, mills, etc., were burned to prevent their falling into the hands of the enemy. At the close of the war the whole Skene property was sold to the highest bidder for £14 10s. In the War of 1812 the fort and blockhouse were rebuilt. The Champlain Canal was built from here to Fort Edward in 1819 and completed to Troy in 1824.

WHITE HART, The. An historic inn in Southwark, London. It is said to have been a frequent resort of Dick Turpin and is mentioned in Act IV., Scene 8 of Shakespeare's *Henry VI.*, part ii.

WHITE′HAVEN. A seaport in Cumberland, England, near the point where the estuary of the Solway Firth joins the Irish Sea, 36 miles southwest of Carlisle (Map: England, C 2). It has spacious streets, handsome shops and public buildings, and possesses a commodious harbor and docks. In the neighborhood are extensive collieries, iron and brass foundries, iron smelting works, and manufactories for cordage, sail-cloth, earthenware, etc. The town was founded in 1633. Population, in 1901, 19,325.

WHITE′HEAD, John (1740-1804). An English Wesleyan clergyman and physician. He was born in London, studied medicine, and became physician to the Bethlehem Hospital, Moorfields. He traveled as a Methodist preacher, 1764-69. For some years he was a Quaker, but returned to the Methodists. He was chief physician to both John and Charles Wesley in their last illnesses, and preached the funeral sermon of John Wesley. With Bishop Coke and Henry More he was appointed by Wesley as literary executor, but had a long dispute with the other executors as to the possession of the Wesley papers. This led to his expulsion from the membership of the Church. He retained the papers, however, and published the *Lives of John and Charles Wesley* (1793; new eds., Boston, 1844, Auburn, 1854). In 1797 he returned the papers and was reinstated in his position in the Church. He died in London.

WHITEHEAD, Paul (1710-74). An English satirist, born in London, and educated in law at the Temple. At an early age he was shut up in Fleet Prison on account of a bill which he had indorsed for a friend, and there he lived for several years, beginning his literary work while a prisoner. In 1749 he appears as a paid literary supporter of Frederick, Prince of Wales, and within the next decade he was a member of the gang of political debauchees headed by Sir Francis Dashwood. As such he was branded by Churchill in *The Conference;* nevertheless he continued to live in prosperity on the fruits of an ample sinecure during another decade. Whitehead may be styled a feeble imitator of Pope with a touch of Churchill's dullness. His more important satires were *State Dunces* (1733), directed against Walpole and others; *Manners* (1739), which led to his summons before the House of Lords; and *Epistle to Dr. Thompson* (1755). His *Poems and Miscellaneous Compositions*, with a *Life*, were issued in 1777.

WHITEHEAD, William (1715-85). An English poet laureate, born at Cambridge, where his father was a baker. He was educated at Winchester School and at Clare Hall, Cambridge, graduating B.A. in 1739. In 1742 he was elected a fellow of his college. For many years he lived in the households of the Earl of Jersey and the Earl of Harcourt, with whose sons he made the Continental tour (1754-56). He was appointed secretary and registrar of the order of the Bath, and in 1758 he succeeded Colley Cibber in the poet-laureateship. He died in London. Whitehead's birthday odes and other official poems were justly ridiculed by the poet Churchill (q.v.). His best work is to be found in his verse tales after the manner of La Fontaine. He also composed two respectable tragedies, *The Roman Father* (1750), and *Creusa, Queen of Athens* (1754); a comedy, *The School for Lovers* (1762); and a farce, *The Trip to Scotland* (1770), all of which met with some success. Consult his *Works* ed. with memoir by Wm. Mason (3 vols., York, 1788). William Whitehead is sometimes confounded with Paul Whitehead (1710-74), the satirist, and member of the dissipated circle of politicians known as the 'monks of Medmenham Abbey.' This latter Whitehead was also furiously attacked by Churchill. Consult the *Poems and Miscellaneous Compositions of P. Whitehead*, ed. by Capt. E. Thompson (London, 1777).

WHITE HOUSE. The official residence of the President of the United States, in Washington. The building is a two-story white freestone edifice, painted white, 170 by 86 feet, of dignified appearance, with an Ionic portico. It contains the private apartments of the President on the second floor and reception rooms on the first floor. Among the latter are the famous East Room, 80 by 40 feet, used for public receptions; the Blue Room, used for diplomatic and social functions; and the Red and Green rooms. The original executive mansion was begun in 1792 and first occupied by President Adams in 1800. It was burned by the British in 1814, and rebuilt in 1818. The White House has long been too small for the various purposes for which it is used, and plans for enlargement have frequently been proposed. In 1903 the pressure of space was relieved by the erection of executive offices in the grounds, connected with the main building. The White House is surrounded by an attractive park, in which during the summer music is provided by the Marine Band.

WHITE HOUSE OF THE CONFEDERACY. A house in Richmond, Va., so called because it was the residence of Jefferson Davis as President of the Confederacy. The mansion now contains a collection of Confederate relics.

WHITEING, hwīt′ing, Richard (1840—). An English journalist and novelist, born in London. He was educated privately, having as his first tutor Benjamin Wyon, the engraver, who made the great seal of William IV. He began his career as journalist in 1866 with a series of satirical sketches contributed to the London *Evening Star*, afterwards published as *Mr. Sprouts—His Opinions* (1867). He subsequently served as editorial writer and correspondent on several of the English dailies, including the Manchester *Guardian* and the London *World*. He was for a while a leader writer on the London *Daily News*. In 1876 appeared his first novel, *The Democracy*, which was followed twelve years later by *The Island*. But he is best known for *No. 5 John Street* (1899), a vivid description of life in the London slums. In 1900 he published *The Life of Paris*, and in 1903 *The Yellow Van*.

WHITE LADY. A spirit who, according to popular legend, appears in many of the castles of

German princes and nobles by night as well as by day, when any important event is imminent, whether joyful or sad, but particularly when the death of any member of the family is near. She is regarded as the ancestress of the race, shows herself always in snow-white garments, and carries a bunch of keys at her side. The Hohenzollern family possesses a white lady. A similar legend was current in Scotland, where it was believed that many of the chiefs had some kind spirit to watch over the fortunes of their house. The entire cycle may apparently be traced back to a goddess of German mythology who influences birth and death, and presides over the ordering of the household. Still more distinctly the appellation white lady and the name Bertha point back to the Germanic nature-goddess Berchta (q.v.).

WHITE LEAD. A name applied to hydrated basic carbonate of lead used in the manufacture of paints. It usually forms a heavy white mass made up, as shown by microscopic examination, of minute, transparent, amorphous globules. It may be made by passing carbonic acid gas through a solution of basic lead acetate, obtained by saturating vinegar with ordinary lead oxide (litharge); after the white lead has been precipitated out, a new quantity of litharge may be introduced into the mother-liquor, carbonic acid gas may again be passed through the solution, and so on. This is known as the 'French method.' Benson's so-called 'English method' consists in triturating litharge with 1 per cent. of its weight of lead acetate dissolved in water, and exposing the paste thus obtained, under constant stirring, to the action of carbonic acid gas for several days. When carefully prepared, and free from neutral lead carbonate, white lead has a greater coating power than any other white pigment known. An excellent white lead may also be obtained by saturating a solution of magnesium acetate with litharge and passing carbonic acid gas into it until the alkaline reaction has disappeared. The term 'white lead' is sometimes, in commercial usage, applied also to other lead pigments besides the basic carbonate described above.

WHITE LEAGUE. An organization formed by white citizens of Louisiana to counteract by force of arms the political power secured by the negroes as a result of the Civil War.

WHITE LEG. See PHLEGMASIA.

WHITELOCKE, hwīt'lŏk, BULSTRODE (1605-75). An English lawyer and statesman, born in London. He was educated at Saint John's College, Oxford; read law in the Temple, and in 1626 was called to the bar and elected member of Parliament for Stafford. In 1640 he was elected to the Long Parliament from Marlow, and, as chairman of the impeachment committee, conducted the prosecution of the Earl of Strafford. He was also one of the Oxford commissioners appointed to treat with Charles I.; an opponent of Presbyterianism in the Westminster Assembly, 1643; Governor of Windsor, 1644; commissioner of the great seal, 1649; and in 1653 went as Ambassador to Sweden. He refused to take part in the trial of the King. In 1656 he was Speaker of the House of Commons; was one of Cromwell's lords, and after Cromwell's death commissioner of the great seal to Richard. He left the manuscripts of an autobiography and other works, the most noteworthy of which are *Memorials of the English Affairs from the beginning of the Reign of King Charles I. to the happy Restoration of King Charles II.* (1682; new ed., 4 vols., 1853); *Journal of the Swedish Embassy in 1653 and 1654* (1772; new ed. 1855); and *Memorials of the English Affairs from the supposed Expedition of Brute to this Island to the end of the Reign of James I.*

WHITE MOUNTAIN BUTTERFLY. A delicate, brownish satyrine butterfly (*Œneis semidea*), which occupies a very restricted range above 5000 feet elevation in the White Mountains of New Hampshire, most abundantly about half a mile from the summit of Mount Washington. It also occurs in the Rocky Mountains of Colorado, and some of its varieties or close relatives in Alaska and on Mount Katahdin, Maine. Its larvæ feed upon a species of sedge during mid-summer, and pupate, it is believed, for two years. A closely allied butterfly (*Œneis aello*) occurs in the Alps in Switzerland. Consult Scudder, *The Butterflies of New England* (Cambridge, 1889).

WHITE MOUNTAINS. A rugged group of monadnocks occupying the north central part of New Hampshire, where they cover an area of about 1300 square miles (Map: New Hampshire, J 4). They belong to the older or crystalline belt of the Appalachian system, and form the highest of a number of more or less isolated residual portions of a former plateau which all around them has been worn down to the present Archæan peneplain of New England, a continuation of the Piedmont Plain of the Southern States. The White Mountains proper extend from Squam Lake in the south to the transverse valley of the Androscoggin and Ammonoosac rivers on the north. North of that depression there is another highland region which belongs rather to the Green Mountain system of Vermont. Several small and distant outlying monadnocks are, however, regarded as belonging to the White Mountain group, such as Mount Kearsarge and Mount Monadnock in southern New Hampshire, and Saddleback Mountain and Mount Katahdin in Maine.

The group is divided into two main portions by a grand and rugged defile known as the Crawford Notch, which gives passage to the Saco River. West of this notch the principal group is called the Franconia Mountains, whose highest point, Mount Lafayette, has an altitude of 5269 feet. The highest peaks, however, rise to the east of the notch in the Presidential Range, so called because its chief summits are named after Presidents of the United States. The culminating peak is Mount Washington (q.v.), 6293 feet high. Other summits with their altitudes are Mount Adams, 5805 feet; Mount Jefferson, 5725 feet; Mount Clay, 5554 feet; Boot Spur, 5520 feet; Mount Monroe, 5390 feet; and Mount Madison, 5380 feet high. The White Mountains are composed wholly of ancient metamorphic rocks, chiefly gneisses in the outskirts, with a central core of granite forming the highest portion. The soil is poor and gravelly, but the slopes and lower peaks are forest-covered, only the higher peaks raising their bare, rocky summits above the timber line. Besides the main notch there are several other deep river valleys which give the group a more rugged character than that of the average Appalachian mountain scenery; indeed, east of the Rocky Mountains the White Mountains are equaled in height and ruggedness only by the Black and Unaka Mountains of North Carolina. Of the narrow waterways the best known is the 'Flume,' at Franconia Notch. The varied scenery has for over a century attracted large numbers of visitors, and the region is now easily accessible through several lines of railroad which penetrate to the heart of the mountains. There is a short rack and pinion road to the summit of Mount Washington. One of the most celebrated natural features of the region is the "Old Man of the Mountain," a remarkably regular human profile 80 feet high formed by three out-jutting rocks on Profile Mountain. The White Mountains are noted as a resort of hay-fever patients, most of whom find more or less relief. Among the towns and resorts of the region are Lancaster, Littleton, Bethlehem, Gorham, North Conway, and Berlin. The last named is a busy industrial town, manufacturing great quantities of wood-pulp.

WHITE PLAINS. The county-seat of Westchester County, N. Y., 22 miles northeast of the centre of New York City, on the Harlem Division of the New York Central and Hudson River Railroad (Map: New York, G 4). It has many attractive residences, a public library, and the Westchester County Law Library. Bloomingdale Asylum for the Insane occupies a fine site overlooking the village. The government is vested in a president, chosen biennially, and a unicameral council. The water-works are owned and operated by the municipality. Population, in 1890, 4042; in 1900, 7899.

Here on October 28, 1776, during the Revolutionary War, was fought the battle of White Plains, or Chatterton Hill. On October 12th General Howe occupied Throggs Neck in Westchester County, but was held here for six days by an American force on the mainland, while Washington rapidly evacuated all of Manhattan Island, except Fort Washington, and on the 23d concentrated his forces at White Plains. Howe, unable to make a rear attack, sent 4000 men against the outpost on Chatterton Hill, west of the Bronx River, and compelled the 1400 Americans stationed here under General McDougall to withdraw to Washington's camp, the English losing 229 men, and the Americans about 140. Howe delayed his attack on the main American army, and on the evening of the 31st Washington took up an unassailable position at North Castle. White Plains was incorporated as a town in 1788. Consult an article "White Plains in the Revolution," in the *Magazine of American History*, vol. xxviii.; and Shonnard and Spooner, *History of Westchester County* (New York, 1900).

WHITE PRECIPITATE, or Ammoniated Mercury. A white pulverulent compound prepared by precipitating mercuric chloride with ammonium hydrate. It is official in the Pharmacopœia, and is used externally in the form of an ointment for skin diseases.

WHITE QUEEN, The. An occasional epithet of Mary Queen of Scots, on account of the white mourning assumed for her husband.

WHITE RIVER. A river of Arkansas (Map: Arkansas, D 3). It rises in the Ozark Mountains in the northwestern part of the State, and flows first northeast into Missouri, then, returning into Arkansas, it flows southeast till it empties into the Mississippi through several channels, some of which unite with the mouth channels of the Arkansas River. Its length is about 800 miles. After leaving the Ozark highlands it flows through an extensive low and marshy forest region in which it throws off a number of bayous, and during high water overflows its banks. It is navigable by river steamers to Batesville, about 380 miles.

WHITE RIVER. The chief tributary of the Wabash in Indiana (Map: Indiana, B 4). It is formed by two main branches, the East and the West Fork, which rise near the eastern boundary of the State, and flow southwest to their confluence on the border of Pike County. The united stream continues the southwest direction 50 miles to its junction with the Wabash opposite Mount Carmel, Ill. Total length, including the West Fork, 350 miles. The chief city on the West Fork is Indianapolis, but the river is navigable only to Martinsville, some distance below the capital, and on the East Fork to Rockford.

WHITE RIVER. A tributary of the Missouri. It rises in the northwestern part of Nebraska, and after a northeasterly and then easterly course through South Dakota, empties into the Missouri near Oacoma (Map: South Dakota, E 6). It flows through the Bad Lands. Length, 325 miles.

WHITERUMP, or Spot-Rump. The Hudsonian godwit. See Godwit.

WHITE RUSSIA. A term indefinitely used of portions of Western Russia, and indicating only a general ethnographic division. The name was given by Catharine II. to the governments of Vitebsk and Mohilev, but was abolished as a political designation by Nicholas.

WHITES. See Leucorrhœa.

WHITE SEA (Russian *Bieloye More*). A large arm of the Arctic Ocean extending southwestward into Northern Russia as far as the 64th parallel of latitude (Map: Russia, F 1). It consists of an outer portion, 150 miles long and 75 miles wide, between the Kanin and the Kola peninsulas, and an inner portion, 150 by 250 miles, separated from the former by a strait 100 miles long and 35 miles wide. The inner portion consists of three large bays or sections, Kandalak Bay in the northwest, and Dvina and Onega Bays in the southeast. The principal rivers entering the White Sea are the Dvina, the Mezen, and the Onega, all from the southeast but the sea receives the surplus waters of a large number of lakes dotting the low and level coast region to the west. In the north and east the country is higher and the coasts are bolder. In spite of the fact that the White Sea is ice-bound from September to June, while dense fogs are frequent, the volume of trade and navigation is considerable. The chief port is Archangel, on the Dvina delta. By means of canals connecting the Dvina with the Volga and the latter with the Dnieper a continuous waterway is established between the White Sea and the Caspian and Black seas.

WHITE SULPHUR SPRINGS. A health and pleasure resort in Greenbrier County, W. Va., 142 miles southeast of Charleston, on the Chesapeake and Ohio Railroad (Map: West Virginia, D 4). It is surrounded by picturesque mountain scenery, in a region noted for its numerous mineral springs. The popularity of White Sulphur Springs as a watering place dates from the Revolutionary period, and thousands of visitors are attracted here annually.

WHITE SWELLING. See JOINTS, DISEASES OF THE.

WHITE TERROR. A name given to the reign of violence initiated in Southern France by the returned émigrés, after the second restoration of the Bourbons, in revenge for their sufferings during the Red Terror of Revolutionary times and under the Empire. In Marseilles, Nîmes, Toulouse, and Avignon a number of Protestants who were looked upon as the special adherents of Napoleon were murdered. Judicial persecutions were also of frequent occurrence. See FRANCE.

WHITETHROAT. A European warbler (*Sylvia cinerea*), plentiful during summer in the greater part of England and Ireland, which has an energetic song, and is very lively and amusing as a cage-bird, and very easily tamed. Its plumage is brown, of various shades; the breast and belly are brownish white, tinged with rose color in the male. Other closely allied species are the lesser whitethroat (*Sylvia curruca*) and the garden whitethroat (*Sylvia hortensis*).

In the United States the name usually refers to the white-throated sparrow. See SPARROW.

WHITE TOWER. The oldest portion of the Tower of London, a massive square structure 116 by 96 feet, 92 feet high, with walls 13 to 15 feet thick. Its site was once occupied by bastions built by King Alfred in 885. The present tower was built in 1078 by William the Conqueror. The White Tower has many historical associations. In it Richard II. abdicated in 1399, and under its stone staircase were discovered the bones of the sons of Edward IV., murdered by order of Richard III. It contains the fine Norman Chapel of Saint John, and an important collection of old armor.

WHITE WALNUT. See BUTTERNUT.

WHITEWATER. A city in Walworth County, Wis., 50 miles southwest of Milwaukee, on the Chicago, Milwaukee and Saint Paul Railroad (Map: Wisconsin, E 6). It is the seat of a State normal school, and has a public library and a fine city hall. The section is engaged in stock-raising and dairy farming, and is especially known for its production of butter and cheese, leaf tobacco, and sugar beets. There are manufactures of flour, leather, carriages, beer, lumber, brick, tiling, machine-shop products, etc. Whitewater was settled in 1839 and was incorporated in 1858. Population, in 1890, 4359; in 1900, 3405.

WHITE'WAY, SIR WILLIAM VALLANCE (1828—). A Canadian statesman, born in Little Hempston, England. He was admitted to the Newfoundland bar in 1852, and in 1862 was appointed Queen's counsel. In 1858 he entered the Newfoundland Legislature, from 1865 to 1869 was Speaker of the Assembly, and in the latter year was a delegate to Ottawa to arrange terms of confederation. From 1873 to 1878 he was Solicitor-General, and from 1878 to 1885 was Premier and Attorney-General. In 1889 he reentered the Legislature as Prime Minister, and in 1893 and 1895 was returned.

WHITE WHALE, or BELUGA. An Arctic cetacean (*Delphinapterus leucas*), of the family Delphinidæ, and closely allied to the narwhal. It is pure white in color, 12 to 18 feet long, whale-like in form, with a rather swollen muzzle and a mouth filled with numerous conical teeth. It swims with extraordinary speed by doubling its tail far under its body and then striking out; hence it is able to capture the swiftest fishes, and often follows its prey far up the Northern rivers. It is gregarious, and may be seen in herds of 40 or 50, which often gambol around boats; it abounds in most parts of the Arctic seas, and is found as far south as Great Britain and Nova Scotia. The Greenlanders take this whale with harpoons or with nets. Its flesh affords them a valuable supply of food, and is eaten by most of the inhabitants of Arctic coasts; it affords also a considerable quantity of the very finest oil, and the skin is made into leather, known to the trade as 'porpoise-hide.' Living specimens have occasionally been exhibited in public aquariums. See WHALE.

WHITE WOOD. See CANELLA; LIME-TREE.

WHIT'FIELD or **WHITFELD,** HENRY. An English clergyman. The place and date of his birth are not known with certainty. He took orders and is said to have been appointed minister of Ockley, Surrey, in 1616. He protected some of the Puritan divines during Laud's persecution, to which he was himself finally exposed. He emigrated to New Haven in 1639, and was one of the founders of Guilford, Conn. He returned to England (1650) and was minister at Winchester. He wrote: *Some Helpes to Stirre up to Christian Duties* (3d ed. 1636); *The Light Appearing More and More Toward the Perfect Day, or a Farther Discovery of the Present State of the Indians in New England Concerning the Progress of the Gospel Among Them* (1651); in Sabin's *Reprints*, New York, 1865); *Strength Out of Weakness*, on the same topic (1652).

WHITFIELD, ROBERT PARR (1828—). An American geologist. He was born at New Hartford, N. Y., received a secondary education, and in 1856 was appointed assistant in the New York State Geological Survey. He was appointed to the United States Geological Survey in 1872 and was instructor in geology at the Rensselaer Polytechnic Institute from 1872 to 1875 and professor from 1875 to 1878. He was appointed curator of the geological department of the American Museum of Natural History in New York City in 1887.

WHIT'GIFT, JOHN (c.1530-1604), the third Protestant Archbishop of Canterbury. He was born at Great Grimsby, in Lincolnshire, according to one account in 1530, according to another in 1533. He was educated at Cambridge, and in 1555 he was elected a fellow of Peterhouse. He took orders in 1560, and the Bishop of Ely appointed him his chaplain, and gave him the living of Teversham, Cambridgeshire. In 1563 he was appointed Lady Margaret professor of divinity.

In 1567 he became master of Pembroke Hall; in the course of the same year was appointed to the mastership of Trinity College; and in 1567 obtained the regius professorship of divinity. He was appointed Dean of Lincoln in 1571, Bishop of Worcester in 1577, and Archbishop of Canterbury in 1583.

His first work, on becoming master of Trinity, was upon a revisal of the statutes of the university. He obtained such powers for the heads of houses as enabled them to eject Thomas Cartwright from the Lady Margaret professorship on the score of his Calvinistic creed. After becoming primate, Whitgift labored assiduously to secure uniformity of discipline in the Church. He had the full confidence of Queen Elizabeth, who placed all the Church patronage of the Crown, including the bishoprics, at his disposal, and he was armed with full powers for carrying out his design. He required the clergy to subscribe not only to the royal supremacy, the liturgy, and the Thirty-nine Articles, but also to a set of additional articles framed mainly with the view of purging the Church of Puritanism. He was made a Privy Councilor in 1586, and in that capacity drew up a set of statutes for cathedral churches, to make their services conform to the principles of the Reformation. He was offered the Chancellorship by Queen Elizabeth in 1587, but he declined the office. On the accession of King James he seems to have been much alarmed for the stability of the system which he had spent his life in rearing. Anxiety upon this account is said to have hastened his end, in his palace at Lambeth, London. Being wealthy in his own name, he lived in great state and founded a magnificent hospital and a grammar school at Croydon. His works were edited by John Ayre and published by the Parker Society (Cambridge, 1850-53). His *Life* was written by Sir George Paule (London, 1612) and by Strype (ib., 1718; new ed., Oxford, 1822).

WHITING. A fish of the genus Merlucius, family Merluciidæ, closely related to the cods, but differing among other characters in the absence of a barbel on the lower jaw. The common whiting (*Merlucius vulgaris*) is abundant in the seas of Northern Europe, and particularly on the west coasts of Great Britain, where it frequently attains a weight of four pounds, although the average market fish is much lighter. It is caught chiefly by hand lines and 'long' lines, and is in high esteem for the table, and owes its name to the pearly whiteness of its flesh. In the United States the name is applied to the silver hake (*Merlucius bilinearis*); to the 'sand' or 'deep-water whitings' of the genus Menticirrhus (see Kingfish); and to the harvest-fish and certain whitefish (qq.v.).

WHITING. See Chalk.

WHITING, hwī′tĭng, Arthur Battelle (1861—). An American musician, born at Cambridge, Mass. He studied pianoforte with W. H. Sherwood and afterwards with Chadwick and J. C. D. Parker, finishing at the Munich Music School under Rheinberger. His compositions include: *Bagatelle; Fantasy with Orchestra; Concert-étude; Valse-Caprice;* pianoforte pieces, a church service in A, songs, anthems, and organ-music.

WHITING George Elbridge (1842—). An American composer and organist, born at Halliston, Mass. In 1854 he became Dudley Buck's successor as organist of the North Congregational Church at Hartford, Conn., where he organized the Beethoven Society. In 1862 he went to Boston, and was successively organist in several churches there. He studied, at different times, with C. W. Morgan in New York, with Best in Liverpool, and with Haupt and Radecke in Berlin. He taught at the New England Conservatory, in Boston, until 1879, was a teacher in the Cincinnati College of Music in 1879-82, and then returned to the New England Conservatory. His works include: two orchestral masses with the organ (1872); the cantatas *Tale of the Viking, Dream Pictures, Lenore, March of the Monks of Bangor; Midnight Cantata,* for solo and pianoforte; *Henry of Navarre,* a ballad for male chorus and orchestra; songs: a *Te Deum;* and Vesper services. He published *The Organist* (1870) and *The First Six Months on the Organ* (1871).

WHITING, Lilian (1857—). An American journalist and author, born at Niagara Falls, N. Y. She was literary editor of the Boston *Traveller* from 1880 to 1890, was editor of the Boston *Budget* in 1890-93, and afterwards spent several years in Europe. Her publications, several of which have attained considerable popularity, include: *The World Beautiful* (3 series, 1894, 1896, 1898); *A Study of the Life and Character of Elizabeth Barrett Browning* (1899); *Kate Field: A Record* (1899); *The World Beautiful in Books* (1901); and *Boston Days* (1902).

WHITING, William Henry Chase (1825-65). An American soldier, born in Mississippi. He graduated first in his class at West Point in 1845; entered the army as a second lieutenant of engineers; was employed for several years in constructing defenses and in directing internal improvements; and was promoted to be captain in December, 1858. He resigned from the army in February, 1861, and on the outbreak of the Civil War entered the Confederate service, and as chief engineer joined the Army of the Shenandoah, then under Joseph E. Johnston. On July 21, 1861, during the first battle of Bull Run (q.v.), he commanded, after the death of General Bee, the Third Brigade of Johnston's army, whose timely arrival was instrumental in determining the fortune of the day. In August, 1861, he was promoted to the rank of brigadier-general, and in the spring of 1862 took a conspicuous part in the campaign against McClellan. He was placed in command of the Military District of Cape Fear, Department of North Carolina, in December, 1862; was promoted to the rank of major-general in February, 1863; commanded a division of General Beauregard's army at Petersburg in June, 1864; was present during both the attacks on Fort Fisher (though his subordinate, Colonel William Lamb, exercised the actual command), and in the second, on January 15, 1865, was mortally wounded, dying as a prisoner in Fort Columbus, New York Harbor, on March 10th.

WHITLOW, or Paronychia. See Felon.

WHIT′MAN. A town in Plymouth County, Mass., 21 miles south by east of Boston, on the New York, New Haven and Hartford Railroad (Map: Massachusetts, F 3). It is primarily an industrial place, having manufactures of boots and shoes, tacks and nails, steel shanks, paper, wooden boxes, etc. There is a public library with 10,000 volumes. The government is administered by town meetings. The water-works are owned and operated by the town. Whitman, originally a part of Abington, was separately incorporated as South Abington in 1875. Its present name was adopted in 1886. Population, in 1890, 4441; in 1900, 6155.

WHITMAN, CHARLES OTIS (1842—). An American zoölogist, born in Woodstock, Maine, and educated at Bowdoin College (1868) and at Leipzig (1878). In 1880-81 he was professor of zoölogy at the Imperial University, Tokio, Japan. In 1882 he studied at the Naples Zoölogical Station. He was assistant in zoölogy at Harvard University from 1883 to 1885; director of the Allis Lake Laboratory at Milwaukee from 1886 to 1889; professor of zoölogy at Clark University from 1889 to 1892; and subsequently head professor of zoölogy in the University of Chicago. In 1887, in connection with Edward Allis, he founded and afterwards edited the *Journal of Morphology*. In 1888 he became the director of the Marine Biological Laboratory at Woods Hole, Mass. His main work has been in the embryology, and he has published memoirs on the development and anatomy of certain leeches, worms, fishes, etc. He did much to advance methods of microscopical technique, including *Methods of Research in Microscopical Anatomy and Embryology* (1885). Among his more general researches are those entitled: *The Kinetic Phenomena of the Egg During Maturation and Fecundation (Oökinesis)* (1887); *The Seat of Formative and Regenerative Energy* (1888); *Spermatophores as a Means of Hypodermic Impregnation* (1891); *The Inadequacy of the Cell Theory of Development* (1893); *Evolution and Epigenesis* (1894); *Animal Behavior* (1898).

WHITMAN, MARCUS (1802-47). An American pioneer and missionary, born at Rushville, N. Y. He studied medicine at the Berkshire Medical Institution at Pittsfield, Mass., and practiced for four years in Canada. In 1834 he offered himself for missionary work to the American Board of Commissioners for Foreign Missions. In 1835, with Samuel Parker, he was sent to explore the Oregon country, but turned back at Green River. In 1836 he married, and with three other missionaries, H. H. Spalding and his wife, and W. H. Gray, started westward. The party took the first wagon across the Rocky Mountains, reached the Columbia River on May 21st, and located near the site of the present Walla Walla, Wash. Other missionaries came out and four stations were organized. Friction ensued, and numerous quarrels were reported to the board, which voted in 1842 to discontinue the southern branch of the work. Whitman immediately started East, through the dead of winter, and after suffering much inconvenience reached Boston, March 30, 1843, and secured a reversal of the board's resolution. On November 29, 1847, the Cayuse Indians attacked the station, murdered Whitman, his wife, and twelve other persons, and took the other residents prisoners. The prisoners were afterwards released by the influence of the chief factor of the Hudson's Bay Company. The massacre has been attributed to the instigation of the Hudson's Bay Company or of the Catholic missionaries; but the probable explanation is the prevalence of epidemic diseases, unknown before the coming of the whites, which the Indians attributed to poison. In 1864-65 the statement was made by H. H. Spalding that Whitman's visit to the East in 1842-43 was made for political reasons, and that by a visit to Washington and interviews with President Tyler, Secretary Webster, and others, he prevented the cession to England of the American claim to Oregon (q.v.), and in fact prevented Oregon from being traded for a codfishery on Newfoundland. This belief has gained wide circulation, but Professor E. G. Bourne, in *Essays in Historical Criticism* (New York, 1901), presented an elaborate documentary study which seems to disprove the claim. For the other side consult: Mowry, *Marcus Whitman* (New York, 1901); and Nixon, *Life of Marcus Whitman* (Chicago, 1895).

WHITMAN, SARAH HELEN POWER (1803-78). An American poet, born in Providence, R. I. Her *Hours of Life, and Other Poems* appeared in 1853, and a posthumous volume of verse in 1879. She became best known, however, for her association with Poe, with whom, about 1848, she entered into a conditional engagement of marriage. In 1860 she published a work in his defense, entitled *Edgar Allan Poe and His Critics*. In 1828 she married John W. Whitman, who died in 1838.

WHITMAN, WALT (originally WALTER) (1819-92). An American poet, born at West-hills, L. I., and educated in the public schools of Brooklyn and New York. He learned his father's trade, carpentry, and also printing, forming in the composition room associations with printers and journalists that continued through life. At the age of seventeen he was teaching in Long Island and writing occasionally for newspapers and magazines. Two years later (1839) he was editor and publisher of a weekly at Huntington, L. I. This enterprise failing, he spent some years in various printing offices, contributing to periodicals, making long pedestrian tours, generally following the lines of the great Western rivers, and extending his journeys to Canada. That he wrote fiction we know only by the preservation of a title, *Frank Evans*, a temperance tale. For a year he edited the Brooklyn *Eagle*. This varied life brought him in contact with all sorts and conditions of men, and he seems to have fraternized gladly with what he calls 'powerful uneducated persons' of every kind, being by instinct a democrat, and entering heartily into the life and feelings of the people. It is said that he drove an omnibus for a time, though more from charity than liking, and he achieved some local success as a political stump speaker. In 1850, returning from wanderings that had carried him to New Orleans, he started in Brooklyn *The Freeman*, a very short-lived organ of the Free-Soil Party. Then for three years he tried carpentry, building and selling workingmen's houses, and gradually accumulated the materials that made up the first collection of *Leaves of Grass* (1855). This was a modest little book of 94 pages, and, so far as it attracted attention, seems to have provoked mirth, until Emerson made it the occasion of glowing praise and challenged for it the attention of the thoughtful public, which it has since held increasingly throughout the English-speaking world, in editions that grew to several times the bulk of its humble beginning. The remainder of Whitman's uneventful life was given to the elaboration of this book. The incidents and date-marks of the remaining thirty-seven years of the poet's life are these: During the second year of the Civil War the wounding of his brother in the battle of Fredericksburg led him to volunteer as an army nurse, in which capacity he served until the close of the war, in Washington and Virginia. The immediate literary result of this experiment is *Drum Taps* (1865), best described in his own words as "a little book containing life's darkness and blood-dripping wounds and psalms of the dead." This is now incorporated in the *Leaves of Grass*. In 1867 he published *Memoranda During the War*, made up chiefly of letters written at the time to the New York *Times*, from which he drew his chief support. His letters to his mother during the war were posthumously printed as *The Wound Dresser* (1897). His labors in the field brought on a serious illness in 1864, from which it is believed he never recovered completely. In recognition of his services, he was given a clerkship in the Treasury Department (1865-73), after having been dismissed by the Interior Department, on account of his *Leaves of Grass*. His Washington life was terminated by a slight paralytic stroke (1873). He moved to Camden, N. J., the residence of his brother George, and remained there until his death, in honorable poverty and serene cheerfulness, much sought by literary pilgrims, especially Europeans who discerned in him a distinctively American quality. He was never married. The works of this period, many of them incorporated in successive editions of the *Leaves*, were: *Passage to India* (1870); *Democratic Vistas* (1870), prose; *After All Not to Create Only* (1871); *As Strong as a Bird on Pinions Free* (1872); *Two Rivulets* (1873); *Specimen Days and Collect* (1883), prose; *November Boughs* (1888); *Sands at Seventy* (1888); and *Goodby My Fancy* (1891). William Rossetti published in England a selection of his poems in 1868, which began his influence there, the work being continued by Dowden, Symonds, Stevenson, and others. The final editions of the prose works and of the *Leaves of Grass* were issued in 1892 in two volumes. Ten years after Whitman's death an elaborate, complete edition was published.

The intense individualism of Whitman's nature was strengthened rather than modified by the education of environment. He knew little of the life that came through books, but much of that other life of the democratic masses which to most of his poetic contemporaries was as foreign as classical culture was to him. Perhaps he was sometimes willfully eccentric. Certainly, in laboring to be natural, he stripped himself sometimes of more than the garment of convention. There was some excuse for those who found that he became indecent in his endeavors not to be smug. In subject, the *Leaves of Grass* were from the beginning distinctively American, dealing with moral and social conditions and with political questionings. "These United States themselves are essentially the greatest poem," he had said in the preface, and he finds elsewhere that his country's crowning glory is to be spiritual and heroic. It is then the glorification of democracy, of the average man, the assertion of his right to be himself, the freedom of the individual, and at the same time the ideal of democratic brotherhood which this freedom implies, that are his themes and his inspiration. With this passionate devotion to human nature goes a hatred like that of Rousseau for the conventions that hedge it in, and parallel with this, in the style, there is a feeling for poetic beauty and a hatred for the conventions of expression. He has an instinct of rhythm, words come to him in felicitous collocations, but when they do not come he does not seek them. The result of Whitman's efforts was one of the ironies of literary history. The democratic reader, for whom Whitman wrote, made of it nothing at all. For him poetry must needs be conventional to be comprehensible. So Whitman writing of and for the multitude finds himself the admiration of a cultured coterie, appreciated only by a literary aristocracy. Yet there is no doubt that more people are coming to understand and to enjoy him. He was willing, he said, to wait to be understood through the growth of the taste for himself and what he represented. Up to the present time his cult has been mainly confined to a small group of open-minded lovers of poetry and to those in search of new literary sensations. It may be added that only the pruriency against which he protests could find his work immoral. It is not always agreeable, it is often indelicate and totally frank, but it is as lacking in sensuality, even in its most crude and unconventional expression, as was the poet's own life. Although as a whole his unmetrical matter comes under no present definition of poetry, and although a large portion of it has no possible poetic significance, yet there remains a small body of his verse that reveals a richness of poetic imagination unexcelled in America and that promises to last as long as anything in existing American poetry.

Consult *Autobiographia, or the Story of a Life*, selected from *Whitman's Writings* (1892). There is also an authorized biography by Bucke (1883). Consult also: Burroughs, *Whitman, as Poet and Person* (1866); *Whitman, a Study* (1896); O'Connor, *The Good, Gray Poet, a Vindication* (1866); J. A. Symonds, *Essays Speculative and Suggestive*, vol. ii.; and Dowden, *Studies in Literature* (The Poet of Democracy). The Philadelphia *Conservator*, a monthly edited by Horace Traubel, is the chief organ of Whitman studies.

WHIT'NEY, Adeline Dutton (Train) (1824—). An American author, born in Boston, Mass. She was married at the age of nineteen, and lived at Milton, Mass. The list of her books is long. It includes: *Footsteps on the Seas* (1857); *Mother Goose for Grown Folks* (1860), which became popular; *Boys at Chequasset* (1862); *Faith Gartney's Girlhood* (1863); *The Gayworthys* (1865); *A Summer in Hester Goldthwaite's Life* (1866); *Patience Strong's Outing* (1868); *Hitherto* (1869), with which the period of her best work ends; *We Girls* (1870); *Real Folks* (1871); *Pansies* (1872); *The Other Side* (1873); *Sights and Insights* (1876); *Odd and Even* (1880); *Bonnyborough* (1885); *Homespun Yarns* (1886); *Daffodils* (1887); *Bird-Talk* (1887); *Ascutney Street* (1888); *A Golden Gossip* (1890); *Friendly Letters to Girl Friends* (1897).

WHITNEY, ASA (1791-1874). An American mechanical engineer and manufacturer. He was born in Townsend, Mass., and in his youth learned the trade of blacksmith and machinist. After engaging in the manufacture of machinery in several States he became master machinist (1830) and superintendent (1833) of the Mohawk and Hudson Railroad. From 1839 to 1841 he was a canal commissioner of the State of New York, and in 1842 went into partnership with Matthew Baldwin in the manufacture of locomotives at Philadelphia. In 1847 he patented a process for making cast-iron annealed car wheels, and engaged in their manufacture on a large scale, subsequently introducing other improvements which increased the strength of the wheels and contributed materially to the safety of railway travel. Mr. Whitney served for a year as president of the Reading Railroad. He left $50,000 to the University of Pennsylvania for the founding of a chair of dynamical engineering.

WHITNEY, ELI (1765-1825). An American inventor, famous for his invention of the cotton gin. He was born at Westborough, Mass., and was educated at Yale College, where he graduated in 1792. He then went to Georgia as a teacher, where he found a generous patron in the widow of General Nathanael Greene, of the Revolutionary Army, on whose estate he resided, and studied law. While here he had opportunity to display his inventive genius, and at the request of some neighbors of Mrs. Greene he attempted to devise a machine for separating the seed from the fibre of the green seed cotton. He set to work under great disadvantages, having to make his own tools, and even to draw his own wire, while rumors of his success led some lawless people to break into his workshop and steal his machine before he could obtain a patent for it. Forming a partnership with one Miller in 1793, he went to Connecticut to manufacture cotton gins, but litigation in defense of his rights consumed all his profits and $50,000 voted him by the State of South Carolina. Finally, in 1798 he got a Government contract for the manufacture of firearms, which he carried out with ingenious machinery so arranged as to secure absolute interchangeability of parts. His manufactory of firearms was located at Whitneyville, Conn., and was maintained with success. Whitney had but little material reward from the gin, which immediately proved one of the most important inventions connected with the cotton manufacture. See COTTON; COTTON GIN.

WHITNEY, JAMES AMAZIAH (1839—). An American lawyer and author, born at Rochester, N. Y. He studied mechanics, engineering, and chemistry, and in 1868 became an editor of the *American Artisan*. He was one of the founders of the New York Society of Practical Engineering, of which he was for some time president, and in 1869-72 he was professor of agricultural chemistry in the American Institute. He particularly interested himself in equity, and in patent and copyright law. His publications include: *The Relation of the Patent Laws to the Development of Agriculture* (1874); *The Chinese and the Chinese Question* (1880; enlarged 1888); *Sonnets and Lyrics* (1884); and *The Children of Lamech* (1885), a poem. His *Poetical Works* were collected in 1886.

WHITNEY, JOSIAH DWIGHT (1819-96). An American geologist, born at Northampton, Mass., the brother of Professor William D. Whitney. He was educated at Yale College, and in 1840 was employed on the New Hampshire geological survey. After serving in similar surveys of Ohio, the Lake Superior region, Iowa, and Wisconsin, he became State geologist of California, occupying this office from 1860 to 1874. In 1865 he was called to the chair of geology at Harvard University. Through his travels and studies in the principal mining regions of the United States, Whitney became the foremost authority of his day on economic geology, and he was able to perform a great service in the development of the mineral resources of the country. The best known of his writings are: *The Mineral Wealth of the United States* (1854); *A Report on the Upper Mississippi Land Region* (1862); *The Geological Survey of California* (1864-70); *The Yosemite Guide-Book* (1869); with J. W. Foster, *Report on the Geology of the Lake Superior Land District* (1851-52); and with James Hall, *Geological Report on Ohio* (1858).

WHITNEY, SAMUEL BRENTON (1842—). An American organist, conductor, and composer, born in Woodstock, Vt. He was educated under Charles Wels, of New York, and J. K. Paine, of Cambridge, Mass., in which latter city he secured his first organ appointment. He came to be regarded as the greatest Bach player of the United States, and was appointed professor of organ-playing and lecturer in music at the Boston University and the New England Conservatory. In 1871 he was appointed organist and choir director of the Church of the Advent, Boston. His compositions include many anthems and other church pieces, songs, pianoforte music, sonatas, transcriptions, and arrangements for the organ.

WHITNEY, WILLIAM COLLINS (1841-1904). An American politician and Cabinet officer, born in Conway, Mass., and educated at Yale and at Harvard. He settled in New York City, where he was admitted to the bar. In 1871 he was prominent in organizing the Young Men's Democratic Club, and was active in the movement against the 'Tweed Ring.' From 1875 to 1882 he was Corporation Counsel of the City of New York, and during his administration of the office the work of the city's Law Department was completely reorganized and simplified in such a manner as to save thousands of dollars annually. He was active in 1882 in the State campaign which resulted in the election of Grover Cleveland as Governor, and from 1885 to 1889, during Cleveland's first administration as President, was Secretary of the Navy. Under his control considerable progress was made in building the 'new navy.' He afterwards engaged in extensive financial enterprises in New York, and in 1892 successfully managed the Cleveland Presidential campaign.

WHITNEY, WILLIAM DWIGHT (1827-94). An American Sanskrit scholar and philologist, born at Northampton, Mass. He graduated at Williams College in 1845. For the next three or four years he was clerk in the Northampton Bank, but began to show a marked interest in natural science and in languages. In 1849, as assistant sub-agent, he accompanied the United

States Geological Survey to Lake Superior, and on this expedition he began the study of Sanskrit in his leisure hours. On his return in the autumn of the same year he studied Sanskrit at Yale under Salisbury. In 1850 he went to Germany and spent three winters at Berlin under Weber, the summers being devoted to work under Roth at Tübingen. In 1853 he returned to America, and in 1854 was appointed to a chair of Sanskrit and comparative philology at Yale College, where he remained as professor until his death. The American Oriental Society owes much to him for his prolonged services as corresponding secretary, editor of the society's journal, and president. He was also first president of the American Philological Association. Among his publications are: *Language and the Study of Language* (1867; 4th ed. 1884); *German Grammar* (6th ed. 1888); *Oriental and Linguistic Studies* (1872-74); *The Life and Growth of Language* (1875); *Essentials of English Grammar* (1877); *Sanskrit Grammar* (3d ed. 1896); *Roots, Verb-forms, and Primary Derivatives of the Sanskrit Language* (1885); *Practical French Grammar* (1886); translations with commentaries of the *Sûrya Siddhânta*, the *Atharva Veda Prâtiçâkhya*, and the *Tâittirîya Prâtiçâkhya* (in vols. vi., viii., and ix., of the *Journal of the American Oriental Society*); and the posthumous *Translation of the Atharva Veda, with Commentary* (1904). With Roth he edited the *Atharva Veda* (1856), besides which he made noteworthy contributions to the *Sanskrit Dictionary* of Böhtlingk and Roth (Saint Petersburg, 1852-76), and an *Index Verborum to the Published Text of the Atharva Veda* (1881). He was editor-in-chief of the *Century Dictionary*. A complete bibliography of his writings is given in the nineteenth volume of the *Journal of the American Oriental Society* (New Haven, 1897), a memorial in his honor.

WHITON, hwī′ton, James Morris (1833—). An American Congregational clergyman and author. He was born in Boston, and educated at Yale, where he graduated in 1853. He was rector of the Hopkins Grammar School, New Haven (1854-64), and principal of Williston Seminary, Easthampton, Mass. (1876-78). At other times he held various Congregational pastorates, in Lynn, Mass., Newark, N. J., New York City, and Haworth, N. J. In 1896 he became a member of the staff of the *Outlook*. His principal publications are an edition of select orations of Lysias (1875); *Is 'Eternal' Punishment Endless?* (1876); *Beyond the Shadow* (1884); *Gloria Patri*, a dialogue on the Trinity (1892); and *Miracles and Supernatural Religion* (1903); besides several volumes of sermons and textbooks.

WHITNEY, Mount. A peak of the Sierra Nevada (q.v.), in eastern California, in about latitude 36° 35′ N., and longitude 113° 17′ W. (Map: California, D 3). It is the highest mountain in the United States, exclusive of Alaska, having an altitude of 14,898 feet. Its eastern slope, which rises nearly 11,000 feet above the valley, is very precipitous. The mountain was named for Professor Josiah Dwight Whitney.

WHIT′SITT, William Heth (1841—). An American clergyman and educator, born near Nashville, Tenn. He graduated in 1861 at Union University, studied at Leipzig and Berlin, and in 1872 was appointed professor of ecclesiastical history in the Southern Baptist Theological Seminary. In 1895-99 he was president of that institution. His publications include: *History of the Rise of Infant Baptism* (1878); *History of Communion Among Baptists* (1880); *Origin of the Disciples of Christ* (1888); and *A Question in Baptist History* (1897).

WHITSUNTIDE. The English name of the season of Pentecost (q.v.).

WHIT′TIER, John Greenleaf (1807-92). An American poet, born in Haverhill, Mass. He was a descendant of an emigrant to New England in 1638, whose children became members of the Society of Friends. His life as a youth was spent mainly at work on his father's farm. He early showed a talent for verse and published his first poem at the age of eighteen, in the *Free Press*, an anti-slavery paper edited by William Lloyd Garrison. Determining to obtain a better education, he learned the art of making slippers, by which he supported himself during two terms at the Haverhill Academy (1827-28), and then for a short time taught school. In 1829 he became editor of the *American Manufacturer*, published in Boston, and from January to June of the following year was editor of the *Haverhill Gazette*. In July, 1830, he was made editor of the *New England Review*, at Hartford, Conn., a post which he held till ill health obliged him to resign in January, 1832. Here he published his first volume of prose sketches and poems, *Legends of New England* (1831), and was active as a supporter of the great Whig, Henry Clay. On his return to Haverhill he worked on his father's farm, contributed to the *Haverhill Gazette*, wrote *Justice and Expediency* (1833), an anti-slavery pamphlet, and was a delegate to the anti-slavery convention in Philadelphia, in December, 1833. He represented his district in the Massachusetts Legislature in 1835 and 1836. In 1836 he removed to Amesbury, Mass., a small town immediately east of Haverhill, and here he lived the greater part of his life. By this time he was well known as a leading anti-slavery man and was called upon to do a good deal of work for the movement. In 1837 he served for a few months as one of the secretaries of the Anti-Slavery Society in New York, and the following year went to Philadelphia, where, until 1840, he edited the *Pennsylvania Freeman*. In May, 1838, his printing office was sacked and burned by a mob. On his return to Massachusetts he busied himself with the publication of poems designed to arouse public sentiment against slavery, and in addition to these spirited lyrics he wrote many poems descriptive of simple New England life. Many poems of this sort had from time to time appeared from his hand, but these, published in 1843 as *Lays of My Home*, were the first that brought him any money. He was also editor, at Lowell, Mass., for six months (1844-45), of the *Middlesex Standard*. In 1849 he published a volume of anti-slavery verses entitled *Voices of Freedom*. From 1847 to 1860, while living at Amesbury, he contributed editorial articles to the *National Era* of Washington, the anti-slavery paper in which Mrs. Stowe's *Uncle Tom's Cabin* first appeared, and on the establishment of the *Atlantic Monthly* in 1857 he became a frequent contributor. He was a member of the Massachusetts Electoral College in 1860 and 1864, but thereafter took little, if any, active part in public life. He died at Hampton Falls, N. H., while on a visit there. He never married. Aside from his poetry, Whittier was a real force in the practical anti-slavery politics of Massachusetts.

Whittier's literary work, though never very abundant, was very constant. It usually appeared in periodicals, and few years of his life were unmarked by literary production of some sort. The chief titles of his separate works, aside from those already cited and collected editions, are, in prose: *The Stranger in Lowell* (1845); *Supernaturalism in New England* (1847); *Leaves from Margaret Smith's Journal* (1849); *Old Portraits and Modern Sketches* (1850); *Literary Recreations and Miscellanies* (1854); in verse: *Moll Pitcher* (1832); *Mogg Megone* (1836); *Songs of Labor* (1850); *A Sabbath Scene* (1853), a poem descriptive of the workings of the Fugitive Slave Law; *The Chapel of the Hermits* (1853); *The Panorama* (1856); *Home Ballads and Poems* (1860); *In War Time* (1863); *National Lyrics* (1865); *Snow-Bound* (1866), probably his best work; *The Tent on the Beach* (1867); *Among the Hills* (1868); *Miriam* (1871); *The Pennsylvania Pilgrim* (1872); *Hazel Blossoms* (1874), including poems by his sister, Elizabeth Whittier; *Mabel Martin* (1875); *A Centennial Hymn* (1876); *The Vision of Echard* (1878); *The King's Missive* (1881); *The Bay of Seven Islands* (1883); *Poems of Nature* (1886); *Saint Gregory's Guest* (1886); and *At Sundown* (1892). These have been collected into the *Complete Poetical and Prose Works,* revised and annotated by the poet, in seven volumes of the Riverside Press. Whittier was also the compiler, with Lucy Larcom, of *Child Life* (1871), *Child Life in Prose* (1874), and *Songs of Three Centuries* (1876); and during his life he also had a hand in many anti-slavery collections and compilations, both in verse and in prose.

Whittier ranks as one of the foremost American poets. His chief excellence lies in his simplicity, sincerity, directness, and fervor. His verse is, to be sure, often disfigured by faulty rhyming, and much of it labors under the disadvantage of being merely occasional, but even this body of poetry is redeemed by the unfailing sincerity and earnestness of the poet. In his verse dealing with New England life Whittier may be said to have achieved permanence. No American poet has better depicted the simple scenes of rural life, with finer eye for truth of detail or more impressive delicacy of sentiment, than has Whittier in such scenes as those of *Snow-Bound,* a poem which has caused him to be regarded as a sort of American Burns, though in respect to lyrical quality the similarity of the two poets is not striking. A selection of his verses which would show his quality, lyric, descriptive, and moral, most characteristically and at its best, would include such poems as *Ichabod, Barbara Frietchie, Skipper Ireson's Ride, The Pipes at Lucknow, Laus Deo, The Eternal Goodness* (a psalm), *In School Days, Maud Muller, The Barefoot Boy, The Swan Song of Parson Avery,* and *Snow-Bound.*

Consult: W. S. Kennedy, *John Greenleaf Whittier: His Life, Genius, and Writings* (1882); *John G. Whittier, the Poet of Freedom* (1892, in "American Reformers Series;" F. H. Underwood, *John Greenleaf Whittier, a Biography* (1884); W. J. Linton, *Life of John Greenleaf Whittier* (1893), in "Great Writers Series;" Mrs. James T. Fields, *Whittier: Notes of His Life ana His Friendships* (1893); Mary B. Claflin, *Personal Recollections of John G. Whittier* (1893); S. T. Pickard, *Life and Letters of John Greenleaf Whittier* (1894), the authoritative work on Whittier; and G. R. Carpenter, *John Greenleaf Whittier,* in "American Men of Letters Series" (1903).

WHIT'TINGHAM, CHARLES (1795-1876). An English printer, born at Mitcham, Surrey. He was apprenticed to his uncle, Charles Whittingham, founder of the Chiswick Press, and was taken into partnership in 1824. During the four years of this relationship the press issued Knickerbocker's *History of New York* (1824), Pierce Egan's *Life of an Actor* (1825), and Singer's *Shakespeare* (10 vols., 1825). In 1828 the younger Whittingham set up for himself and began a series of issues which were distinguished for excellence and beauty of workmanship. The first book to appear was *A Sunday Book* (1829). This was followed by Bacon's and Peele's works, *The Canterbury Tales, The Compleat Angler,* and others. Upon the death of the elder Whittingham in 1840 both businesses devolved upon the nephew. He began block color printing in 1840, and in 1843 introduced the old-fashioned style of book production. *The Diary of Lady Willoughby* (1844) is an example of the latter innovation. Other works of this later period were: Shaw's *Elizabethan Architecture* (1843); the notes to Samuel Rogers's *Italy* (1843); and Lord Vernon's *Dante* (1854). In 1869 Whittingham retired.

WHIT'TINGHAM, WILLIAM ROLLINSON (1805-79). An American bishop of the Episcopal Church. He was born in New York City, and graduated at the General Theological Seminary there in 1825. Two years later he was ordained, and a little later became rector of Saint Luke's Church, New York. In 1835 he became professor of Church history in the seminary, and in 1840 Bishop of Maryland. He was universally considered the most learned bishop of the time in his Church, especially in Church history and canon law; and his uncompromising adherence to principle, even on an unpopular side, won him further respect. He was generally a supporter of the High Church Party; during the Civil War he was a firm friend of the National Government, though many of his clergy espoused the Southern cause. His literary remains are chiefly of an editorial nature.

WHIT'TINGTON, RICHARD (c.1359-1423). An English merchant, Mayor of London. He was the third son of Sir William Whittington, who was probably a native of Gloucestershire. Nothing is known of his early life. In 1379 Whittington was a mercer in London; in 1393 he was an alderman, and in 1397, 1398, 1406, and 1419 Mayor of London. He advanced large sums of money to the Crown and enjoyed the King's confidence. His liberality appears to have been unbounded. At his death he left the bulk of his property to charity, and for completing those works which had been begun under his own superintendence. But his fame is due mainly to the popular romance of which he became the hero. According to this legend the lad Whittington went to London and found employment as a scullion. To the freight of an outgoing vessel he contributed his cat, which was sold for a large sum in Barbary. Meanwhile the boy, wearying of ill-usage, started from the city, but hearing the Bow bells, which seemed to say

Turn again, Whittington,
Lord Mayor of London,

he went back to his work, soon, from the returning ship, received the price of his cat, married his lady fair, and, living happily, rose to the prophesied post. There is, however, no foundation for this tale nor for the accounts of his being made a knight and of his burning the King's bonds for large sums due him. The *Lives* of him by Lysons (1860) and Besant and Rice (1881 and 1894) are uncritical and treat the legends as facts. Both the facts and the legends can be found in Wheatley's edition of the *History of Sir Richard Whittington* (published for the Villon Society, London, 1885).

WHITT′REDGE, Worthington (1820—). An American portrait and landscape painter, born in Springfield, Ohio. After practicing portrait painting in Cincinnati from 1842 to 1849 he studied abroad, chiefly at Düsseldorf, under Andreas Achenbach. He also worked in Belgium and Holland, and in 1855 he went to Rome, residing there until his return to the United States in 1859. In 1874 he accompanied General John Pope on his Western tour of inspection, and brought back many sketches of Rocky Mountain scenery. In 1875-76 he was president of the National Academy of Design. He has spent the latter part of his life in Summit, N. J. Whittredge's preference is for landscape. A sympathetic feeling for nature is evident in all his work. He painted with fine feeling and purity of color, and without being vigorous in touch, he still invested all that he saw with a wholesome charm. Among his principal paintings are: "Old Hunting Ground" (1864); "View of the Rocky Mountains from the River Platte" (1868, Century Club, New York); "Trout Brook" (1875); "House on the Hudson River" (1863, Lenox Library, New York); and "Sheep Pasture by the Sea."

WHIT′WORTH, Charles, Earl Whitworth (1752-1825). An English diplomat, born at Leybourne, and educated at Tunbridge. In 1786 he was appointed Minister to Poland, and two years later was transferred to Saint Petersburg. There he succeeded in obtaining the Russian adherence to the coalition against France, but upon the reconciliation between Paul I. and Napoleon he was dismissed by the Czar (1800). In 1802 he obtained the embassy to France, which he held under stormy conditions until the war broke out the next year.

WHITWORTH, Sir Joseph (1803-87). An English mechanical engineer, born at Stockport. He settled in Manchester in 1833 as a toolmaker, made numerous and valuable inventions in metal-working and other machinery, and while thus engaged learned to construct absolutely plane surfaces of metal and to determine surface and other inequalities by micrometric methods. The result was to raise the standard of workmanship. Whitworth played an important part in the securing of uniformity of screw threads, and his system of standard threads by which interchangeability and ready reproduction of parts was secured was widely employed. (See Screw.) The request of the Government that Whitworth should design the machinery for the manufacture of military rifles was declined, but he was induced to undertake a series of experiments to determine the most efficient construction of such weapons. He evolved a rifle with hexagonal barrel and small calibre (.45 inch) which fired an elongated projectile; but in spite of satisfactory tests it did not meet with the approval of the War Office, though ten years later a somewhat similar weapon was adopted. From small arms, Whitworth turned his attention to larger ordnance, and made numerous improvements, many of which also failed at the time to meet with the approval of the British authorities. His invention of compressed cast steel for ordnance (q.v.) has been generally utilized in the construction of heavy guns. In 1869 Whitworth was made a baronet, after having received in the previous year the Albert Medal of the Society of Arts and the Legion of Honor of France. His large works at Manchester were made into a stock company in 1874, and in 1897 the company was united with the Elswick Works, founded by Sir William Armstrong (q.v.). Whitworth was a liberal benefactor of education; in 1868 he provided thirty scholarships in mechanics, and after his death his executors carried out his expressed wishes and turned over to Whitworth Park and Institute, Owens College, and other charitable and educational institutions in Manchester and elsewhere, funds aggregating about $2,900,000. Whitworth was the author of papers in the journals of the engineering societies; of (with Wallis) *The Industry of the United States in Machinery, Manufactures, and Useful and Ornamental Arts* (1854); *Miscellaneous Papers on Mechanical Subjects* (1858); *Miscellaneous Papers on Practical Subjects;* and *Guns and Steel* (1873). Consult: *Memoirs,* in *Proceedings of the Institutions of Civil Engineers* (London, 1889); and contemporary volumes of proceedings of other learned societies and scientific journals.

WHITWORTH GUN. See Ordnance: Guns, Naval.

WHOOPER. (1) A swan. (2) A crane.

WHOOPING-COUGH, or Pertussis. An infectious and sometimes epidemic disease, mostly attacking children, especially in the spring and autumn. Its earliest symptoms, which usually appear five or six days after exposure to infection, are those of a common cold, as hoarseness, a watery discharge from the eyes and nose, oppression of the chest, a short, dry cough, and more or less feverishness. This stage, which is called the *catarrhal,* lasts a week or ten days, when the fever remits, and the cough begins to be followed by the peculiar whoop which characterizes the disease, and which is caused by the inspiration of air through the contracted cleft of the glottis. (See Larynx.) The disorder may now be regarded as fully developed, and consists of paroxysms of severe coughing, which usually terminate in the expectoration of glairy mucus, or in vomiting. During the fit of coughing the face becomes red or livid, the eyes project, and the child seizes some person or object for support. These paroxysms occur at uncertain intervals, but usually about every two hours, and between them the child returns to play, takes food with good appetite, and exhibits little or no sign of illness. The disease reaches its height at about the end of the fourth week, after which the paroxysms diminish in frequency, and the patient shows signs of improvement. The second stage may last from two to eight weeks, and is succeeded by what may be termed the convalescent stage, the duration of which is very variable.

Pathology has failed to throw any direct light upon its special seat. The proportion of deaths to recoveries in cases of whooping-cough has not been satisfactorily determined, but when there is a severe epidemic the mortality due to this disease is often very great; the deaths, however, in the majority of cases, occur among the poorer classes. This mortality is, in reality, due rather to the bronchitis and pneumonia which are frequent complications of whooping-cough than to the disease itself.

The diet should consist of milk and unstimulating farinaceous matters. The bowels should be kept moderately open. If the weather is cold, the child should be kept in the house with the temperature of the room about 60°. Slight counter-irritants may also be applied to the surface of the chest. Nothing else is so serviceable in the last or convalescent stage as sea air. The medicinal treatment calls for the services of a physician.

WHORTLEBERRY. See Huckleberry.

WHYDAH, hwĭd'ȧ *or* hwī'dȧ. A seaport of Dahomey, Western Africa. It is on a lagoon 25 miles long and in a low region (Map: Africa, E 4). It was formerly a centre of the slave traffic, and has declined in importance, having now only some 20,000 inhabitants.

WHYMPER, hwĭm'pẽr, Edward (1840—). An English traveler, born in London. He was trained as a draughtsman on wood. In 1860 he was sent by a London publisher to sketch the Alpine peaks. In 1861 he reached the summit of Mount Pelvoux and in 1864 ascended the Point des Ecrins. In 1865 he scaled the Matterhorn, until then found inaccessible. In 1867 and 1872 he visited Greenland. One result of his explorations was the collection of rare fossil plants now in the British Museum. His discovery of magnolia cones demonstrated the former existence of luxurious vegetation in that country. He visited the Ecuadorian Andes in 1879-80, and succeeded in reaching the summit of Chimborazo, a feat which had been unsuccessfully attempted by Humboldt and others. During this journey he discovered the Andean glaciers and made further collections of fossil, plant, and animal specimens. In addition to his *Scrambles Amongst the Alps in the Years 1860-69* (1871; illustrated by himself), he described his travels in *Travels Among the Great Andes of the Equator* (1892); *Chamonix and Mont Blanc* (1896); and *Zermatt and the Matterhorn* (1897).

WHYTE, Violet. See Stannard, Henrietta Eliza Vaughan.

WHYTE'-MEL'VILLE, George John. See Melville, George John Whyte.

WICHERN, vĭk'ẽrn, Johann Hinrich (1808-81). The founder of home missions in Germany. He was born at Hamburg, studied theology at Göttingen and Berlin, and, settling in his native city, devoted himself to missionary work among the poor. He started a Sunday-school which proved very successful, and in 1833 opened his *Rauhes Haus* (q.v.). Wichern traveled through Germany, preaching and establishing hospitals, schools, homes, and rescue stations. Through his exertions the Protestant synod at Wittenberg in 1848 appointed a central committee for home missions. In 1851 the Prussian Government made him inspector of prisons and houses of correction, and in 1858 general superintendent. In 1872 disease forced him to retire from office. He published: *Die innere Mission der deutschen evangelischen Kirche* (1849); *Die Behandlung der Verbrecher und entlassenen Sträflinge* (1853); *Der Dienst der Frauen in der Kirche* (1858).

WICHERT, vĭk'ẽrt, Ernest (1831-1902). A German dramatist and novelist, born at Insterburg. With his play *Unser General York* (1858) Wichert won his first success, and from that time produced both plays and novels which established his reputation as a sound playwright and interesting story-teller. *Licht und Schatten* (1861), *Di Realisten* (1874), and *Im Dienst der Pflicht* (1897) are among his dramas. Considerable success attended his comedy *Ein Schritt vom Wege* (1871), also *Biegen oder brechen* (1874) and *Als Verlobte empfehlen sich.* His volumes of fiction include: *Ein hässlicher Mensch* (1868); *Die Arbeiter* (1873); *Die Taube auf dem Dache* (1892); and *Die Schwestern* (1896).

WICHITA, wĭch'ĭ-tȧ. A tribe of Caddoan stock (q.v.), formerly ranging over the country between the Washita and Upper Red Rivers, including the Wichita Mountains, in southern Oklahoma, and now gathered in a reservation on the north side of Washita in the vicinity of Anadarko. According to tradition, they, as well as their confederates, the Waco (q.v.) and Tawaconi, are direct offshoots of the Pawnee (q.v.), all these tribes speaking the same language with but slight dialectic differences. They call themselves *Kitikitish* and sometimes *Tawéhash*, of which their popular name may be a derivative. By the French they were called Pani Piqué, 'Tattooed Pawnee,' their common designation among other tribes being 'Tattooed People,' in allusion to the tribal custom of tattooing upon the face, arms, and breast, particularly among the women. Like all the Caddoan tribes, the Wichita were agricultural and semi-sedentary, occupying villages of large dome-shaped houses built of grass laid over a framework of poles. On temporary outings they used the ordinary skin tipi. They had a number of interesting ceremonials, most of which they still retain, including a gift dance, a thanksgiving or green corn dance, and a great ceremonial foot race in which every one able to run participated. They were peaceable and industrious and are one of the few tribes which have always kept peace with the whites.

Their earliest migration appears to have been up the Red or Canadian River from Arkansas or Louisiana. They are identical with the people of Quivira visited by Coronado in 1542. About 1780 they were living about the present Wichita Falls, Tex. At a later period they fixed their village on the north fork of Red River, in the Wichita Mountains, where they were visited by a Government expedition in 1834, resulting in a treaty of friendship the next year, soon after which they removed to the site of the present Fort Sill. In 1859 they were assigned to their present reservation, but on the outbreak of the Civil War were compelled to take refuge in Kansas, camping about the present site of Wichita on the Arkansas, where they remained until 1867. They are now allotted citizens, and, being self-supporting and industrious, would be in fairly prosperous condition but for the dissipation brought among them by the opening of the country to white settlement. From an estimated total of over 3000 in 1804 the confederated bands have decreased to 692 in 1872 and about 360 in 1901.

WICHITA. The county-seat of Sedgwick County, Kan., 228 miles southwest of Kansas City, on the Arkansas River, and on the Atchison, Topeka and Santa Fe, the Missouri Pacific, the Chicago, Rock Island and Pacific, the Saint Louis and San Francisco, the Wichita and Western, the Wichita and Colorado, and other railroads (Map: Kansas, E 4). It is well laid out and has attractive residences, imposing business blocks, and fine public buildings. The city is the seat of Fairmount College (Congregational), opened in 1892; Albertus Magnus University (Roman Catholic), opened in 1900; the Friends' University; Kansas College of Osteopathy; Lewis Academy; and All Hallows Academy. The Public Library has 7000 volumes. Other prominent institutions include the Martha Washington Home, Orphans' Home, Children's Home, and the Wichita and Saint Francis hospitals. The United States Government building, county court-house, city hall, high school building, and the Scottish Rite Masonic Cathedral are noteworthy. Riverside Park, the most prominent of the public parks, contains 146 acres. Wichita is favored with excellent transportation facilities, and has considerable commercial and industrial importance. The region is very fertile, and is known for its large farming, dairying, and stock-raising interests. There are extensive packing establishments and stock yards, flouring mills, foundries and machine shops, stove works, grain elevators, implement manufactories, car shops, etc. A large wholesale and jobbing trade is carried on here. Under the charter of 1886, the government is vested in a mayor, chosen biennially, and a unicameral council. The majority of the subordinate officials are appointed by the mayor, subject to the confirmation of the council. The board of education, however, is elected by popular vote. Wichita was settled in 1870, and was incorporated the following year. Population, in 1890, 23,853; in 1900, 24,671.

WICHITA MOUNTAINS. A group of mountains in the southern part of Oklahoma between the Washita and Red rivers (Map: Oklahoma, E 4). They form a western outlier of an interrupted system of ancient, denuded rock masses extending across Indian Territory into southern Arkansas, and rise abruptly from the surrounding plain to a height of nearly 1000 feet above it. The group consists of a number of isolated conical granite peaks surrounded by outcrops of folded Paleozoic strata.

WICK. A seaport, capital of Caithness, Scotland, at the mouth of Wick Water, and at the head of Wick Bay, 18½ miles south of John o' Groat's House (Map: Scotland, E 1). Wick is the headquarters of the herring fishery and its kindred industries in Scotland. There are two harbors and an extensive breakwater. Population (Parliamentary borough), in 1901, 7881.

WICKED BIBLE. See BIBLE, CURIOUS EDITIONS OF.

WICK'FIELD, AGNES. The patient daughter of Miss Betsy Trotwood's solicitor, in Dickens's *David Copperfield.* She marries David after the death of his child-wife, Dora. Her father is a well-meaning but not very strong-minded man, whose unfortunate taste for drink Uriah Heep cultivates in order to ruin him.

WICK'LOW. A maritime county of the Province of Leinster, Ireland, bounded by the Irish Sea and the provinces of Wexford, Carlow, Kildare, and Dublin (Map: Ireland, E 4). Area, 781 square miles. The land rises abruptly from the sea, and a large part of the county is mountainous and barren. About one-half is pasture land, and cattle-raising is the chief occupation, though some oats and potatoes are raised. Population, in 1901, 60,824. County town, Wicklow.

WICKRAM, vĭk'râm, JÖRG (?-c.1560). A German author, born probably at Colmar, in Alsatia, where he founded in 1549 a Meistersinger school. The only other event of his life of which we have definite record is that in 1555 he became town clerk at Burgheim in the Breisgau. The best of his dramas are *Der verlorne Sohn* (1540) and *Tobias* (1551). He is better known, however, as the first writer of prose fiction in the German Reformation period, and in his tales he expressed the new social ideas which were prevalent. Aside from his novels, *Ritter Galay aus Schottland* (1539), *Der Knabenspiegel* (1554), *Der irrereitende Pilger* (1556), and *Goldfaden* (1557), he published a collection of witty tales entitled *Das Rollwagen-Büchlein* (1555), which contains his best-known and most interesting work. Consult Scherer, *Die Anfänge des deutschen Prosaromans und Jörg Wickram von Colmar* (Strassburg, 1877).

WICK'STEED, PHILIP HENRY (1844—). An English Unitarian clergyman and lecturer, born at Leeds. He was educated at University College, Manchester, and New College, London, and in 1874-97 had charge of the Little Portland Street Chapel, London. In 1887 he began to lecture for the University Extension movement, speaking principally on poetry and economics. His publications include: *Dante: Six Sermons* (1880); *The Alphabet of Economic Science* (1888); *The Coördination of the Laws of Distribution; Henrik Ibsen* (1892); and translation and notes to Dante's *Paradiso* (Temple edition).

WICKY. A North American shrub. See KALMIA.

WIC'LIF, JOHN (c.1320-84). A noted English reformer, often styled the 'Morning Star of the Reformation.' He was born probably near Richmond, in Yorkshire. The known facts of his life are singularly few and meagre. He seems to have belonged to a well-to-do family of the lower nobility and to have been sent as a youth to the University of Oxford. He became a fellow and not long before 1360 master of Balliol College. He was made rector of the neighboring parish of Fillingham (1361-69), of Ludgarshall (1369-74), and of Lutterworth (1374-84). In 1365 he appears as King's chaplain, if this is the proper translation of *peculiaris regis clericus*, and from this date he enters into close relations with the Government, especially with the King's son John (of Gaunt). In 1375 he was made a member of a royal commission to confer with legates of the Pope at Bruges. Attention was first called to his views on theological questions in the year 1376, and he was summoned to give account of his teaching at Saint Paul's in London by Bishop Courtenay. In the next year a series of Papal bulls were procured, directing the ecclesiastical authorities to proceed against Wiclif, but he was supported by so strong a faction at the time that nothing could be accomplished. At a second hearing at Lambeth in 1378 he was protected by the Queen Mother and allowed to withdraw with only a gentle admonition. From this time until two years before his death in 1384, he continued to write and teach at Oxford, elaborating his views with more clearness and winning many supporters. His doctrines were carried to Prague and served there as the basis of the revolt under John Huss. They were formally condemned at the Council of Constance (1415) and repudiated by all parties down to the Reformation. In 1428 Pope Martin V. called upon Bishop Flemmyng, of London, to disinter the remains of Wiclif from the parish church at Lutterworth and scatter them abroad, and this was done.

The activities of Wiclif may be classified as political, theological, and evangelical, but these are all closely connected by a common principle of thought. The one creative idea which governed all his action, and which may be regarded as Wiclif's contribution to the Reformation, is the right of the individual to form his opinions on the basis of Scripture and reason, and then to carry out these opinions in association with other individuals as seems best to him and them. Although he describes himself as a realist and worked according to the formal methods of the mediæval realistic school of thought, his conclusions are largely tinged by the new nominalistic writing of William of Ockham and Marsiglio of Padua. The essence of this new thought was the comparative unimportance of traditions in Church or State, and the corresponding right of the members of the body politic or religious to govern themselves as they saw fit. Such ideas fell in naturally with the newly developed nationalistic feeling in all countries, and more especially in England. If it was true that Englishmen owed their first duty to England, then there must be some way of showing that such national loyalty was consistent with fidelity to the Christian faith. Wiclif's first public service was in furnishing to the Government just such a demonstration as this. In 1365 the Pope, then living in France, had renewed a long-neglected claim on England for the tribute promised by King John a hundred and fifty years before as a part of his bargain with Rome. Money given to the Papacy seemed to be money taken from England to serve her enemy, France, and the Government sought a valid excuse for refusing the demand. Wiclif's pamphlet, *Determinatio quædam de Dominio*, supplied the need. In it he showed that a nation had the same rights of self-preservation as an individual; that the Papacy, being a spiritual power, could not lawfully exercise sovereignty over a dependent country; and, finally, that King John had had no right to make any such bargain without the consent of the people of England. The same points are clearly seen in another pamphlet written eleven years later in reply to an inquiry from Parliament whether the nation would be justified in refusing to pay 'Peter's pence' during a time of domestic need. Wiclif takes here the broad ground that all such contributions were acts of charity, and hence not subject to demand; they might rightfully be withheld when the nation had need of the money to provide for the maintenance of religion at home. On both these occasions Wiclif was led on to express opinions on the nature and the present perversions of the Papal office which could not be overlooked. The bulls of Gregory XI. in 1377 were the direct outcome of this opposition. They placed Wiclif fairly in the position of a condemned heretic, but there was no power in England strong enough to enforce them against a man who had made himself the champion of national rights as against all foreign aggression. They fell flat and unquestionably weakened the Papal cause in England. Though the attitude of the Government changed with the shifting of parties consequent upon the death of Edward III. and the accession of Richard II., Wiclif continued to enjoy the protection that had carried him so far and was allowed to end his days in peace.

The principles governing Wiclif in these political questions are laid down by him chiefly in his two great treatises, *De Dominio Divino* and *De Civili Dominio*, in which he tried to show the limits of human lordship and especially of the lordship of the Church over temporal things. In these, as in his other writings, the appeal is throughout to Scripture as the highest expression of the divine law, and in opposition to the man-made statutes of the Roman Church. From this supreme authority of Scripture Wiclif went on naturally to the importance of teaching it to every Christian, and so to the duty of giving it to the world in the common tongue. It seems now to be clear that before Wiclif's time there had been no systematic attempt to translate the whole Bible into English, and hence the vast importance of the version known as Wiclif's Bible, though it is not probable that he did more than a fragment of the work of translation himself. Aside from its value as a contribution to the growing standard of English prose, this English Bible was the chief agency in spreading the ideas that form the practical side of Wiclif's activity. He tried to meet the need of the times by sending out the Bible in the hands of young men, not ordained to the ministry nor bound by any vows, not even, so far as we know, equipped with any professional learning, though probably often youths who had listened to his teaching at Oxford. These 'poor priests' were to imitate as far as possible the conditions of the Apostles. They went forth on foot, in a russet gown, with scrip and staff, and, if we may believe the reports of friends and enemies alike, the people heard them gladly. They were instructed to preach nothing but the plain, straightforward word of God. The description of the 'persone of a town' in the prologue to the *Canterbury Tales* corresponds very closely to the ideal set forth in Wiclif's instructions to these preachers.

What the heresies of Wiclif were is best learned from the list of charges brought forward at the several trials. They may all be regarded as growing out of the one fundamental notion of a divine law—*lex Christi*—superior to all earthly laws and not intrusted to any human person or institution. It is obvious that in the last resort this divine law is only to be found in the individual conscience using all the means, intellectual, spiritual, and emotional, that it can command. This was Wiclif's real and sufficient offense. It appears in every detail of the charges. In speculative theology the test came, as it continued to do throughout the Reformation period, on the question of the sacramental observances, and especially of the Eucharist. Realist as he claimed to be, Wiclif could not accept the doctrine that in the consecration of the elements the accidents were separated from the substance they represented, and he therefore had to deny the doctrine of transubstantiation. True, he tried every device of the subtlest logic of the schools to prove that he believed in an actual presence of the body of Christ in the Host, but his definitions were vague enough to admit the widest differences of interpretation, and this would not do. His view of the Church was that it consisted of the body of the followers of Christ, and that therefore it could not be controlled by any person or group of persons, such as the Pope and the cardinals. Authority in the Church depended upon the purity with which those who claimed authority lived up to the law of Christ. If they violated that law, they forfeited all claim to obedience. It was the business of temporal authorities to see to it that this law be obeyed, and to recall the rulers of the Church to obedience if they failed. The control of the temporalities of the Church lay in the hand of the civil rulers, who ought to withdraw them if they were abused.

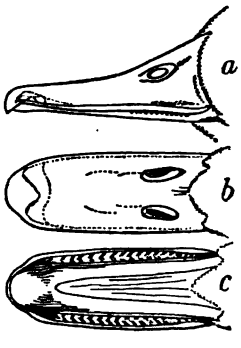
However subversive of existing institutions these principles of Wiclif might be, they would, perhaps, have been overlooked if he had not aroused the bitterest personal enmities by his unsparing application of them to the evils of society. Especially his denunciations of the mendicant Orders brought into the field against him a power that few could in the long run withstand. The episcopal order felt itself threatened by the growing contempt for organized authority, and was only too ready to connect the social upheavals of the time (1381) with this religious agitation. The sympathy of the ruling classes was diverted from Wiclif in his last years, but it is clear that his teaching was held in reverence by many of the lower and middle classes. 'Lollardry,' as the following of Wiclif came to be called, was doubtless very widely spread and maintained itself for about a generation after Wiclif's death as a powerful religious and political factor in the English people. The most active work in collecting and editing Wiclif's writings has been done under the auspices of the Wiclif Society, which is still engaged in clearing up the evidence as to the reformer's life and work. Consult: Lechler, *Johann von Wiclif und die Vorgeschichte der Reformation* (Leipzig, 1873; Eng. trans., London, 1884); Burrows, *Wiclif's Place in History* (2d ed., London, 1884); Poole, *Wycliffe and Movements for Reform* (ib., 1889); Trevelyan, *The Age of Wycliffe* (ib., 1898); Sargeant, *John Wyclif* (New York, 1893). See LOLLARDS.

WICOPY. See LEATHERWOOD.

WIDDIN, or **WIDIN**, vid'ĭn. An ancient town and the capital of a department in the Principality of Bulgaria, situated on the right bank of the Danube, about 100 miles west-northwest of Sofia (Map: Balkan Peninsula, D 3). It is surrounded by marshes and its inaccessibility formerly gave it great strategical importance. There are still preserved the ancient walls and the citadel. A new quarter is growing up along the river. Widdin manufactures gold and silverware, tobacco, and spirits. Population, about 15,000. Widdin was a very strong Turkish fortress and constituted an important strategic point in the Russo-Turkish war.

WIDE, WIDE WORLD, THE. A popular novel by Susan Warner, under the name of Elizabeth Wetherell (1850).

WIDGEON, or **WIGEON** (from OF. *vigeon*, widgeon, from Lat. *vipo*, sort of small crane). A river-duck of the genus Mareca, allied to the gadwall and teal, and common throughout the Arctic regions. The true widgeon (*Mareca penelope*) is seen in temperate latitudes only in winter, when it flies in large flocks, and is a favorite with gunners. Its whole length is about 19 inches. The forehead and top of the head in the male are white; the cheeks and hind part of the neck reddish chestnut; the upper parts grayish white, crossed with irregular zigzag lines of black; the tail nearly black; the wing-coverts white, tipped with black; the primaries dark brown; speculum green, edged with black; the throat pale rufous; the breast and belly white. The female is very different, the head and neck rufous brown, speckled with dark brown; the back varied with two shades of brown, darker in the centre, and paler in the edges of the feathers. Widgeons feed during the daytime, and chiefly on water-plants. The note is a shrill whistle, whence its French name *siffleur*, and the English names, 'whew duck' and 'whewer.' The American widgeon or baldpate (*Mareca Americana*) is much like the European, but the upper parts are finely waved transversely with black and reddish brown; the under parts are mostly white; the top of the head is almost white; the wing-coverts are white, the greater tipped with black. It is common in winter in the interior of the United States, and its flesh is highly esteemed. It breeds regularly from Minnesota northward, and occasionally much farther south. See DUCK.



BILL OF A WIDGEON.

a, profile; *b*, upper side; *c*, under side; showing serrations. (*Mareca Americana.*)

WIDMANN, vĭt′män, Joseph Viktor (1842—). A Swiss author, born at Nennowitz, Moravia, and educated at Heidelberg and Jena. He became director of a girls' boarding school at Berne in 1868, but left this work in 1880, when he was made literary editor of the Berlin *Bund*. His writings include narrative and lyrical verse as well as dramas and novels. Among them may be named *Erasmus von Rotterdam* (1865); *Arnold von Brescia* (1867); *Buddha* (1869); *Spaziergänge in den Alpen* (1885); *Jenseits von Gut und Böse* (1893); *Maikäferkomödie* (1897); and *Die Muse des Aretin* (1902).

WIDNMANN, vĭd′n-män, Maximilian von (1812-95). A German sculptor, born in Eichstätt. After studying under Eberhard and Schwanthaler in Munich, he spent three years (1836-39) in Rome. In 1849 he was made professor in the Munich Academy, and executed several public monuments in that city. More successful, though perhaps less numerous than the former, were his busts and statuettes. His works include statues of Orlando di Lasso (1848), Schiller (1863), Goethe (1868), Castor and Pollux (1877), all in Munich, and others at Bamberg, Regensburg, Würzburg, and elsewhere.

WID′NES. A municipal borough in Lancashire, England, at the head of the Mersey estuary, 13 miles southeast of Liverpool (Map: England, D 3). It is a great chemical manufacturing centre and also has iron foundries and copper works. Population, in 1901, 28,580.

WIDOR, vē′dôr′, Charles Marie (1845—). He studied at home under his father, and at Brussels under Lemmens on the organ and Fétis for composition, and in 1860 succeeded his father as organist at Saint François. In 1869 he became organist at Saint Sulpice, Paris. He succeeded César Franck as organ professor in 1890, and Dubois in 1896, as professor of counterpoint, fugue, and composition at the Paris Conservatory. Under the pen name of 'Aulētēs' he was the musical critic of *L'Estafette*. He was also director and conductor of the society 'La Concordia.' He is an acknowledged virtuoso on the organ and a skillful improviser, and his compositions for the organ rank with the most important of modern times. His compositions and writings include the two-act ballad *La Korrigane* (1880); music to the play *Conte d'Avril* (1885); to *Les Jacobites* (1885); the lyric drama *Maître Ambros* (1896); the pantomime *Jeanne d'Arc* (1890). Other compositions include several operas not yet produced; masses, anthems, and other church music; *Walpurgis Night* for chorus and orchestra (1880); two symphonies, and chorals, and considerable chamber music. His organ works include nine symphonies, and the celebrated *Symphony gotique*. He has also published many compositions for the violin, 'cello, piano, etc.

WIDOW (in law). See Jus Relictæ; Marriage; Succession; Dower.

WIDOW, The. A comedy probably entirely by Middleton, though ascribed to Fletcher and Jonson as well, written about 1616, and printed in 1652.

WIDOW BEDOTT PAPERS. A series of humorous sketches first published in *Neal's Saturday Gazette* and afterwards issued in book form (1855) by Frances Miriam Whitcher. Consult Hart, *Female Prose Writers of America* (New York, 1855).

WIDOW-BIRD. One of the group of weaver-birds (subfamily Viduinæ), dwelling in Western Africa, and remarkable for the gay plumage and long tails of the males, the females having a plain brown dress. The name was given originally by the Portuguese settlers to a species (*Chera procne*) which, excepting a buff and scarlet wing-bar, is wholly black, the color and long train suggesting the garb of a widow. One of the most remarkable species is illustrated herewith. Its body is not larger than that of a small finch. The head, throat, back, and wings are greenish brown, the nape and under parts dark yellow, and the breast deep red. The long tail is most curious. The middle pair of feathers have the webs greatly widened, and through the twisting of the shafts their inferior surfaces are vertically opposed; the next pair are produced to the length of about a foot, and droop in a graceful curve; and each has attached to its base a long hair-like filament. This and some other species are often kept in Europe as cage birds for the sake of their song as well as their plumage. Erroneous spellings of this name are "whydah-bird" and "vida-bird."

LONG-TAILED WIDOW-BIRD
(*Vidua paradisea*).

WIDOW'S TEARS, The. A coarse but humorous comedy by Chapman (1612). Its source is Petronius's story of the Ephesian widow.

WIECK, vēk, Friedrich (1785-1873). A German musical instructor, born at Pretzsch, near Wittenberg. Having at first studied theology at Wittenberg, he turned to music, established a piano factory and music store at Leipzig, but soon devoted himself entirely to teaching the pianoforte according to a rational method of his own, which presently brought him considerable reputation and was successfully put to the test by the brilliant achievements of his daughters Klara (wife of Robert Schumann) and Marie (1832—). In 1840 he removed to Dresden, where he also gave vocal instruction. Most of his extensive pedagogical experiences may be found incorporated in the publication *Klavier und Gesang* (3d ed., 1878). Consult the biographies by Meichsner (Leipzig, 1875) and Kohut (Dresden, 1888); also Joss, *Friedrich Wieck und sein Verhältnis zu Robert Schumann* (ib., 1900); id., *Der Musikpädagoge Friedrich Wieck und seine Familie* (ib., 1902).

WIED, vēt, Maximilian, Prince of (1782-1867.) A German naturalist, born at Neuwied. He undertook two journeys of scientific investigation, one through Brazil (1815-17) and one through the United States (1832-34). These he described in *Reise nach Brasilien in den Jahren 1815-17*, with atlas (1819-20); *Abbildungen zur Naturgeschichte Brasiliens* (15 parts, 1823-31); *Beiträge zur Naturgeschichte Brasiliens* (1824-33); *Reise nach Nordamerika*, with engravings and atlas (1838-43).

WIEDEMANN, vē′de-män, Alfred (1856—). A German Egyptologist, son of the following. He was born in Berlin and educated at the University of Bonn, where he became professor of Egyptology in 1891. He wrote: *Aegyptische Geschichte* (1884; supplement, 1888); *Die Religion der alten Aegypter* (1890); and *Die Toten und ihre Reiche im Glauben der alten Aegypter* (2d ed., 1902), trans. from 1st ed. under the title *The Ancient Egyptian Doctrine of the Immortality of the Soul* (1895).

WIEDEMANN, Gustav (1826-99). A German physicist and chemist. He was born in Berlin and studied at the university in that city, where in 1851 he became a privatdocent. In 1854 he was appointed professor at Basel; in 1863 he was called to the Polytechnic School at Brunswick; in 1886 he went to Karlsruhe, and in 1871 he became professor of physical chemistry at Leipzig, taking the chair of physics in 1887. He carried on many researches in magnetism and electricity and studied the conduction of heat and electricity by solids, electrolysis, magnetic properties of bodies, and devised a number of species of original apparatus. He was the author of *Die Lehre vom Galvanismus und Elektromagnetismus*, the third edition of which was published in four volumes under the title of *Lehre von der Elektricität* (1881-85), and a fourth edition in 1893. Wiedemann, at the death of Poggendorff (q.v.) in 1877, assumed the direction of the *Annalen der Physik und Chemie*, to which he added the *Beiblätter* as a supplement.

WIEDERSHEIM, vē′dẽrz-hīm, Robert (1848—). A German comparative anatomist. He studied at Tübingen and Würzburg, and was for a while prosector under Kölliker in Würzburg, and in 1876 became professor of anatomy at Freiburg. His most important works are his textbooks of vertebrate comparative anatomy, *Lehrbuch der vergleichenden Anatomie der Wirbelthiere* (1882, 1886); *Grundriss der vergleichenden Anatomie der Wirbelthiere* (1884, 1888, 1893, 1898), translated into English by W. N. Parker under the title *Elements of the Comparative Anatomy of Vertebrates* (1886, 1897). Among his other important works are *Der Bau des Menschen als Zeugniss für seine Vergangenheit* (1887), and *Das Gliedmassenskelet der Wirbelthiere* (1892).

WIELAND, vē′länt, Christoph Martin (1733-1813). A German author, one of the most important of the classic period of German literature, born at Oberholzheim, near Biberach, in Württemberg. He went to Tübingen (1750) to study law, but was more interested in literature and the classics, and returned to his family much affected by the mystical piety of Klopstock, as he tells us in his *Empfindungen eines Christen*, but also under the spell of the skeptical French philosophy of the time. At Zurich he was welcomed (1752) by Bodmer (q.v.), who called his attention to biblical epical themes and enlisted his aid in a controversy with the Anacreontic school of Gleim (q.v.). In the course of this occupation Wieland himself was attracted to Greek literature and in poetic contributions to the psychology of modern love broke irretrievably with the Puritans of Zurich. In 1759 he went to Bern to accept a position as private tutor. Here his naturally light heart betrayed him into several love adventures; but in 1760 he obtained an office in Biberach. In intimate association with the fascinating Sophie von La Roche, who played an important part in Goethe's life, Wieland hovered for a time on the brink of thoughtless hedonism. but presently outgrew this, married a homespun bread and butter wife (1765), and settled down to the daily round of a model paterfamilias amid a circle of fourteen children. During these years Wieland was writing fiction that made him a favorite with the German nobility and an Ichabod to his former associates. The versified *Nadine* (1769) is Greek in its joy of life, the prose *Don Silvio von Rosalva* (1764) is a satire on idealism, and the *Comic Tales* (*Komische Erzählungen*, 1766) pass the border line of frivolity. Then study of Fielding and other English novelists appears in *Agathon* (1767) and the versified tale *Musarion* (1768); and the influence of Shakespeare, twenty-two of whose plays he had translated before 1767, is also unmistakable. Wieland now attempted in *Der goldene spiegel* a description of an ideal State (1772), after obtaining a professor's chair in the University of Erfurt (1769), whence he was summoned in 1772 to Weimar to become tutor to the young Prince Karl August and his brother. At Weimar Wieland remained honored and respected till death. The added dignity naturally produced greater literary seriousness. His critical quarterlies, *Der Deutsche Merkur* (1773-95), *Attisches Museum* (1796-1804), and *Neues Attisches Museum* (1808-09), spread and confirmed his influence, which was now toward a serene optimism. purer taste, and the diffusion of culture. Thus he moderated with a discriminating sympathy the excesses of the writers of the period of Storm and Stress (q.v.). The first important work of the Weimar period was *Die Abderiten* (1774). a satirical novel in the interest of political cosmopolitanism. Then Goethe, and soon afterward Herder, came to Weimar and gave new wings to Wieland's genius, leading him back to verse and to the unworked mine of mediæval Germany, whence he drew the inspiration of *Geron der Adelige* and of his best known epic, the romantic *Oberon* (1780). His later romances. *Peregrinus Proteus* (1791) and *Aristipp* (1800), are of inferior interest. and his most valuable contributions to literary culture in the last thirty years of his life were his translations of the *Satires* and *Epistles* of Horace (1782-86). the *Letters* of Cicero (1808-12), the *Dialogues* of Lucian (1788), and parts of Xenophon. Aristophanes, and Euripides. He took an active part in critical journalism up to 1809, and from 1794 to 1802 superintended an edition of his *Works* (45 vols.). His death was that of a calm Epicurean. Of all the Weimar galaxy he is the most recreative, the most delightful, the most genial, though others be more philosophical, more serious, more versatile or profound. Wieland first called German attention generally to Shakespeare and to the Middle Ages; he first made stylistic elegance and refinement natural to German verse and prose.

Wieland's complete *Works* are edited by Gruber (53 vols., Leipzig, 1818-28, and in 40 vols., Berlin, 1867-75). Of selections the editions are numerous. His *Letters* are collected in *Ausgewählte Briefe an verschiedene Freunde* (Zurich, 1815-16); *Auswahl denkwürdiger Briefe* (Vienna, 1815); *Briefe an Sophie von La Roche* (Berlin, 1820); and Hassencamp, *Neue Briefe Wielands, vornehmlich an Sophie von La Roche* (Stuttgart, 1894). The *Abderiten* is translated by Christmas as *The Republic of Fools* (London, 1861); the *Oberon* by Sotheby (3d ed., London, 1826). There are *Lives* of Wieland by Gruber (Leipzig, 1827-28), Hallberg (Paris, 1869), Pröhle (Berlin, 1877), Ofterdingen (1877). Consult also: Loebell, *Entwickelung der deutschen Poesie* (Brunswick, 1858); Ranke, *Zur Beurtheilung Wielands* (Marburg, 1885); Hirzel, *Wieland und Martin und Regula Künzli* (Leipzig, 1891).

WIELEMANS, vē'le-mäns, Alexander von Monteforte (1843—). An Austrian architect, born in Vienna, and trained in the academy of that city under Van der Nüll and Schmidt. In 1875 he began the Palace of Justice, which was completed in 1881. His later buildings include the *Haus zum goldenen Becher*, also in Vienna; the Wodianer palace in Budapest; the Redoutensäle at Innsbruck; the Rathaus and court-houses at Gratz; and the court-house and a building for the Musik- und Kunstverein at Prague.

WIELICZKA, vyĕ-lĭch'kȧ. A town in the Crownland of Galicia, Austria, seven miles southeast of Cracow, on a branch of the Austrian State railway (Map: Austria, G 2). The population is Polish, and in 1900 numbered 6293. The town is important only for its rock-salt mines, which are the most famous in the world, and in large part supply the Austro-Hungarian monarchy. These mines, reaching a depth of more than 900 feet, form a subterranean town, extending about two and one-half miles from east to west and about 4000 feet from north to south. The galleries traverse seven levels and aggregate 58 miles in length. Some of the halls are very large and contain statues and other decorations carved from the salt. There are several ponds. Eleven shafts lead down to the mines. About 1000 workmen are employed. There were produced in 1894 28,416 metric tons of rock salt and 51,757 metric tons of prepared salt. It is not known how long the mines have been in operation, but there is evidence that they were worked as early as 1044. From the possession of the Poles the mines fell to Austria in 1772; in 1809 they were shared by Austria and the Dukedom of Warsaw, and in 1814 went again to Austria alone. There were inundations in 1868 and 1879. The land on which the town of Wieliczka stands has settled somewhat. Consult Windakiewicz, *Das Steinsalzbergwerk in Wieliczka* (Freiberg, 1896).

WIENBARG, vēn'bärk, Ludolf (1802-72). A German author, born at Altona. He studied theology and philosophy at the universities of Bonn and Kiel, and afterwards devoted himself to literature and became associated with the 'Young Germany' party. His writings on æsthetics and literary history were a great power in their time. Most important among his publications are: *Holland in den Jahren 1831 and 1832* (1833); *Die neueste Litteratur* (1835); *Geschichtliche Vorträge ueber altdeutsche Sprache und Litteratur* (1838); and *Geschichte Schleswigs* (1862). Consult the monograph by Schweizer (Leipzig, 1896).

WIENER-NEUSTADT, vē̆'nẽr-noi'stȧt. A town of Lower Austria, situated 28 miles south of Vienna (Map: Austria, E 3). The town is overlooked by the old castle of the dukes of Babenberg, now occupied by a military academy, founded by Maria Theresa. The castle contains a fine Gothic chapel of the fifteenth century. There are extensive manufactures of machinery, flour, brass goods, locomotives, bells, glycerin, paper, leather, and ammunition. Population, in 1900, 28,438.

WIENIAWSKI, vē-nyäv'skē, Henri (1835-80). A Polish violinist, born in Lublin. He was a pupil of Çlavel and of Massart at the Paris Conservatory, and his progress was so rapid that when only eleven years old he won the first prize. In 1848 he went with his mother to Russia and gave his first concerts in Saint Petersburg and Moscow. In 1849 he returned to Paris, reëntered the Conservatory, and took up the study of harmony under Colet, obtaining the second prize for that subject in 1850. At the age of eighteen he went on a tour through Poland, Russia, Belgium, Holland, Germany, and England, and was everywhere received with enthusiasm. In 1864 he was appointed solo violinist to the Emperor of Russia, and after the retirement of Vieuxtemps from the Brussels Conservatory succeeded him as professor of the violin. From 1860 to 1872 his permanent residence was in Saint Petersburg, in the conservatory of which he taught from 1862 to 1867. Together with Anton Rubinstein he toured the United States in 1872. Most of his compositions remain in manuscript. His published works consist of two concertos, several fantasias, salon pieces, and violin studies. He died in Moscow.—His brother Joseph (1837—) was an accomplished pianist, and, after teaching and conducting musical societies in Moscow and Warsaw for several years, became professor at the Conservatory in Brussels.

WIERTZ, vērtz, Antoine Joseph (1806-65). A Belgian painter. He was born at Dinant, and at the age of ten painted a portrait without any previous instruction in art. When twelve years old he is said to have discovered for himself the art of wood-engraving. At fourteen he began to study at the Academy of Antwerp under Herreyns and Van Brée, making Rubens his model, and in 1832 won the Prix de Rome. In Italy he modeled his art upon Michelangelo, and as the fruit of his assiduous reading of Homer he produced, in 1835, an enormous canvas, the "Combat Over the Body of Patroclus," thirty feet in length, with more than a dozen life-size figures. The picture, viewed by countless artists of all nations, produced a deep impression, and Thorwaldsen pronounced the young artist a giant.

On his return Wiertz settled first at Liège, and in 1848 at Brussels, where he painted his masterpiece, "The Triumph of Christ," and where, in 1850, the Government built for him, after his own design, a gigantic studio, now known as the Musée Wiertz, in which all his historical, allegorical, and ideal pictures are united, and which he bequeathed to the nation. There he executed the most remarkable of his purely ideal creations and his realistic pictures, the most original and interesting of all his works. There he also carried on chemical experiments, resulting in the discovery of a new process of painting, combining the advantages of oil and fresco, which he called *peinture mate*, or painting with a dull surface. Always seeking to give visible expression to an idea, Wiertz's undisciplined imagination often indulged in morbid representations, the mere titles of which will indicate their character: "A Second After Death," "The Child Burned," "Precipitate Inhumation," "The Suicide," "Hunger, Folly, and Crime," "A Scene in Hell," "Thoughts and Visions of a Head Cut Off." He was about to depict the history of the human race in a series of epic pictures, when death summoned him from the midst of his labors, while still in the vigor of his power. Among his many literary productions, brought out in swift succession, may be cited *L'eloge de Rubens* (1840), and *L'école flamande de peinture* (1863), which was crowned by the Royal Academy of Belgium. For his biography, consult: Watteau (Brussels, 1865), and Labarre (ib., 1867); the sketch in the *Art Journal* (London, 1869); and Atkinson, in the *Portfolio* (ib., 1875).

WIESBADEN, vēs'bä-den. A city of Prussia, in the Province of Hesse-Nassau, previous to 1866 the capital of Nassau, six miles north of Mainz (Map: Prussia, C 3). Altitude, 385 feet. It is a charming city and one of the most fashionable and popular summer resorts of Europe, its 30 hot saline springs being visited annually by about 130,000 persons. Its climate is moderate.

Wiesbaden lies for the most part in a fan shape, the streets of the town proper stretching away from the Wilhelmstrasse, which, in a straight line nearly north and south, separates the town proper from the Kurhaus, the adjacent pleasure grounds, and the attractive residence section on the east. The Wilhelmstrasse is the leading boulevard and the centre of local life. Here, toward its northern end, on the right, is the fine Kursaalplatz, containing two cascades, with the Old Colonnade on the north, the New Colonnade and the splendid modern Royal Theatre on the south, and the Kurhaus on the east. The Kurhaus was erected in 1809-10. It is dignified by Greek colonnades combining both Doric and Ionic features, and contains a handsome main room. In the rear are a large fountain and basin marking the entrance to the beautiful Kurhaus Park. Northwest of the Kursaalplatz is the modern Trinkhalle, with a pavilion and colonnades. Here is the celebrated Kochbrunnen (temperature 156° F). Southwest, in the old part of the town, may be seen the fragment of a Roman wall—the Heidenmauer—over 60 feet long. The adjacent Michelsberg is now crowned by a sightly modern synagogue. Eastward and adjacent to the Wilhelmstrasse are the market place, where are to be found the modern brick Markt Kirche (Protestant)—a striking Gothic structure; the royal palace, completed in 1840, with interesting statuary by Schwanthaler; and the fine modern late-Renaissance town hall. The last contains the Fischbach Textile Museum.

The Museum, situated near by on the Wilhelmstrasse toward its southern end, contains antiquities, natural history specimens, the royal collections of paintings, and a library of 120,000 volumes. The antiquities include Roman, Alemannian, and Frankish relics. Its noteworthy Jupiter Column dates from A.D. 221. To the southeast of the Museum are the splendid Renaissance Augusta Victoria Baths—a new establishment. The modern Pauline Palace, in the style of the Alhambra, is now in private hands. On the extreme western edge of the city is the new conspicuous Ring Kirche (Protestant). Not far distant, to the southeast of the Neroberg on the north, is a striking Greek chapel—a mausoleum completed for a Russian grand duchess in 1855.

There are in the city an agricultural institute and experiment station, music and architectural schools, special medical schools, and a chemical laboratory. The Nassau Art Union has a permanent display of paintings. Wiesbaden is provided with a municipal hospital, several celebrated eye institutions, and a military hospital (in a modern building in the Italian style). The trade in wine is heavy. The population in 1900 was 86,111.

Wiesbaden is the Mattiacum of the Romans—a fortress said to have dated from the time of Drusus. Its waters were known to Pliny.

WIESELER, vē'ze-lēr, FRIEDRICH (1811-92). A German archæologist and philologist, born at Altencelle, Hanover, and educated at Göttingen and Berlin. In 1854 he was appointed professor of archæology and philology at Göttingen. Here he became known for his archæological seminar, the first of its kind in Germany (1847). His researches took him through many parts of Europe, as well as Asia Minor, and he was the first to date correctly the silver objects discovered at Hildesheim. His publications include: *Conjectanea in Æschyli Eumenides* (1839); *Ueber die Thymele des griechischen Theaters* (1847); *Das Satyrspiel* (1848); and *Theatergebäude und Denkmäler des Bühnenwesens bei den Griechen und Römern* (1851), but his most comprehensive and valuable contribution to literature is his new adaptation and continuation of Karl Otfried Müller's *Denkmäler der alten Kunst* (1854-56).

WIESNER, vēs'nēr, JULIUS (1838—). An Austrian botanist, born at Tschechen, near Brünn, and educated there, at Jena, and at Vienna. He was appointed professor of the anatomy and physiology of plants and director of the institute of plant physiology at the University of Vienna in 1873. He became known through his investigations of chlorophyll, of vegetable cell tissue, of the relation between light and vegetation, of the laws of plant growth, and the possibilities of plant movement. He wrote: *Die technisch verwendeten Gummiarten, Harze und Balsame* (1869); *Die natürliche Einrichtung zum Schutze des Chlorophylls* (1876); *Die Entstehung des Chlorophylls in der Pflanze*

(1877); *Das Bewegungsvermögen der Pflanzen* (1881); *Elemente der wissenschaftlichen Botanik* (1881-89 et seq.); and *Pflanzenphysiologische Mitteilungen aus Buitenzorg* (1894 et seq.).

WIFE FOR A MONTH. A comedy by John Fletcher, produced before 1623, printed in 1647. The scene is Naples, whose Duke unsuccessfully tries to disgrace a lady by offering her to any bidder for a month.

WIFE-HATER BIBLE. See BIBLE, CURIOUS EDITIONS OF.

WIF'FEN, BENJAMIN BARRON (1794-1867). An English editor and biographer. He was a younger brother of Jeremiah Holmes Wiffen (q.v.) and was born of Quaker parentage at Woburn, Bedfordshire. Having become interested in Spanish literature, he visited Spain in 1839, and again in 1842, and did much to rescue from oblivion the works of early Spanish reformers. With the assistance of Don Luis de Usoz y Rio he published the collection of *Obras Antiquas de los Espanōles Reformados* (20 vols., 1847-65). He also wrote the *Life and Writings of Juan de Valdés* (1865) to accompany the English translation of the works of Valdés by J. T. Betts, besides other biographical sketches.

WIFFEN, JEREMIAH HOLMES (1792-1836). An English poet and translator. He was born of Quaker parentage at Woburn, Bedfordshire. He was for a time a schoolmaster, and he acquired a knowledge of the classics, Hebrew, French, Italian, and later of Spanish and Welsh. In 1821 he was appointed librarian at Woburn Abbey to John Russell, sixth Duke of Bedford. Among his published works are: *Aonian Hours* (1819); *Julia Apinula and Other Poems* (1820); a translation of Tasso's *Jerusalem Delivered* (1824); and *Historical Memoirs of the House of Russell* (1833).

WIG (abbreviation of *periwig, perwig, peruique*, etc., variants of *peruke*, from OF., Fr. *perruque*, from OIt. *perucca*, It. *perrucca, parruca*, wig, from OIt. *peluccare, piluceare, pilluccare*, to pull out hairs, from Lat. *pilus*, hair). An arrangement of false hair for concealing baldness, or for the supposed adornment of the head. The custom of wearing wigs dates from remote antiquity. Wigs worn as early as B.C. 2000 have been found on Egyptian mummies and indications of the fashion are seen on the Assyrian sculpture. From the East the fashion traveled to Greece and Rome. Xenophon mentions that Astyages wore an immense wig. Several of the Roman emperors wore wigs. Roman ladies under the Empire wore large masses of golden red hair imported from Gaul (see HAIR-DRESSING), a fashion which a council of the Church ended in 672. It is interesting to note that the Roman Catholic Church never sanctioned the fashion. However, in the sixteenth century false hair began to be extensively used by the ladies of Europe; Queen Elizabeth is said to have had 80 different coiffures of false hair. But this periwig was an imitation of the real hair or an addition to it, and not the distinctive feature of costume which it became after its adoption by Louis XIII. to conceal his baldness. By means of the wig, the courtiers imitated the heavy flowing locks of Louis XIV., and then the fashion of wig-wearing became fully established in Europe. For more than a century no gentleman of fashion could appear without one. Such was the extravagance in this article of dress that as much as three guineas an ounce was paid in England for fine qualities of hair, and wigs were made at a cost of £140. It was only toward the end of the eighteenth century that the unnaturalness of this ornament appears to have been thought of, and it began to be superseded by the queue with hair-powder (q.v.). Clergymen and military officers long clung to the style and it has not yet been discarded on the English bench. The full-bottomed wig is worn by the Speaker of the House of Commons. The wig of the judges has flaps formed of precise curls hanging down in front and also resembles the wig of Queen Anne. The undress wig of the judges and that of barristers and advocates are relics of the old tie wig, in which the lower part of the wig is tied. In Queen Anne's reign the fashion became most extreme in England. She patronized the full-bottomed wig, an immense headdress which parted into two bunches of ringlets, one on each breast, and floated down the back and shoulders.

WIG'AN. A manufacturing town and Parliamentary borough, in Lancashire, England, on the Douglas, 15½ miles south-southeast of Preston, and 18½ miles northeast of Liverpool (Map: England, D 3). An ancient town, irregularly built, Wigan has made rapid architectural and municipal progress. The twice restored parish church of All Saints is a stately edifice, dating from the fourteenth century. There are fine modern public buildings. The municipality owns the gas and water supplies and maintains a cemetery, park, markets, free library, baths, and schools for technical instruction. It has extensive collieries, and important iron and cotton industries. Population, in 1891, 55,013; in 1901, 60,770.

WIG'FALL, LOUIS TREZEVANT (1816-74). An American soldier and politician, born in Edgefield District, S. C. He was educated at the College of South Carolina, but served as lieutenant of volunteers in the Seminole War before graduating. He studied law at the University of Virginia, and after admission to the bar removed to Marshall, Tex., in 1846. He served in the Lower House of the Texas Legislature in 1849-50, and in the Senate in 1857-58 and 1859-60. He was elected to the United States Senate, took his seat January 4, 1860, and became at once known as a defiant advocate of secession. He was expelled July 11, 1861, when he did not appear at the extra session. Meanwhile, he had served as an aide to General Beauregard at the bombardment of Fort Sumter, and on April 13th made his way to the fort to counsel surrender, as further resistance was useless. He became colonel of the Second Infantry in the Confederate Army August 28th, and at the same time served as Representative in the Confederate Congress. He was promoted to brigadier-general in October, 1861, but resigned February 20, 1862, to take his seat in the Confederate Senate, of which he remained a member until the end of the war. Then he lived in England for several years and on his return took up his residence in Baltimore.

WIG'GIN, KATE DOUGLAS (1857—). An American writer, born in Philadelphia, Pa.; the daughter of Robert N. Smith, a lawyer. She was early taken by her parents to Hollis, Maine; was educated at Abbott Academy, Andover, Mass.; removed to California in 1876, studied kindergarten methods at Los Angeles under Emma Marvedel, taught for a year in the Santa Barbara College, and then organized at San Francisco the first free kindergarten on the Pacific Coast, meeting with great success as a teacher. In 1888 she removed to New York City. She was married in 1880 to Samuel Bradley Wiggin, a San Francisco lawyer, who died in 1889, and in 1895 she was married to George C. Riggs. Among her published stories, several of which have been widely popular, are: *The Story of Patsy* (1889); *Timothy's Quest* (1890); *A Cathedral Courtship* (1893); *Polly Oliver's Problem* (1893); *Marm Lisa* (1896); *Penelope's Progress* (1898); *Penelope's Experience in Ireland* (1901); *Diary of a Goose Girl* (1902); and *Rebecca of Sunnybrook Farm* (1903). She also published: *The Birds' Christmas Carol* (1888); *Nine Love Songs and a Carol* (1896); and, with her sister, Nora A. Smith, *Froebel's Gifts* (1895); *Froebel's Occupations* (1896); and *Kindergarten Principles and Practice* (1896).

WIGGLESWORTH, wĭg'lz-wẽrth, MICHAEL (1631-1705). A New England clergyman and poet, born in England. He was brought to Charlestown at the age of seven, but was soon taken to New Haven. He graduated at Harvard (1651), served as tutor there (1652-54), preaching occasionally in Charlestown, and afterwards in Malden, where he was settled as pastor from 1657 till his death. In 1663 he went to Bermuda in search of health. During this time he studied medicine, and, having resumed preaching in 1686, practiced both professions thereafter. He is best known for his *Day of Doom* (1662), a poem on the Day of Judgment, according to the views current at his time. This poem was immensely popular for more than one hundred years in America, but is now regarded chiefly as a literary curiosity. Wigglesworth wrote also *God's Controversy with New England* (1662; first published 1871 by the Massachusetts Historical Society), and *Meat Out of the Eater, or Meditations Concerning the Necessity, End, and Usefulness of Affliction to God's Children* (1669), which was also very popular. Minor poems were usually appended to the *Day of Doom*, and are in a modern edition (1867). Consult the *Life* by John Ward Dean, with letters of Wigglesworth and a catalogue of his library (1871).

WIGHT, ISLE OF. An island in the English Channel, included in Hampshire, and separated from the mainland of England by the Solent (q.v.) (Map: England, E 6). It is 56 miles in circuit, and has an area of 145 square miles. Population, in 1901, 82,387. The soil of the northern half of the island is for the most part a stiff clay, growing oats; of the southern, a red loam which produces crops of barley. Red wheat is grown in other parts of the island. The chalk downs afford admirable pasturage for sheep, celebrated for the pureness of their wool. They furnish the London market with spring lamb. The chief exports are wool, corn, flour, cement stones (septaria), and white glass-house sand. Newport is the capital; the other towns are Ryde, Cowes, and Ventnor, all exceedingly popular summer resorts. Near Cowes is the royal domain of Osborne, formerly a favorite residence of Queen Victoria, and after her death presented to the nation by Edward VII. Cowes is noted as the great English yachting centre. There is railway communication between Ryde and Ventnor, and between Cowes and Newport. The chief physical feature of the island, to which it owes its shape and much of its beauty, is an undulating range of chalk downs, extending from the Culver cliffs on the east to the Needles on the west, rising to its greatest elevation in Mottiston Down, 661 feet above the sea. The river Medina, rising near the southern extremity of the island, flows north through a gap in this range, expands into a tidal estuary below Newport, and flows into the Solent at Cowes. A second range of chalk downs, of greater elevation—Saint Boniface Downs, 783 feet, etc.—rises at the southern point of the island, and expands into a broad promontory, the southern face of which forms the picturesque district known as the Undercliff, or 'back of the island,' in which is situated Ventnor. The whole of this part of the island is sheltered from cold winds, and enjoys a well-merited reputation as a residence for invalids suffering from consumption or any other pulmonary disease. Its remarkable healthfulness is attested by the death-rate of the district, which is the lowest in the kingdom; while the mildness of its climate is borne witness to by the luxuriance of the myrtles and other exotics which live through the winter without protection.

The great variety of strata displayed within so small an area renders the Isle of Wight one of the best available localities for the geological student. In Alum Bay, at the western extremity of the island, the rapid succession of vertical layers of sands and clays of bright and varied hue produces a singular and beautiful effect. Isolated masses of chalk, which in consequence of their superior hardness have survived the marine and atmospheric waste, form the well-known Needles, at the western opening of the Solent, and the picturesque rocks of Freshwater Bay. The cliffs of the Undercliff are of the upper greensand or firestone, underlying the chalk. Below this comes the gault or blue marl. To the action of the land-springs upon this formation the landslips to which the back of the island owes its beauty are due. The lower greensand succeeds the gault, occupying the greater part of the area between the north and south chalk downs. This presents a wall of cliff to the sea, diversified with many narrow picturesque gorges, locally known as chines. The fresh-water Wealden formation is the lowest visible in the island. Bones of the colossal iguanodon and other saurians are found in this formation. The antiquities include sepulchral barrows on the downs, Saxon burial places in several localities, the remains of a Roman villa, with a tessellated pavement, at Carisbrooke, and the scanty remains of Quarr Abbey, near Ryde. Carisbrooke Castle is a fine ruin, occupying a commanding position.

The Isle of Wight is supposed to have been the tin mart of the Greek traders mentioned under the name of *Ictis* by Diodorus Siculus. The Romans knew it as *Vecta* or *Vectis*, which is the Latinized form of the native name. It was conquered for the Romans by Vespasian in the reign of Claudius (A.D. 43). Cerdic, the founder of the

Kingdom of Wessex, took the island in A.D. 530. In A.D. 661 it was reduced by Wulphere of Mercia, and given to Ethelwold, King of Sussex, from whom it was wrested (A.D. 686) by Ceadwalla of Wessex, to whom, under the influence of Wilfrid, Archbishop of York, the island owed the introduction of Christianity. During the three centuries preceding the Norman Conquest it was repeatedly devastated by the Danish pirates, who made it their stronghold to which they retired with their plunder. William the Conqueror gave it to his kinsman, Fitz-Osborne; Henry I. transferred it to the family of De Redvers, in whose hands it remained till the reign of Edward I., when it passed by sale to the Crown. During the French wars of Edward III. and his successors the island was repeatedly invaded and pillaged by the French. At the close of the reign of Henry VIII. the Armada dispatched by Francis I., under the command of D'Annebault, made several landings on the coast, and inflicted some damage, but was ultimately driven back by the prowess of the islanders. The most interesting event in the history of the island is the imprisonment of Charles I. in Carisbrooke Castle, after his flight from Hampton Court.

WIGHT, Moses (1827—). An American genre and portrait painter, born in Boston, Mass. He practiced portrait painting until 1851, then studied for three years in Paris under Hébert and Bonnat. He returned to the United States, but in 1865 settled permanently in Paris. His ideal paintings include: "Lisette;" "Confidants;" "John Alden and Priscilla;" "Le vieux document." Among the better known of his portraits are those of Humboldt, Everett, Sumner, and Josiah Quincy. Many of his works are in private possession in Boston.

WIGHT, Orlando Williams (1824-88). An American physician and translator, born in Centreville, N. Y. He was educated at the Rochester Collegiate Institute, was ordained as a Universalist clergyman and accepted a call to Newark, N. J. (1850). Three years afterwards he left the Church to engage in literary work. In 1865 he graduated in medicine at the Long Island College Hospital; in 1874 was appointed State geologist and Surgeon-General of Wisconsin, and afterwards served as health commissioner of Milwaukee (1878-80), and of Detroit. His publications include: *History of Modern Philosophy* (trans. with F. W. Ricord from the French of Victor Cousin, 1852); *Life of Abélard and Héloise* (1853 and 1861); *Standard French Classics* (14 vols., 1858-60); *Pascal's Thoughts* (1859); *The Household Library* (18 vols., 1859 et seq.); six volumes of translations from Balzac (1860); Henri Martin's *History of France* (with Mary L. Booth, 1863); and *A Winding Journey Around the World* (1888).

WIGHT'MAN, William May (1808-82). A bishop of the Methodist Episcopal Church, South. He was born in Charleston, S. C.; graduated at Charleston College (1827); entered the South Carolina Conference (1828); acted as financial agent for Randolph-Macon College, Va. (1834-38); was professor of English literature in the same college 1838; editor of the *Southern Christian Advocate* (Charleston, 1840-54); president of Wofford College, Spartansburg, S. C. (1854-59); and chancellor of the Southern University, Greensboro, Ala. (1859-66). He was elected bishop in 1866. He was a prolific writer, but published in book form only a *Life* of Bishop Capers (Nashville, 1858).

WIG'TOWN. The southwesternmost county of Scotland, bounded by the Irish Sea, the North Channel, and the counties of Ayr and Kirkcudbright (Map: Scotland, D 5). Area, 491 square miles. It is deeply intersected by arms of the sea, and consists mainly of rolling hills and moorland. Large crops of oats are raised, but most attention is paid to cattle-raising and dairying. Population, in 1901, 32,683. County town, Wigtown.

WIGWAM (Etchemim Algonquian *weekwahm*, house). In general, a native American house, especially one made of bark or matting. The typical wigwam consists of a framework of saplings set in the ground, connected by longitudinal poles, and bent inward and lashed together by means of withes or thongs in such a manner as to form a rounded roof; the whole covered with sheets of birch bark sewed together and attached to the frame by means of flexible rootlets. The better structures were provided with a smoke hole and wind guard in the centre of the roof, and a deerskin curtain to cover the doorway, which faced the east. South of the birch-tree zone mats made of rushes, etc., were sometimes substituted for the sheets of bark, although most of the mat-covered structures are elongated and dome-shaped in form. In some districts the walls were of slender saplings wattled together and the roof of bark or skin. Some of these forms grade into the *tipi*, or tent of poles and buffalo skins; the *wickiup*, or house of shrubbery usually wattled; the *ki*, or grass houses of the prairies and deserts; the earth lodge, of which the Navajo *hogan* may be taken as the type; and the *pueblo* of adobe or stone. The native houses were all invested with a certain sacred character, and each type was constructed with care according to fixed standards, usually in conformity with ritualistic observances, extending from the gathering of material to the ceremonial installation of household deities without which no primitive habitation is complete. See Indians.

WIJNANTS, vī'nänts, Jan. A Dutch painter. See Wynants.

WI-JU, wē'jo͞o' (Sinico-Korean, 'Region of Rectitude'). A walled city and port of Korea, in the Province of Phyŏng-an, situated on the left bank of the estuary of the Yalu-kiang (q.v.), 12 miles from its mouth and opposite the Manchurian treaty port of An-tung; latitude 39° 59′ N., longitude 124° 38′ E. (Map: Korea, F 4). It is to be the terminus of the great trunk railway from Fu-san in the south, through Seoul, 'the capital,' and Songdo, now in course of construction. Under the old régime it was through Wi-ju and An-tung that the annual tribute-bearing mission to Peking passed, accompanied by a large number of merchants bound for the fair held at the 'Korean Gate,' near Fung-hwang T'ing, until the return of the mission from Peking. It was at this point that the Manchus in 1627 crossed the ice, invaded Korea, and first exacted the tribute, and it was here that the Japanese crossed over into Manchuria and conquered it as far as the Liao, October, 1894.

WILAMOWITZ-MÖLLENDORF, vĭ'lȧ-mō'-vĭts mĕl'*en*-dôrf, ULRICH VON (1849—). A German classical scholar. He was born at Markowitz, Posen, and was educated at the universities of Bonn and Berlin. In 1874 he became privatdocent in Berlin, and in 1876 professor of classical philology in Greifswald. In 1883 he was called to a similar position at Göttingen, and in 1897 to Berlin, where he was also made a member of the Academy of Sciences and a director of the German Archæological Institute. His works include: *Analecta Euripidea* (1875); Haupt's *Opuscula* (1876); *Callimachus* (1882); translations of Æschylus's *Agamemnon* (1885) and *Oresteia* (1896); Euripides's *Hippolytus* (1891) and *Heracles* (noteworthy for its introduction); *Aristoteles und Athen* (1893); *Bakchylides* (1898); and the *Persians* of Timotheus (1903).

WIL'BERFORCE, SAMUEL (1805-73). A distinguished English bishop. He was born at Clapham, and privately educated until his matriculation at Oriel College, Oxford. He was ordained deacon in 1828 and priest a year later, after which he became rector of Brightstone in the Isle of Wight and remained there for ten years. He became Archdeacon of Surrey in 1839 and Canon of Winchester in 1840, in which year he also took the living of Alverstoke in Hampshire. In 1845 he was made Dean of Westminster. Here he remained only a few months, however, becoming Bishop of Oxford in October. His position here was unusually difficult, owing to the excitement caused by the ferment of the Oxford Movement. The new Bishop, however, took firm hold of his diocese and positively transformed it within a short time. Among other activities, he founded a theological college at Cuddesdon and a training college for schoolmasters at Culham. He soon became recognized as a power in the House of Lords and in the national life generally. He was the prime mover in the revival of Convocation (q.v.), and took a leading part in the controversies over *Essays and Reviews*, the Hampden election, and the Colenso case. In 1869, on the resignation of Bishop Sumner of Winchester, he was translated to the vacant see, which gave him opportunities for more extended work. Only four years later, however, he was killed by a fall from his horse, July 19, 1873. Consult: his *Life*, by Canon Ashwell and his son Reginald Wilberforce (London, 1879); also a revised biography by Reginald Wilberforce alone (ib., 1888); another by Daniells (ib., 1891); Burgon, in *Lives of Twelve Good Men* (ib., 1888); and references in most of the works cited under OXFORD MOVEMENT.

WILBERFORCE, WILLIAM (1759-1833). An English statesman and philanthropist, born at Hull, in Yorkshire, August 24, 1759. While at school he addressed a letter to a York paper "in condemnation of the odious traffic in human flesh," a subject he seems never afterwards to have lost sight of. At seventeen he entered Saint John's College, Cambridge, and in due time he passed his examinations with credit. On attaining his majority he came into possession of a large fortune, and determined to enter Parliament. In 1780 he was returned for Hull. He had known Pitt when at Cambridge, and in London they became inseparable friends. In Parliament, however, Wilberforce remained independent of party, and when the elevation of Pitt to the Premiership gave him an opportunity of taking office he declined to do so, but rendered efficient service to his friend. In 1784, in spite of opposition from the great Whig families, he was returned to Parliament without a contest as a representative from Yorkshire. In 1786 he carried through the Commons a bill for mitigating the criminal law, but the Lords rejected it. Next year he founded a society for the discouragement of vice, and about the same time he entered on his great struggle for the abolition of the slave trade, to which he thenceforward dedicated his whole energy. He did not originate the movement, but was in every way qualified to take the lead of it. He was powerfully supported by the Quakers, and by Thomas Clarkson (q.v.), who collected evidence and kept the general public interested while Wilberforce represented the cause in Parliament. In 1789, after a critical illness, he brought before the House of Commons a series of resolutions condemning the slave trade. Supported by Pitt, Burke, and Fox, he carried them, but the planters caused their postponement. In 1792 a motion for the gradual abolition of the slave trade passed the House of Commons by a great majority. Again in 1804 his bill was carried through the Commons, to be rejected by the Lords, and in the following year it was lost in the Commons. In 1806, however, a resolution was moved by Fox, pledging the Commons to a total abolition of the slave trade in the following session. Meantime a work published by Wilberforce against the traffic had a remarkable influence on public opinion and on the subsequent debates. True to its pledge, the House of Commons accepted the bill, the Lords finally approved it, and it received the royal sanction in 1807. In the Commons Sir Samuel Romilly, who supported the measure, compared the feelings of Napoleon, then at the height of his glory, with those of the English philanthropist, "who would that day lay his head upon his pillow, and remember that the slave trade was no more," and the whole House burst into applause, and greeted Wilberforce with enthusiastic cheers. Wilberforce now sought to secure the abolition of the slave trade abroad, and at the same time entered on an agitation for the total abolition of slavery itself. Declining health, however, compelled him, in 1825, to retire from Parliament, in which since 1812 he had sat for the borough of Bramber. The movement against slavery was then intrusted to Sir T. Fowell Buxton. Three days before Wilberforce's death news was brought him that the abolition bill had passed a second reading. He died July 29, 1833, and was buried as a national benefactor in Westminster Abbey. He was a man of great versatility of mind and character; sociable, witty, vivacious, and so kind and sincere that even his opponents loved him. He wrote *Practical View of the Prevailing Religious System of Professed Christians, in the Higher and Middle Classes, Contrasted with Real Christianity* (1st American ed., Philadelphia, 1798). See his *Correspondence*, ed. by his sons (2 vols., London, 1840); *Private Papers*, ed. by A. W. Wilberforce (ib., 1897); Wilberforce (sons), *Life of William*

Wilberforce (ib., 1838), chief authority; Clarkson, *History of the Rise, Progress, and Accomplishment of the Abolition of the African Slave Trade by the British Parliament* (New York, 1836).

WILBERG, vĭl'bĕrk, Christian (1839-82). A German painter and etcher, born at Havelberg. He studied under Eduard Pape, Weber, and Gropius, in Berlin, and then in Düsseldorf under Oswald Achenbach (1870). He became known as an architectural painter, particularly of interiors like those of Saint Mark's in Venice and the Cappella Palatina in Palermo. His other works include: "Villa Mondragone at Frascati" (National Gallery, Berlin); "Memento Mori," a scene from the Sabine Hills (Dresden Gallery); "View in Greece" (Kunsthalle, Hamburg); and "The Acropolis of Pergamon." He also left about twenty etchings of German, Greek, and Italian views.

WILBRANDT, vĭl'brânt, Adolf (1837—). A German novelist and dramatist, born in Rostock. His novels of present-day problems, *Adams Söhne* (1890), *Hermann Ifinger* (1892), *Der Dornenweg* (1894), *Schleichendes Gift* (1897), *Feuerblumen* (1900), *Villa Maria* (1902), and others, have been hardly less successful than his dramas, among which *Kriemhild* (1877) is noteworthy as an effort to give new life to the heroic saga. *Der Graf von Hammerstein* (1870), *Die Maler* (1872), *Gracchus* (1872), *Arria und Messalina* (1872), and *Giordano Bruno* (1874) are also of mark. His best comedies are *Jugendliebe* (1872) and *Nathalie* (1878). Deserving especial notice are also his excellent biographies of Heinrich von Kleist (1863), Hölderlin, and Fritz Reuter, the last two in the collection *Fährende Geister* (2d ed., Berlin, 1896).

WIL'BUR, John (1774-1856). The founder of the Wilburite branch of Friends (q.v.). He was born at Hopkinton, R. I., and spent much of his life as a school teacher and surveyor. At the age of twenty-eight he was appointed an elder in the orthodox Friends Church. For opposing the innovations made in the church by Joseph B. Guerney and others he was denounced in the Rhode Island Yearly Meeting in 1838, and when he was sustained by his own monthly meeting of South Kensington, that meeting was dissolved, and its members were added to the Greenwich meeting, while in 1843 he was disowned. A considerable number of his supporters withdrew from the orthodox Church and formed an independent yearly meeting, whose members became known as Wilburites. This branch, in 1900, numbered 4468. Wilbur published *A Narrative and Exposition* (1845). His *Journal and Correspondence* were published by his friends in 1859. Consult A. C. and H. R. Thomas, *History of the Society of Friends in America* (New York, 1894).

WILCKEN, vĭl'ken, Hermann. The real name of the German teacher and writer better known as Hermann Witekind (q.v.).

WIL'COX, Cadmus Marcellus (1826-90). An American soldier, born in Wayne County, N. C. He graduated in 1846 at West Point, and served through the Mexican War. Upon the outbreak of the Civil War he resigned his commission of captain and was appointed a colonel in the provisional Confederate service. He reinforced General Beauregard at the first battle of Bull Run, and served with the Army of Northern Virginia until its surrender. In 1861 he was promoted to be brigadier-general, and in 1863 to be major-general. He fought in the second battle of Bull Run and at Fredericksburg, Chancellorsville, and Gettysburg, and after the war declined an appointment as brigadier-general in the Egyptian Army. From 1886 to 1889 he was chief of the railroad division of the Washington general land-office. He published *Rifles and Rifle-Practice* (1859), and a *History of the Mexican War*.

WILCOX, Ella (Wheeler) (1855—). An American journalist and poet. She was educated at the University of Wisconsin and married (1884) Robert M. Wilcox, of Meriden, Conn. Soon afterward she moved to New York. She was at an early age a frequent contributor to journals. Among her collections of verse may be named: *Drops of Water* (1872); *Maurine* (1875); *Shells* (1883); *Poems of Passion* (1883), her best known performance; and *Poems of Pleasure* (1888). Among her prose writings are: *Mal Moulée*, a novel; *Men, Women, and Emotions; A Double Life; Sweet Danger;* and *An Erring Woman's Love*. She also wrote a great many short essays for the New York *Journal*, with whose readers she seemed to be very popular.

WILD, vĭlt, Heinrich (1833-1902). A Swiss meteorologist and physicist. He was born at Uster (Zurich), and was educated at Zurich, Königsberg, and Heidelberg. In 1857 he was appointed professor of physics and director of the observatory at Bern. That institution he enlarged into a central meteorological bureau and laid the foundation of the extensive meteorological system of Switzerland. Appointed inspector of weights and measures in 1861, he brought about reforms, and was made head of the commission to maintain the standards (1867). In 1868 he was called to Saint Petersburg, where he completely reorganized the observatory and established a meteorological system throughout the Empire. Until his retirement in 1895 he remained in the service of the Russian Government. He invented the polaristrobometer—a form of saccharimeter—a polarization photometer, a magnetic theodolite, and various new optical methods for comparing measures of length. Many of his papers were published in the *Annalen des physikalischen Observatoriums für Russland* and the *Neues Repertorium für Meteorologie*, founded by himself in 1865 and 1869 respectively; as also in the *Mitteilungen* of the International Polar Commission, of which he was president (1882-83). He published, furthermore, *Temperaturverhältnisse des russischen Reichs* (tables, atlas, etc., 1876; German and Russian).

WILD, Jonathan (c.1682-1725). An English thief and receiver of stolen goods. He was born at Wolverhampton, was apprentice to a Birmingham buckle-maker, and about 1706 went to London. Having been four years imprisoned for debt, he became a receiver of stolen goods, and, when he chose, an informer. He concluded his career at Tyburn. He is interesting chiefly as being in rather remote fashion the subject of Fielding's satire, *History of the Life of the Late Mr. Jonathan Wild the Great* (1743).

WILD′AIR, Sir Harry. A gay man-about-town, in Farquhar's *Constant Couple*, and the title character of the same author's *Sir Harry Wildair*. The character was successively personated by Wilks, Garrick, and Peg Woffington.

WILDBAD, vĭlt′bät. A town of the Kingdom of Württemberg, Germany, in the Black Forest, romantically situated in a valley watered by the Enz, about 29 miles west of Stuttgart (Map: Germany, C 4). It is noted for its thermal springs and baths, the water of which ranges from 91° to 98.6° F. in temperature. The waters are nearly pure, the principal ingredient being common salt. Population, in 1900, 3532.

WILD BOAR OF THE ARDENNES. A name given to William, Count de Lamarck, beheaded by Maximilian in 1485. He appears in Scott's *Quentin Durward*.

WILDCAT. In general, a wild cat as distinguished from a domesticated one; specifically, the European wildcat (*Felis catus*), primitively numerous all over Europe, except Scandinavia, and much of Northern Asia, and still to be found in the wilder districts. It is much larger than the domestic cats and differs from them in the proportionately longer body and limbs and the shorter and thicker tail. Its body is yellowish gray, with a dark mark along the back, and numerous darkish stripes down the sides and across the limbs; its tail is ringed with black; and in the male the soles of the feet are deep black. Although it may have contributed by an occasional cross to the varieties of domestic cat (q.v., under Cat), it is not believed that any domestic race sprang directly from it. Consult for this species Hamilton, *The Wildcat of Europe* (London, 1896).

In the United States the name 'wildcat' is applied to the lynx; in Egypt, to the Caffre cat or the gloved cat; in India, usually to the jungle cat; and in Mexico, to the chati or margay (two forms of *Felis tigrina*). In fact, omitting the lion, tiger, leopard, puma, jaguar, and a few others, the term applies to all the feline race, of which some forty species might be mentioned, most of which are elsewhere described under their distinctive names, as Ocelot, Eyra, etc. See Felidæ; Cat; and authorities there cited. See Plate of Wildcats.

WILD CELERY. See Vallisneria.

WILD CHERRY (*Prunus*). Several North American trees and shrubs belonging to the natural order Rosaceæ. *Prunus Pennsylvanica*, or wild red cherry, is a tree from 20 to 30 feet high, common in rocky woods, particularly in the Northern States, with leaves oblong-lanceolated, pointed, finely and sharply serrate, green, and smooth on both sides; flowers in a cluster on long pedicels in May; fruit round, light-red, very small, with thin pulp; stone globular. *Prunus serotina*, the wild black cherry, is a fine tree with gray, sometimes rather shaggy bark on the trunk, and reddish limbs, often growing in the Western States to 80 feet in height and 2 feet or more in diameter, but smaller in the Atlantic States, leaves lanceolate-oblong, taper-pointed, serrate, with incurved, short, and callous teeth, thick, shining above; flowers, which appear in June, in long racemes; fruit purplish-black, about the size of a common pea, but often larger on rich alluvial soils. When very ripe and large it is agreeable to the taste. In some of the older sections of New York the tree was formerly planted in the fields and along the fences. Its dark-colored timber is highly valued as a cabinet wood. *Prunus Virginiana*, the common choke-cherry, is a tall, rather slender shrub (sometimes it may be called a tree), from 8 to 15 feet high, with grayish bark, leaves oval, oblong, or obovate, blunt-pointed, sharply serrate; racemes short and close; petals roundish; fruit red, turning to dark crimson, and very astringent until perfectly ripe, when it is not unpleasant, if large, and growing on good soil; flowers in May; grows along fences and river banks, especially northward. The popular name is sometimes wrongly applied to the preceding species. The name wild cherry is often given to other species than the above, as to the bitter cherry (*Prunus emarginata*), and the holly-leaf cherry (*Prunus ilicifolia*), varieties of the cultivated cherries that have escaped from cultivation in many places in the Eastern United States.

WILD RED CHERRY (*Prunus Pennsylvanica*).

WILDE, Henry (1833—). An English electrical engineer, born at Manchester. He was educated at private schools, and from an early age engaged in scientific pursuits, particularly the study of electro-magnetism, which enabled him to make certain improvements in lightning conductors and the telegraph (1858-64). In 1864 he discovered that currents of electricity of considerable intensity could be derived from infinitely small amounts of magnetism and electricity and was thus led to develop a dynamo-electric machine. Four years later in investigating alternating currents he discovered that by their synchronizing property it was possible to control the rotations of the armatures of a number of dynamos. This property is now an essential feature of numerous electro-generating stations. In 1878 he discovered certain remarkable multiple relations among the atomic weights. With his dynamo-electric machine he developed a powerful electric light, which was used in 1865. By this invention and others he produced the searchlight employed in the Royal Navy. He also carried on important investigations in electrolysis and magnetism, devising many important methods used in electroplating, and inventing a magnetarium for reproducing and studying the phenomena of the earth's magnetism.

WILD COFFEE. See Feverwort.

WILDE, Lady Jane Francesca Elgee (1826-96). An English writer, wife of Sir William Robert Wilde. She was born at Wexford, Ireland, and after her marriage began to contribute both in prose and in verse to the nationalist newspaper, *The Nation.* Indeed, an article from her pen, signed Speranza, was the ostensible reason for the suppression of the journal in 1848. Her publications include: *Poems by Speranza* (1871); *Driftwood from Scandinavia* (1884); *Ancient Legends, Mystic Charms, and Superstitions of Ireland* (1887); *Ancient Cures, Charms, and Usages of Ireland* (1890); *Notes on Men, Women, and Books* (1891); and *Social Studies* (1893).

WILDE, Oscar Fingall O'Flahertie Wills (1856-1900). An English author, son of Sir William Wilde, a distinguished surgeon, and his wife, Jane Francesca, known as a writer of verse. He was educated at Magdalen College, Oxford, where he took his degree in 1878, winning also the Newdigate prize for English verse. He went to London soon afterwards, and devoted himself to poetry and to the exposition of æsthetic culture, of which he was in a sense the apostle, though some exaggerations in his manner and that of his disciples were keenly satirized by Du Maurier in *Punch,* and by Gilbert in the opera *Patience.* A volume of his poems was published in 1881, a tragedy, *Guido Ferranti,* in 1890, and *Intentions,* a collection of brilliant essays, in 1891. From 1893 to 1895 he won considerable success as a writer of comedies, deficient in dramatic construction, but remarkable for their sparkling epigrammatic cleverness—*Lady Windermere's Fan* and *The Importance of Being Earnest* among them; also *Salome,* a drama in the mediæval style. The most widely read of his books was *The Picture of Dorian Gray,* a novel (1891). His talents were undoubtedly great, and his poems, of which a complete edition was published in 1903, were usually marked by great beauty of style and thought. But the end of his life was sad. Convicted in 1895 of a grave offense against morality, he was imprisoned for two years, during which he wrote one of his strongest poems, *A Ballad of Reading Gaol.* After his release he went to Paris, where he died November 30, 1900.

WILDE, Richard Henry (1789-1847). An American poet, born in Dublin, Ireland. He came to America with his parents in 1797, settling finally at Augusta, Ga. He studied law, was admitted to the bar in 1809, rose rapidly in his profession, became Attorney-General of the State, and was three times a member of Congress, 1815-17, 1824-25, and 1827-35. He was a lyric poet of merit, and during a stay in Europe from 1835 to 1840 did considerable study in Dante and Tasso, and helped to discover Giotto's portrait of the first-named poet. On his return from Europe he attained success at the bar of New Orleans, and was made professor of constitutional law in the University of Louisiana. He is best known as the author of the beautiful lyric, "My Life is Like the Summer Rose." A long posthumous poem, *Hesperia,* was published in 1867, and during his life he issued *The Love, Madness, and Imprisonment of Torquato Tasso* (1842).

WILDEBEEST. See Gnu; Antelope.

WILDENBRUCH, vĭl′den-brōōk, Ernst von (1845—). A German dramatist and novelist, born in Beirut, Syria, where his father was Prussian consul, February 3, 1845. He served two years in the army, then studied law, and entered the Government service. He became privy councilor of legation in 1897. Of his earlier dramas the more successful were *Väter und Söhne* (1882), *Harold* (1882), *Der Mennonit* (1882), all in a somewhat radical spirit. More significant are the series of national dramas, *Die Karolinger* (1882), *Die Quitzows* (1888), *Der neue Herr* (1891), *Heinrich und Heinrich's Geschlecht* (1895), *Willehalm* (1897), and *Die Tochter des Erasmus* (1900) all remarkable literary expressions of the new Prussia. In his short stories and novels, e.g. *Der Meister von Tanagra* (1880), *Der Astronom* (1887), *Das edle Blut* (1893), *Franzeska von Rimini* (1893), *Eifernde Liebe* (1893), *Schwester-Seele* (1894), *Der Zauberer Cyprianus* (1896), *and Tiefe Wasser* (1898), as well as in social drama, Wildenbruch has shown great originality in tragic development. Among his *Lieder und Gesänge* (1877) and *Dichtungen und Balladen* (1884) are pieces, notably "The Witches' Song," that have become widely popular.

WILDER, wīl′dẽr, Alexander (1823—). An American physician and author, born in Verona, N. Y. He was an editor of the Syracuse *Star* in 1852, and in 1856 of the *New York Teacher.* From 1858 to 1871 he was on the staff of the New York *Evening Post,* and from 1878 to 1883 was professor of physiology and psychological science in the United States Medical College. His publications include: *The Worship of the Serpent* (1877); *Vaccination a Fallacy* (1878); and editions of T. Taylor's *Eleusinian and Bacchic Mysteries* (1875); R. P. Knight's *Symbolical Language of Ancient Art and Mythology* (1876); Max Müller's *India: What Can It Teach Us?* (1883); and Iamblichos, *On the Mysteries.*

WILDER, Burt Green (1841—). An American comparative anatomist, born in Boston. He graduated from the scientific department of Harvard College in 1862, and its medical department in 1866; served as assistant surgeon and surgeon of the Fifty-fifth (Negro) Massachusetts Infantry, 1863-65; was assistant in comparative anatomy in the Harvard Museum of Comparative Zoölogy, 1866-67; curator of herpetology in the Boston Society of Natural History and a university lecturer, 1867-68; professor of zoölogy in Cornell University since 1867; and lecturer on zoölogy in the University of Michigan, medical department, 1876-77. His work since 1880 has been principally noticeable from his attention to securing a simple anatomic nomenclature. In 1885-86 he was president of the American Neurological Association. In 1892 he was honored by the presentation of a *Festschrift* written by his pupils, called *The Wilder Quarter-Century Book* (Ithaca, 1893). Among his voluminous contributions to literature are: *What Young People Should Know; Anatomy, Physiology, and Hygiene of the Human Reproductive Organs* (Boston, 1875); *Health Notes* *for Students* (New York, 1883); *Human Locomotion* (New York, 1870); *Anatomical Technology as Applied to the Cat,* with Gage (New York and Chicago, 1882); and *Physiology Practicums* (Ithaca, 1895).

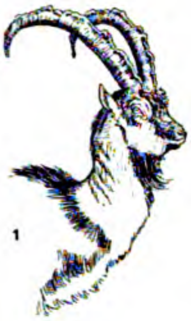
WILDER, MARSHALL PINCKNEY (1798-1886). An American merchant and agriculturist, born at Rindge, N. H. He received a common school education, worked on a farm for some time, and in 1825 became a merchant in Boston in the West India trade. He was a member at different times of both Houses of the Massachusetts Legislature, being chosen president of the Senate in 1850, and was also a member of the Executive Council. He was one of the organizers of the Constitutional Union Party, which nominated Bell and Everett in 1860. Having acquired a large fortune, he turned his attention to the development of agriculture. He founded the United States Agricultural Society and the Massachusetts Agricultural College, was an officer of various agricultural and genealogical societies, and was one of the earliest promoters of the Massachusetts Institute of Technology. Among his publications are a number of addresses and *The Hybridization of the Camellia and Its Varieties* (1847) and other lectures on floriculture, pomology, and agriculture.

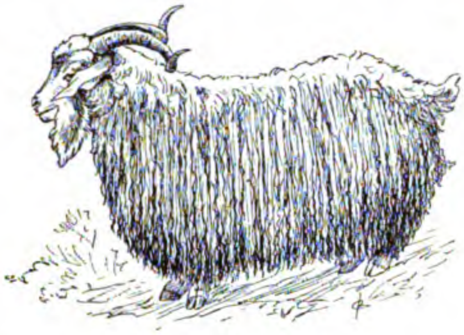
WILDERMUTH, vĭl′dẽr-mo͞ot, OTTILIE (1817-77). A German novelist. She was born at Rottenburg-on-the-Neckar, was married in 1843 to Professor Wildermuth, of Tübingen, and in that city passed the remainder of her life. Her novels had a wide popularity, which was well deserved, since she pictured with much grace the life of the region to which she confined her work—Swabia. She also wrote excellent stories for the young. The best of her works are: *Bilder und Geschichten aus Schwaben* (1852-54); *Auguste* (1857); *Bilder aus der Wirklichkeit* (1861); and *Zur Dämmerstunde* (1871).

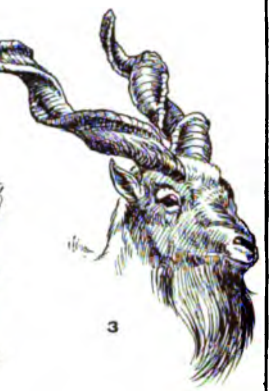
WILDERNESS, BATTLE OF THE. A battle of the Civil War in America, fought on May 5-6, 1864, between the Army of the Potomac under General Meade, with General Grant in supreme command, and the Army of Northern Virginia under General Lee. The Wilderness is a region of dwarfed woods and tangled undergrowth lying south of the Rapidan River, and extending for about fifteen miles from east to west and ten miles from north to south, the nature of the ground being such as to render cavalry operations and the use of artillery almost impossible. The battle of the Wilderness was the opening engagement of the campaign of 1864 in Virginia. The Confederate army, consisting of three corps, lay in a strong position south of the Rapidan, with its right under Ewell on the river, the centre under A. P. Hill at Orange Court House, and the left under Longstreet at Gordonsville. Its strength was about 62,000 men, with 224 guns. The Union army was encamped north of the Rapidan from Hazel's River through Culpeper to Stevensburg. It comprised the corps of Warren (Fifth), Sedgwick (Sixth), and Hancock (Second). With Burnside's corps a day's march to the north, the Union strength amounted to about 120,000 men, with 316 guns. Grant's plan was to cross the Rapidan, turn Lee's right flank, and interpose his army between the Confederate forces and Richmond. The movement of troops was begun at midnight of May 3d, Warren's corps, preceded by cavalry and followed by the corps of Sedgwick, crossing at Germana Ford, while Hancock crossed at Ely's Ford, farther down the river. The right column was ordered to proceed to Wilderness Tavern, at the junction of the Germanna Plank Road and the Orange County Turnpike; Hancock's objective was Chancellorsville. As soon as Lee became acquainted with the movement of the Union troops he adopted the bold expedient of changing front and sent the corps of Ewell and Hill along the Orange County Turnpike and the Orange Plank Road to take Grant's army in flank. Early in the morning of May 5th Warren sent Griffin westward along the pike and Crawford along the plank road to ascertain the presence of the enemy. Griffin came into contact with Ewell and a little later Crawford became engaged with Hill's troops. Believing at first that the enemy's forces were but a strong rear guard, Grant made no attempt to support Warren, but some time before noon it became evident that the main strength of the Confederates was in front. Sedgwick's corps was thereupon directed to support Warren on the right, while orders were sent to Hancock, who was now some distance beyond Chancellorsville, to return by the Brick Road and take up his position at its junction with the Orange Plank Road. Until Hancock's arrival a division of the Sixth Corps under General Getty was ordered to hold back the Confederates, under Hill, at that point. Owing to the nature of the ground, Sedgwick was delayed in bringing support to Warren on his left, and though Griffin's and Wadsworth's divisions drove Ewell's vanguard before them, they were compelled to give way before the attack of the latter's main force. The Sixth Corps as it was working into position was also struck by Ewell. but after a fierce struggle the Confederates were repulsed. Getty, meanwhile, hard pressed by Hill, was relieved by the arrival of Hancock at about three in the afternoon, and a desperate conflict ensued, at a close distance, in which neither side gained any distinct advantage. Wadsworth, sent to the support of Hancock's right, did not arrive until night put an end to the combat. Owing to the impossibility of manœuvring in the tangled underbrush, the conflict became a struggle between lines of men closely in touch, but for the most part invisible. It was almost exclusively a musketry battle. The combat between Warren and Ewell and that between Hancock and Hill were practically isolated.

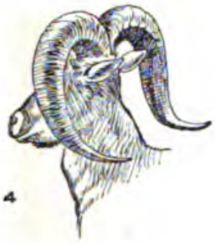
During the night Burnside's corps was brought to the front and placed between Warren and Hancock. Longstreet was summoned by Lee from Gordonsville and ordered to reinforce Hill on his right. It was Lee's intention to hurl Longstreet against the Union left in an attempt to throw it back on the Rapidan. To gain time for Longstreet's arrival and to divert attention from the move, he ordered an assault on the Union right. The assailants were thrown back and Sedgwick took up an advanced position. At the same time Hancock assailed Hill in front, while Wadsworth struck him on the flank. The Confederates were driven back for more than a mile, when the Union advance ceased, owing to the confusion in the lines and to the fact that Hancock had left part of his corps behind, in anticipation of a flanking movement by Longstreet. The lat-

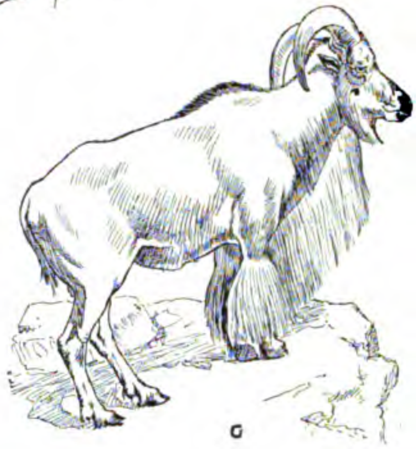
WILD GOATS AND SHEEP

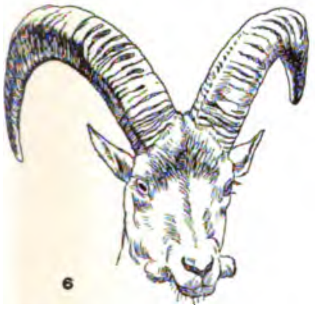

1

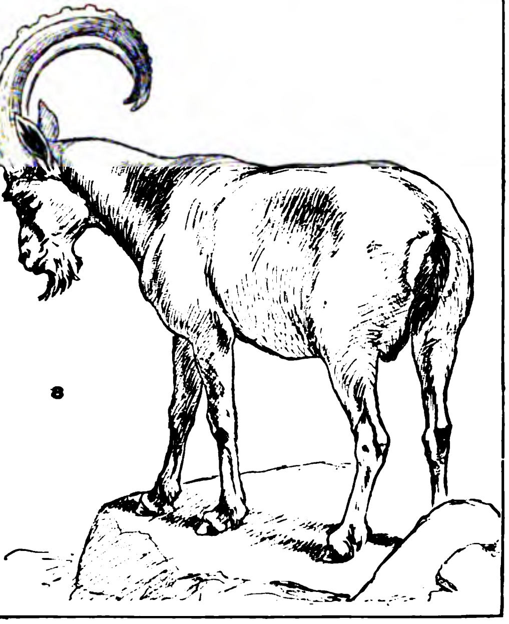

2

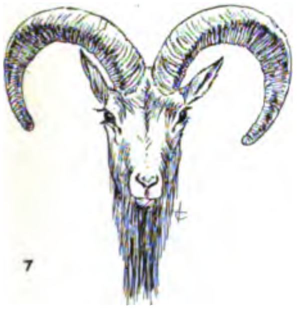

3


4


5


6


8


7

1. WILD GOAT; PASANG (Capra ægagrus).
2. ANGORA RAM.
3. MARKHOR (Capra Falconeri); Kabul variety.
4. BHARAL (Ovis nahura).
5. AOUDAD (Ovis tragelaphus).
6. WESTERN CAUCASUS TUR (Capra Severtzowi).
7. OORIAL or SHA (Ovis Vignei).
8. ALPINE IBEX (Capra ibex).

ter had actually begun such a movement, but had been summoned to reinforce Hill's weakened forces in front, and now came on the field of battle, driving Hancock back to his original position. At this critical moment for the Union army, however, Longstreet was wounded and the violence of the attack subsided until about four o'clock, when Lee threw Hill's and Longstreet's corps against Hancock. Aided by a fire which broke out in the underbrush and seized on the logs of the Union breastworks, while the wind blew the smoke into the faces of the Federals, the Confederates broke through the Union line and a Confederate flag was planted upon the intrenchments. Almost immediately, however, the Confederate line was driven back. The battle ended with an assault by Ewell on the Union right, in which two brigades were captured and the Union line was for a time endangered. The Confederate advance, however, was checked and night made an end of hostilities. No definite gain had been made by either side, and within a few days fighting was resumed at Spottsylvania Court House (q.v).

The losses were heavy, the best authority placing the Union casualties at 2265 killed, 10,220 wounded, and 2902 missing, a total of 15,387. The woods took fire in many places, and at least 200 wounded perished in the flames. The Confederate records show 2000 killed, 6000 wounded, and 3400 missing, a total of 11,400. Among the general officers killed were Wadsworth and Baxter, of the Union army, and Jenkins of the Confederates, while Getty of the one and Longstreet of the other side were wounded. Consult: Johnson and Buel (eds.), *Battles and Leaders of the Civil War* (New York, 1887); Humphreys, *The Virginia Campaign of 1864 and 1865* (New York, 1883); Grant, *Personal Memoirs* (last ed., New York, 1895); Badeau, *Military History of Ulysses S. Grant* (New York, 1868-81); and Swinton, *Twelve Decisive Battles of the War* (New York, 1867).

WILDES, wildz, Frank (1843-1903). An American naval officer, born in Boston. He graduated at the Naval Academy in 1863, and saw active service on the steam sloop *Lackawanna* and the monitor *Chickasaw* in the operations against Mobile. He became a commander in 1880, and a captain in 1894. In the battle of Manila Bay in 1898 he commanded the cruiser *Boston*, and for his services was advanced five numbers. He became a rear-admiral in 1901.

WILDFIRE, Madge. The nickname of Margaret Murdochson, a gypsy girl in Scott's *Heart of Midlothian.* She is corrupted by George Robertson and goes mad on being deserted by him.

WILD FOWL. A general term, formerly in more common use than now for wild birds, especially such as interested sportsmen, in distinction from domesticated fowls. The term became more and more restricted to game-birds, and especially to the ducks, geese, and the like, or 'waterfowl,' and to the shore birds; and a person who made a practice of shooting this class of birds for sport was known as a 'wildfowler.' The indefiniteness of the term gradually caused its disuse as sport became more specialized and ornithological information more extensive and exact, and the term 'wild fowl' has gradually become relegated to poetic use when a pleasing suggestion is required rather than precise characterization.

WILD GINGER. See Asarabacca.

WILD GOATS, SHEEP, AND IBEXES. A group of small ruminants not easily divisible technically even into the two apparently easily distinguishable genera Ovis (sheep) and Capra (goats and ibexes); and characterized by the massive, angulated horns borne by the male (rams), which in the sheep tend to form a coil beside the head, and in the goats sweep backward from the forehead and show a strongly cross-ridged front. The wild sheep and goats are mountain-dwelling animals, and are limited, with one exception, to the central elevated regions of the Old World, stretching from the Pyrenees, Atlas, and Abyssinian mountains through the Sinaitic Carpathian, Armenian, and Persian chains, to the Himalayan and Mongolian ranges, which are continued northeastward to Bering Strait. Each separate section of the line of uplift has one or more peculiar species. There is also an American species or group of species (see Bighorn) native to the northern cordillera, as far south as the borders of Mexico. The species are not many, most of them have a comparatively limited and local range, and several are extinct as wild animals. The genus Ovis has given to civilized man the domestic sheep, but their specific source (or sources) is uncertain. The domestic goat seems to have been derived with little admixture from the wild goat still extant in Southwestern Asia. See Goat; Ibex; Sheep.

WILD-GOOSE CHASE, The. A comedy by John Fletcher, produced in 1621, printed in 1652. Four acts of Farquhar's *The Inconstant* were taken from it.

WILDING. (1) The principal character in Shirley's *The Gamester*. In his adaptation of this play, *The Gamesters*, December 22, 1757, Garrick himself assumed the rôle. (2) The principal character in Foote's play *The Liar.* The author himself created the rôle of Young Wilding in this play.

WILD ONION. See Allium.

WILD PIGEON. Specifically, the American passenger pigeon. See Pigeon.

WILD SARSAPARILLA. See Aralia.

WILD SPINACH. See Chenopodium.

WILD'WOOD, Will. The pseudonym of the American writer on sports Frederick Eugene Pond (q.v.).

WILES, Irving (1861—). An American figure and portrait painter, born in Utica, N. Y. He was a pupil of his father, then studied at the Art Students' League, New York City, under Carroll Beckwith and William Chase, and from 1882 to 1884 in Paris under Lefebvre and Carolus-Duran. After further studies in Italy he returned to New York. Wiles furnished illustrations for many of the leading magazines, but devoted himself principally to painting in oils and water-colors. The merit of his work gained for him various prizes besides the gold medal at the World's Columbian Exposition, Chicago (1893), and a medal at the Paris Exposition (1900). Among his paintings are the "Corner Table," the "Sonata," "Sunshine and Flowers" (a portrait of a woman and child), "Memories" (1891, Carnegie Collection), the

"Girl in Black," and "Golden Dreams." His best known portrait is "My Father and Mother." He has a clever touch in both mediums—water-colors and oils—and is peculiarly skillful in his rendition of textures.

WI'LEY, Harvey Washington (1847—). An American chemist, born in Kent, Ind. He graduated at Hanover College in 1867, at the Indiana Medical College in 1872, and at Harvard in 1873; was professor of chemistry at Purdue University from 1874 to 1883; was State chemist of Indiana in 1881-83; and became chief of the Division of Chemistry in the United States Department of Agriculture in 1883, acting also, after 1895, as professor of agricultural chemistry in the Columbian University, Washington, D. C. In 1893-95 he was president of the American Chemical Society. His publications include: *Songs of Agricultural Chemists; Principles and Practice of Agricultural Chemistry* (3 vols., 1894-97); and a large number of Government bulletins and reports.

WILEY, Isaac William (1825-84). A Methodist Episcopal bishop. He was born at Lewiston, Pa., graduated from the medical department of New York University in 1846, and entered the Genesee Conference in 1849. He was missionary to Fu-chow, China, 1850-54; pastor in Newark and Jersey City, 1854-58; principal of Pennington Seminary, 1858-64; and editor of the *Ladies' Repository*, Cincinnati, 1864-72; and was elected bishop, 1872. He died while on an episcopal visit to Fu-chow. He published: *Fallen Heroes Buried in Foochow Cemetery* (1858); *Religion in the Family* (1872); *China and Japan* (1879). Consult biography by R. S. Rust (New York, 1885).

WIL'FRID, or **WILFRITH**, Saint (634-709). An English churchman. He was the son of a Northumbrian thane. At fourteen he was sent to the Court of King Oswin, and from there to the Monastery of Lindisfarne. At the age of nineteen he went on a pilgrimage to Rome. After an absence of five years he returned to England and warmly advocated the Roman custom of celebrating the Easter Festival on the 14th day of the moon, which had never been followed in the British Isles. From Alchfrith, King of Deira, he received a grant of land for a monastery at Ripon, and there, probably in 663, he was ordained a priest. The Synod of Whitby, which met in 664 to discuss the disputed question regarding Easter Time was attended by the most distinguished members of both parties, and among others by Colman, Bishop of Lindisfarne, and Wilfrid. The council and audience were carried away by Wilfrid's argument, and the King decided in favor of the Roman party. Wilfrid was afterwards named Bishop of York, but he did not enter into possession of his see until 669. He then surrounded himself with great pomp, built churches, one of which, at Hexham, was said to be the finest north of the Alps, but soon found himself at strife with the royal power. A quarrel with the King of Northumbria, named Egfrid, resulted in Wilfrid's deposition. He started on a journey to Rome to make a personal appeal to the Pope and on the way landed on the coast of Frisia, the inhabitants of which were still pagan. There, however, he was hospitably received by the ruler, and he baptized many of the people. Wilfrid was afterwards recalled to his see; but he was still active as the leader of the Roman party, and ultimately he was deprived of his bishopric. He again went to Rome, where he arrived in 704, returned to England in 705, and received the see of Hexham. He died at Oundle, in Northampton. The best contemporary authority is Eddi's *Vita Wilfridi*, published in *Historians of York*, vol. i., "Rolls Series." Consult also: Bright, *Early English Church History* (3d ed., Oxford, 1897); Hunt, *The English Church from Its Foundation to the Norman Conquest* (London, 1899).

WILHELM, vĭl'hĕlm, Karl (1815-73). A German musician, composer of "Die Wacht am Rhein." He was born at Schmalkalden, studied at Cassel, under Spohr, and at Frankfort under André and Aloys Schmitt. He was director of the Crefeld Liedertafel from 1839 to 1864, and composed numerous male choruses for it; "Die Wacht am Rhein" was first sung by a large chorus on the occasion of the silver wedding of the Prince of Prussia (afterwards William I.), in 1854, but did not attain its wide popularity until the outbreak of the Franco-German War in 1870. Wilhelm received the title of 'Royal Prussian Musical Director' in 1860, and four years later received a gold medal from Queen (later Empress) Augusta and was granted a pension of 3000 marks. He died at Schmalkalden.

WILHELMINA, vĭl'hĕl-mēnȧ, Queen of the Netherlands (1880—). She is the only daughter of William III. of the Netherlands, and his second wife, Emma, daughter of Prince George Victor of Waldeck. She was born at The Hague on August 31, 1880. Upon the death of her father in 1890 she became Queen; but the country remained under the regency of Queen Emma until August 31, 1898, when Wilhelmina completed her eighteenth year and became Queen regnant. Her conoration took place on September 6, 1898, in the New Church at Amsterdam, amid unusual rejoicings. The influence of the popular Queen Emma was not lessened by this event, however, and she remained the constant companion and adviser of her daughter till the latter's marriage on February 7, 1901, at The Hague, to Duke Henry Frederick of Mecklenburg-Schwerin.

WILHELMJ, vêl-hĕl'mê, August (1845—). A German-English violinist and conductor. He was born at Usingen, in Nassau, and received his first lessons on the violin from Conrad Fischer, Court conductor to the Duke of Nassau at Wiesbaden. At the age of eight he played in quartets, and on January 8, 1854, made his first public appearance at a concert given at Linburg-on-the-Lahn, and two years later caused a great sensation with his skillful playing at the Court theatre of Wiesbaden. From 1861 to 1864 he studied under Richter and Hauptmann, at the Leipzig Conservatory, and subsequently under Raff at Wiesbaden. Throughout his entire career as a student, however, Ferdinand Davis, to whom he had been taken by Liszt, superintended his studies. In 1865 he made a tour of Switzerland, and the following year visited Holland and England, in 1877 France and Italy, and in 1878 Russia, in which latter country he became acquainted with Berlioz. In 1874 he toured Norway, Sweden, Denmark, Germany, and Austria, and made a long stay in England. In 1876 he was concertmeister of the Bayreuth orchestra during the production of *Der Ring des Nibelungen.* Probably his most successful and enthusiastic tour was that of the United States from 1878 to 1882. Other tours in European countries followed up to 1892, when he permanently settled in London as professor of violin at the Guildhall School of Music. He has been an important factor in the development of orchestral music and concerts in England, and notably in the great Wagner Festival held in the Royal Albert Hall in May, 1877, for which event he was able to secure the personal attendance and conductorship of Wagner himself, and at the same time introduced Hans Richter to the British public. His only published works are: *Hochzeits-Cantate,* for soli, chorus, and orchestra, a violin concerto, a few instrumental pieces, and a number of transcriptions from Bach, Chopin, and Wagner.

WILHELM MEISTER'S LEHRJAHRE, vĭl′hĕlm mī′stẽrz lâr′yä-r*e* (Ger., Wilhelm Meister's apprenticeship). A romance by Goethe, published in 1795-96, but planned some twenty years previously, and three-fourths drafted by 1785. It describes the development from youth to manhood of a vacillating and sensitive young man infatuated with the stage, and presents some personal experiences. In it appear several of Goethe's finest lyrical compositions, including Mignon's "Kennst du das Land?" The work, from its method of construction, lacks unity, but is valuable as a picture of the times and containing splendid passages.

WILHELMSHAVEN, vĭl′hĕlms-hä′f*e*n, or **WILHELMSHAFEN.** The chief naval station of Germany, on the west side of the entrance of the Bay of Jade, an inlet of the Baltic Sea, 40 miles northwest of Bremen (Map: Germany, B 2). The town, projected in 1856, is regularly laid out on a strip of land bought in 1853 by Prussia from Oldenburg. The harbor is 7050 feet long. There are three immense dry docks, and the workshops of the Imperial shipyards, which are inclosed by a lofty wall, pierced by fourteen portals. There is a torpedo-boat station, connecting with the Jade by a lock. The town is strongly fortified. It is the station of the North Sea fleet. To the west of Wilhelmshaven is the industrial settlement of Bant, where live the workers (3000 families) employed in the various shops of the shipyards. Population, in 1900, 22,571.

WILHELMSHÖHE, vĭl′hĕlms-hē′*e*. See Cassel.

WILHELM TELL, vĭl′hĕlm tĕl. See Schiller.

WILHEM, vē′läɴ′, Guillaume Louis (1771-1842). A French composer, born in Paris. From 1795 to 1801 he was a student at the school of Liancourt, and later for two years at the Paris Conservatoire. He taught music at the military school of Saint-Cyr, and from 1810 until his death at the Lycée Napoléon, which later became the Collège Henri IV. In 1819 he was called upon to found a system of musical instruction for the Paris primary schools. The following year he was appointed singing teacher at the Polytechnique and director of the Normal School of Music. Ten elementary schools were under his direction in 1830, and in 1833 he instituted regular reunions of his pupils in one large chorus, called the 'Orphéon.' In 1835 he was made a Chevalier of the Legion of Honor and was appointed director-general of musical instruction in all Paris primary schools. He also formed classes of workingmen, out of which grew numerous popular singing societies, called 'Orphéons.' He published many songs and choruses besides an extensive collection of *a cappella,* choruses, 'Orphéon,' in five, and later in ten volumes. His first exposé of his method, *Guide de la méthode élémentaire et analytique de musique et de chant* (1821 to 1824), was followed by *Tableaux de lecture musicale et d'exécution vocale* (1827 to 1832); *Nouveaux tableaux de lecture musicale et de chant élémentaire* (1835); *Manuel musical à l'usage des collèges,* etc.

WILKES, Charles (1798-1877). An American naval officer and explorer, born in New York City. He received a common school education, entered the United States Navy as a midshipman in 1818, served in the Mediterranean and the Pacific, became a lieutenant in 1826, and in 1830 was placed in charge of the United States department of charts and instruments. In 1838 he was placed in command of an expedition authorized by act of Congress of May 18, 1836, for the purpose of exploring and surveying the Southern Ocean. This was the first expedition fitted out by the National Government for scientific purposes. Between the years 1838 and 1842 the expedition visited the Madeira Islands and Rio de Janeiro in 1838; Tierra del Fuego, Chile, Peru, the Paumotou Group, Tahiti, Tutuila and the Samoan group, and New South Wales in 1839; the Antarctic regions, New Zealand, the Fiji group, and the Hawaiian Islands in 1840; the Columbia River, of which a survey was made, Willamette Valley, and part of the California coast in 1841; and the Philippine Islands, Sulu Archipelago, Saint Helena, Singapore, and the Polynesian Islands in 1842. A great mass of valuable scientific information was collected during the voyage and afterwards published in nineteen large volumes. A very valuable part of the report was that of J. D. Dana (q.v.). Wilkes wrote the volumes on *Meteorology* and *Hydrography,* and also the *Narrative of the United States Exploring Expedition* (6 vols., 1845; abridged ed. 1850). The claim of Wilkes to the discovery of an Antarctic continent has not always been conceded. Wilkes became a commander in 1843 and a captain in 1855, and in 1861, upon the outbreak of the Civil War, was placed in command of the frigate *San Jacinto* and sent to the West Indies in search of the Confederate cruiser *Sumter.* On November 8, 1861, he stopped at sea the English mail steamer *Trent,* and removed therefrom Mason and Slidell, the Confederate commissioners to England and France respectively. (See Trent Affair.) Wilkes commanded the Potomac flotilla in 1862, and later commanded the flying squadron ordered to prevent blockade-running between the West Indies and the Confederacy. He became a commodore in July, 1862, was placed on the retired list in June, 1864, and became a rear-admiral on the retired list in July, 1866. Besides the reports mentioned above, he published: *Western America, Including California and Oregon* (1849); and *The Theory of the Wind* (1855).

WILKES, JOHN (1727-97). An English politician, born in London, of well-to-do parents. He received an excellent education, spending four years at the University of Leyden, where he was entered when but sixteen years of age. Returning to England, he became a boon companion of the fastest London set, the notorious Lord Sandwich being among their number, and in a short time had run the gamut of all the vices of the day. In 1754 he entered national politics by standing for Berwick-upon-Tweed, but he was not successful. Three years later, however, he became member for Aylesbury. In 1761 he was again returned for the same seat. When Lord Bute forced Pitt out of office in 1762, Wilkes began a bitter fight against the new Government. To assist him in this attack he established a paper called the *North Briton*. Number 45 of this paper, which was issued after the appearance of the King's message on the Peace of Hubertsburg (1763), contained an article that maligned the Government for its desertion of Frederick the Great and its peace policy in general. Then followed what was popularly known as the Seven Years' War against Wilkes. A general warrant was issued for the apprehension of the author of the article, and Wilkes was among the number of those arrested, but he was soon released on the ground of his privilege as a member of Parliament. With this incident the practice of issuing general warrants came to an end, for Wilkes and others brought suit against Lord Halifax and other officials of the Government who were concerned in the matter, with the result that the court declared general warrants illegal, and granted heavy damages, Wilkes receiving £4000. When Wilkes, however, reprinted the obnoxious issue, his enemies renewed their attack upon him and succeeded in getting the House of Commons to declare the article "a false, scandalous, and seditious libel." In January, 1764, two months later, he was expelled from Parliament on this ground, and in February the Court of King's Bench found him guilty of republishing the article and also of printing an *Essay on Woman*, an obscene parody on Pope's *Essay on Man*. In the meantime Wilkes, who had been wounded in a duel, had repaired to Paris to recuperate, and, as he did not appear to receive his sentence, the court declared him an outlaw. Wilkes remained abroad until, in 1768, his penurious condition forced him to face matters in England. He first sued for pardon from the King, but in so undiplomatic a way that it was denied him. He then stood for Parliament from London, but was defeated. A second contest, this time for Middlesex, brought him a victory. Wilkes then surrendered himself to the Court of King's Bench to answer to the charge of outlawry. A technical point brought about the reversal of this sentence, but the original condemnation for reprinting Number 45 of the *North Briton* and the *Essay on Woman* still stood, and for these he was sentenced to twenty-two months in prison and a heavy fine. Had the Government now left Wilkes alone he would probably have sunk into obscurity, but they insisted on expelling him from the House. Though still in prison, Wilkes was again returned for the district, only to be expelled a second time. Again the same process was repeated, and when the district returned him a fourth time by a vote of 1143 to 296 for his opponent, Colonel Luttrell, the House seated the latter, declaring that as Wilkes was an outlaw all votes for him were void. This persecution gained for Wilkes what he probably would not have been able to acquire otherwise, great personal popularity and money. He was the hero of the hour, and contributions poured in from all sides. Before he left prison he was elected alderman of London. In 1771 he served also as sheriff for Middlesex and London and in the same year played a prominent part in the contest between the House of Commons and the printers, by which the latter gained the freedom to publish Parliamentary debates. In 1774, after a previous unsuccessful contest, he became Lord Mayor of London. In the same year he was returned to Parliament from his old Middlesex district, which he now represented continuously until 1790. This time the House permitted him to sit, on the ground that the disability resulting from outlawry did not last over the Parliament in which it occurred. In 1779 Wilkes was elected to the position of Chamberlain of the City of London, from which sinecure he gained his livelihood for the remainder of his days. He soon became reconciled with the King; in fact, the two became firm friends. He spent the last years of his life in his Parliamentary work and in various literary undertakings, but none of the latter are of especial merit. Wilkes's contest with the Ministry is of primary importance in English history as vindicating the absolute rights of the Parliamentary constituencies. Consult Fitzgerald, *The Life and Times of John Wilkes, M. P.* (London, 1888); also the *Letters of Junius*.

WILKES-BARRE, wĭlks′băr-rĕ. The county seat of Luzerne County, Pa., 144 miles north by west of Philadelphia, on the Susquehanna River, here spanned by four iron bridges, and on the Pennsylvania, the Lehigh Valley, the Delaware, Lackawanna and Western, the Delaware and Hudson, and other railroads (Map: Pennsylvania, F 2). It is attractively situated in a region abounding in beautiful scenery, and is rich in reminiscences of the Colonial and Revolutionary periods. In the vicinity there are of historic interest the Wyoming Monument, marking the site of the conflict of July 3, 1778, between the Americans and the Loyalists and Indians (see WYOMING VALLEY); the old Forty Fort Church, erected in 1808; and Queen Esther's Rock. Among the prominent institutions of Wilkes-Barre are the Harry Hillman Academy, the Malinckrodt Convent, Saint Mary's Convent, Home for Friendless Children, Home for Homeless Women, and the City and Mercy hospitals. The Osterhout Free Library has 35,000 volumes. Other collections include those of the Law and Library Association (7500 volumes), the Wyoming Historical and Geological Society, and the Young Men's Christian Association. The Wyoming Historical Museum has 20,000 volumes, and a collection of 30,000 relics of the early wars. Of the buildings the most notable are the post-office, county court-house, city hall, jail, armory, and coal exchange. Wilkes-Barre is known as a centre of one of the most productive anthracite coal regions in the United States, the total output in 1900 amounting to about 19,000,000 tons. The manufacturing interests also are extensive.

In the census year 1900 the various industries had an invested capital of $10,501,537, and a production value of $10,758,348. The Wilkes-Barre Lace Manufacturing Company, the Hazard Wire Rope Works, the Sheldon Axle Works, and the Vulcan Iron Works are among the largest concerns of their kind in the United States. Other important establishments include shops of the Lehigh Valley Railroad, foundries and machine shops, cutlery works, and manufactories of silk and silk goods, underwear, flour, malt liquors, clothing, shirts, etc. The government is vested in a mayor, chosen every three years, and a bicameral council. Of the subordinate officials, the majority are appointed by the mayor, subject to the confirmation of the council. In 1902 the net debt of the city was $593,014; and the assessed valuation of real and personal property was $36,346,818, this amount being reduced by the board of revision for taxable purposes to $18,173,409. For maintenance and operation there is spent annually about $372,000, the chief items being: schools, $144,000; municipal lighting, $38,000; street department, $38,000; fire department, $36,000; police department, $35,000; interest on net debt, $24,000. Population, in 1890, 37,718; in 1900, 51,721. The first settlers came to Wilkes-Barre in 1769 and laid out the village. In 1784, during the Pennamite-Yankee War, 23 of the 26 buildings were destroyed by the Pennamites, but the village was slowly rebuilt and in 1806 was incorporated as a borough. In 1850 its population was only 2723, but after the Civil War it grew rapidly, and in 1871 was chartered as a city. It takes its names from John Wilkes and Col. Isaac Barré, advocates of the colonists in the British Parliament, during and preceding the Revolution. Consult *History of Luzerne, Lackawanna, and Wyoming Counties* (New York, 1880).

WIL'KIE, Sir David (1785-1841). The principal genre painter of the Scottish school. He was born November 18, 1785, at Cults, a small village in Fifeshire, where his father was a clergyman. At fourteen he entered the Trustees' Edinburgh Academy, and studied under the historical painter John Graham until his return to Cults in 1804. "Pitlessie Fair," his first important work, gave him a local reputation, and "The Village Politicians" (1806), considered the best picture of the year in London, provided him the means to remove to the capital. By studying the work of the Dutch masters, he acquired fine technique in color. He painted humorous subjects from family fireside scenes or comic episodes that took place in the village festivities, which called forth great applause; among them are "The Blind Fiddler" and "The Village Festival" (1812), both in the National Gallery; "The Card Player" (1808); "Rent Day;" "The Cut Finger;" "The Penny Wedding" (1818); and the "Reading of the Will" (Pinakothek, Munich). He was elected a Royal Academician in 1811. In 1825-28, to restore his enfeebled health, Wilkie was compelled to travel, chiefly in Italy and Spain. There he was especially influenced by Velazquez and Titian, and changed his theme from genre to historical and portrait subjects, in which, however, he did not succeed as well. His best known works of this character are "Wellington Writing a Dispatch," "Napoleon and the Pope at Fontainebleau," and "Sir David Baird Discovering the Body of Tippoo Saib." In 1836 he was knighted and in 1840 he started upon a tour abroad, but died on the homeward journey, June 1, 1841, and was buried at sea. Consult Cunningham, *Biography of Wilkie* (London, 1843).

WILKIE, William (1721-72). A Scottish divine and poet, born at Echlin, in the parish of Dalmeny, Midlothian, Scotland. He attended the University of Edinburgh, but, owing to the death of his father, his academic career was interrupted. For several years he carried on a farm with success, studying in the meantime for the ministry in the Church of Scotland. In 1753 he became assistant to the parish minister at Ratho and in 1756 the sole incumbent. In 1759 he was appointed professor of natural philosophy in the University of Saint Andrews, a position which he held till his death. Wilkie was styled 'the Scottish Homer' for *The Epigoniad* (1757; 2d ed. 1769), an epic in heroic verse on the capture of Thebes. He also published a volume of lively verse *Fables* (1768) in the manner of Gay. Consult Chalmers's *English Poets*, vol. xvi. (London, 1810).

WIL'KINS, John (1614-72). An English prelate and scientist. He was born at Fawsley, Northamptonshire. He graduated at Oxford in 1632; took orders in 1635; was chaplain to Lord Say and Charles, Prince Palatine of the Rhine; during the Civil War adhered to the Parliament; was made warden of Wadham College (1648); married the widowed sister of Oliver Cromwell; and was appointed by Richard Cromwell master of Trinity College in 1659. He was ejected at the Restoration (1660); but being greatly esteemed for his toleration and attainments, obtained favor with Charles II., was made prebendary of York in 1660; rector of Saint Lawrence, London, in 1662; and Bishop of Chester in 1668. At an early age he became known for his scientific writings, invented and described the perambulator or measuring wheel, and in 1645 was one of the promoters of a philosophical club which in 1662 developed into the Royal Society, of which he became first secretary. His principal writings are: *The Discovery of a World in the Moone* (1638), to which was added a *Discourse Concerning the Possibility of a Passage Thither* (1640); *A Discourse Concerning a New Planet* (1640), an argument that the earth is one of the planets; *Mercury, or the Secret and Swift Messenger* (1641), an ingenious treatise on rapid means of correspondence; *Mathematical Magick* (1648); *An Essay Towards a Real Character and a Philosophical Language* (1668); and *On the Principles and Duties of Natural Religion* (1678).

WILKINS, Mary Eleanor (Mrs. C. M. Freeman) (1862—). An American novelist, born in Randolph, Mass., of New England and Puritan descent. She received her education at Mount Holyoke Seminary, South Hadley, Mass., and passed the greater part of her life in Massachusetts and in Vermont. Her stories dealt almost wholly with New England life, which she pictured as a dull, patient existence, but in such striking lines that her work became very widely read and was taken as representative of the New England character. She married in 1901. Her place in popular estimate was among the foremost of contemporary American novelists, with

Sarah Orne Jewett, Thomas Nelson Page, George W. Cable, and others who have dealt with local scenes and types. Her characters represented, in the main, a lower social order than those of Miss Jewett, and were not so sympathetically but more forcibly depicted. Her chief works were: *The Adventures of Ann* (1886); *A Humble Romance* (1887), which gave the author vogue; *A New England Nun* (1891); *Young Lucretia* (1892), for children; *Jane Field* (1892); *Giles Corey* (1893), a drama; *Pembroke* (1894); *Madelon* (1896); *Jerome, a Poor Man* (1897); *Silence, and Other Stories* (1898), containing some of her best work; and *The Love of Parson Lord* (1900). Later works were: *The Portion of Labor* (1901); *Understudies* (1901); and *The Wind in the Rose Bush* (1903). Much of Miss Wilkins's work appeared as short stories and serials in the leading magazines.

WIL'KINSBURG. A borough in Allegheny County, Pa., adjoining Pittsburg, of which it is a residential suburb (Map: Pittsburg, B 3). It has the Home for Aged Protestant Women and the United Presbyterian Home for the Aged. Wilkinsburg was named in honor of William Wilkins, Secretary of War under President Tyler, and was incorporated as a borough in 1887. Before receiving its present name it was known first as M'Nairville and then as Rippeyville. Population, in 1890, 4662; in 1900, 11,886.

WIL'KINSON, Henry Spenser (1853—). An English journalist and writer on military themes. He was born in Manchester, May 1, 1853; was educated at Owens College, Manchester, and at Merton College, Oxford, and was called to the bar at Lincoln's Inn in 1880. From 1883 to 1892 he was connected with the *Manchester Guardian*, and in 1895 he joined the staff of the London *Morning Post*. Becoming convinced as early as 1874 that Great Britain was inadequately armed, he began to devote great attention to the subject of the national defense. During the early months of the Boer War (1899-1900) Wilkinson won wide recognition by his extraordinarily accurate forecasts of the military movements of both Boers and British, and of the resulting battles. Besides his work as special correspondent to the newspapers, his writings include *Essays Toward the Improvement of the Volunteer Forces* (1886); *Essays on the War Game* (1887); *The Brain of an Army* (1890), an account of the German general staff; *The Volunteers and the National Defense* (1891); *Imperial Defense* (jointly with Sir Charles Dilke, 1892); *The Great Alternative, a Plea for a National Policy* (1894); *The Command of the Sea* (1894); *The Brain of the Navy* (1895); *The Nation's Awakening* (1896); *British Policy in South Africa* (1899); *Lessons of the War* (1899); and *War and Policy* (1900).

WILKINSON, James (1757-1825). An American soldier, born in Benedict, Md., of English ancestry. He was privately tutored and studied medicine in Philadelphia (1773-75). In September, 1775, he enlisted in the American Army, joining the army before Boston; the following year he was made captain and led a company northward, joining Arnold at La Chine in the invasion of Canada. He became a colonel, served on the staff of General Gates, and was promoted by the latter to be deputy adjutant-general of the Army of the Northern Department. He served with some distinction through the Saratoga campaign, and was delegated to bear to Congress the news of the surrender of Burgoyne. He was brevetted brigadier-general in November, 1777; was implicated in the Conway Cabal (q.v.); acted as secretary to the Board of War from January to March, 1778; and in July, 1779, was made clothier-general of the Continental Army. He resigned in 1781, and in 1784 removed to Kentucky, where he soon came to exert considerable influence. He played a conspicuous part in the early politics of that State; and even went so far as to intrigue with the Spaniards in Louisiana for the absorption of the Western country by Spain. He was, however, spokesman for but a small coterie of politicians and adventurers, his motive being largely selfish. For the rôle he played he received valuable trade concessions with Louisiana—he had come to be the largest tobacco dealer in the West—and a pension from the Spanish Government. His treasonable conduct being unknown, he was appointed lieutenant-colonel in 1791, and served with ability in the Indian wars of the West, notably in Anthony Wayne's campaign. In March, 1792, he was appointed brigadier-general, and in 1796 succeeded Wayne as commander-in-chief of the army. In 1805, after the acquisition of Louisiana and its division into two Territories, he was appointed by Jefferson Governor of Upper Louisiana with his capital at Saint Louis. At this time he was already engaged with Aaron Burr in a scheme for the conquest of Mexico. During 1806, under cover of the Spanish War excitement, this scheme took shape, but Wilkinson, seeing the opportunity of driving a double bargain, turned traitor, denouncing the expedition to the President, and applying to the Viceroy of Mexico for money to compensate him for having saved that kingdom to Spain. His treachery and guilty conduct, however, were clearly exposed to some people and he narrowly escaped indictment along with Burr at Richmond in 1807. Wilkinson's period of impunity was ended. On December 31, 1807, John Randolph introduced a resolution in Congress to inquire into the conduct of Brigadier-General James Wilkinson "in relation to his having, at any time, while in the service of the United States, corruptly received money from Spain or its agents." He was exonerated, but of his guilt Randolph was certain, and early in 1810 two committees in Congress took up charges against the General. On December 25, 1811, he was again acquitted, and resumed command of the army. In March, 1813, during the second war with Great Britain, he was raised to the rank of major-general and placed in command of the Canada Expedition, but, proving incapable, he was superseded in 1814, and in November a court-martial was ordered for his trial on charges of neglect of duty, drunkenness, conduct unbecoming an officer, and of countenancing and encouraging disobedience of orders. In 1815 he was again acquitted, and was honorably discharged from the service. He removed to Mexico City and took a small part in some of the revolutionary movements then afflicting that country. His last years were spent in trying to collect from Mexico a large sum of money due himself and some of his friends for munitions and arms. He was a brave officer, a fluent speaker, and a ready but rather grandiose writer. Since his death materials have been brought to light which show him to have been a consummate intriguer, barren of honor and shamelessly corrupt. He published: *The Aaron Burr Conspiracy Exposed* (1808); and a partially reliable work, *Memoirs of My Own Times* (1816), which was left incomplete. For accounts of his Western intrigues, consult: Gayarré, *Spanish Dominion in Louisiana* (New York, 1854); Roosevelt, *Winning of the West*, vol. iii. (ib., 1894); Green, *The Spanish Conspiracy* (Cincinnati, 1891); Daniel Clark, *Proofs of the Corruption of Gen. James Wilkinson* (1809); and McCaleb, *The Aaron Burr Conspiracy* (New York, 1903).

WILKINSON, Jemima (1753-1819). An American religious enthusiast. She was born at Cumberland, R. I., and educated among the Society of Friends. When twenty years old she suffered from a severe fever, and, after an apparent suspension of life, she asserted that she had been raised from the dead to instruct the living. She professed to work miracles. She had a few followers who with her built in Yates County, N. Y., a village named Jerusalem. She enjoined celibacy, and the religious exercises which she instituted had some resemblance to those of the Shakers. At her death the sect was broken up. Consult: David Hudson, *History of Jemima Wilkinson* (Seneca, N. Y., 1821); and *Memoir of Jemima Wilkinson* (Bath, N. Y., 1844).

WILKINSON, Sir John Gardner (1797-1875). A distinguished English traveler and Egyptologist, born October 5, 1797. Wilkinson was educated at Harrow and at Exeter College, Oxford, but left the university without taking a degree and went to Italy for his health in 1820. Becoming interested in Egyptological studies, he went to Egypt in 1821 and took up his abode at Cairo, where he soon became proficient in Arabic and in Coptic. In the course of the next twelve years he explored nearly every part of Egypt and Lower Nubia, twice ascending the Nile as far as the second cataract and several times as far as Thebes. To the exploration of the latter site he devoted more than a year, and he also visited the deserts on either side of the Nile and the Egyptian oases. As a result of his first visit to Egypt, he transmitted to the British Museum more than 300 antiquarian objects, besides numerous specimens of natural history. His first work on Egyptian antiquities, *Materia Hieroglyphica*, was published at Malta in 1828. It was followed, two years later, by *Extracts from Several Hieroglyphical Subjects*, and in the same year (1830) he published his *Topographical Survey of Thebes* in six sheets. In 1833 he was compelled by ill health to return to England, and at the close of the following year he was elected fellow of the Royal Society. His *Topography of Thebes and General View of Egypt* was published at London in 1835, and two years later appeared his great work, *Manners and Customs of the Ancient Egyptians* (3 vols., best ed. by Birch, 1878), a work remarkable both for the extensive and accurate information it contains and for the agreeable style in which it is written. It immediately attained great popularity and gained for its author in 1839 the honor of knighthood. In 1841 he revisited Egypt, traveled extensively in Northern Africa, Syria, and Turkey, and returned to England in 1843. In the year of his return he published his *Modern Egypt and Thebes*, of which a new and condensed edition was issued among Murray's *Hand-books* in 1847. A journey through Montenegro, Herzegovina, and Bosnia in 1844 furnished the material for his *Dalmatia and Montenegro* (2 vols., 1848). He visited Egypt for the third time in 1848-49 and again in 1855-56. He presented his collection of Egyptian, Greek, and other antiquities to Harrow School and in 1874 gave to the same institution his valuable collection of coins and medals. He died at Llandovery, in Wales, October 29, 1875. Among Wilkinson's other works may be mentioned: *The Architecture of Ancient Egypt* (1850); *The Fragments of the Hieratic Papyrus at Turin* (1851); *A Popular Account of the Ancient Egyptians* (1853); *The Egyptians in the Time of the Pharaohs* (1857); *On Color, and on the Necessity for a General Diffusion of Taste Among All Classes* (1858).

WILKINSON, Tate (1739-1803). An English actor and theatrical manager, especially celebrated for his powers of mimicry. At first he did not meet with much success as an actor, and in fact his own regular acting never advanced him very far; but he showed such a popular gift for mimicking the peculiarities of other performers that he was throughout his early career alternately the delight and the detestation of the theatrical people with whom he had to do. He was especially successful in mimicking Peg Woffington, Foote, and Garrick, to all of whom he gave considerable offense. In the provinces Wilkinson successfully took leading parts in serious drama. About 1768 he married and settled down in York as the manager of what was called the Yorkshire Circuit, which he directed with excellent judgment and prosperity for over thirty years. Among his actors were Mrs. Siddons and the other Kembles, Miss Farren, and a number of others who afterwards became famous. His oddities were notorious, but he was a generous manager. Of his writings the most important are: the *Memoirs of His Own Life, by Tate Wilkinson, Patentee of the Theatres-Royal, York and Hull* (1790) and *The Wandering Patentee; or a History of the Yorkshire Theatres from 1770 to the Present Time*, etc. (1785). Consult also: Archer, in *Actors and Actresses of Great Britain and the United States*, edited by Matthews and Hutton (New York, 1886); Baker, *Our Old Actors* (London, 1881).

WILKINSON, William Cleaver (1833—). An American educator and poet. He was a graduate of Rochester University (1857) and Theological Seminary (1859), pastor of a Baptist church in New Haven until 1861 and of another in Cincinnati (1863-66). He then opened a school at Tarrytown, N. Y., and from 1872 till 1881 was professor of homiletics in Rochester Seminary, and after 1892 professor of poetry and criticism in the University of Chicago, giving himself mainly to literary work. For the Chautauqua Literary and Scientific Circle he prepared many text-books on languages. He published also: *The Dance of Modern Society* (1868); *A Free Lance in the Field of Life and Letters* (1874); *The Baptist Principle* (1881); *Webster*, an ode (1882); *Poems* (1883); *Edwin Arnold as Poetizer and Paganizer* (1885); *The*

Epic of Saul (1891); *The Epic of Paul* (1898); and *The Epic of Moses* (1903).

WILL (AS. *willa*, Goth. *wilja*, OHG. *willo*, Ger. *wille*, will, wish, from AS. *willan*, Goth. *wiljan*, OHG. *wellan*, *wollan*, Ger. *wollen*, to will, to wish; connected with Lat. *velle*, Lith., OChurch Slav. *velēte*, to will, Welsh, Corn., Bret. *guell*, better, Skt. *var*, to choose, or perhaps with Gk. *ἐθέλειν*, *ethelein*, *θέλειν*, *thelein*, Skt. *haray*, to wish). A term in psychology variously connoting volition. It may denote: (1) a general phase or mode of consciousness, as when will or willing is set over against thinking or intellection; or (2) it may be employed as the equivalent of voluntary action, action which has conscious antecedents as distinguished from reflex and instinctive movements; or (3) it may be restricted to the group of mental processes included in deliberation, choice, desire, and a conscious anticipation of the result of action. Will, with this connotation, implies a selective activity. In the first sense (1) will corresponds to what was termed, in the older psychologies, one of the fundamental faculties, or powers, or activities of mind. (See Faculty.) Will in the second sense (2) is discussed under Action. The terms volition and conation are often used synonymously with it. See Conation.

The chief question in connection with the first definition of will is that of an ultimate and elementary will-quality constituting the essence of volition. Some psychologists contend that there is such an unanalyzable quality, which they make coördinate with sensation and affection or feeling; others deny that it exists and explain its apparent presence in conation or effort or the feeling of subjective initiation of action or thought by an analysis of consciousness into strong affection, muscular and tendinous sensations, and an idea of end or result toward the realization of which the organism is tending. (See Effort.) The question of an elementary will-quality loses much of its importance as soon as it becomes clear that it is a question of analysis and has nothing whatever to do with the validity of will and the efficacy of the will as a determinant of action. A volition directed toward the selection of one of two possible lines of action, for example, has precisely the same significance whether there is in willing an ultimate conative element or whether the volition is a complex analyzable into a dozen part-processes all different from the whole. Introspective evidence in the matter of analyzability falls on both sides of the question, and the dispute at present is undecided. It may be said, however, that those who claim an elementary quality of will often confuse a root-function, i.e. a primitive mode of conscious action (q.v.), with such a quality. It is, perhaps, true that, genetically, the remote ancestor of true volition was a simple, impulsive movement toward, or away from, an object; a movement which was accompanied by the consciousness of fruitful endeavor; i.e. a conative attitude toward a presented object. But even if this attitude were present in the most primitive consciousness, it does not follow that either it or its derivatives are qualitatively simple or that they contain an element which is lacking to other more 'passive' forms of consciousness.

However we answer the question just proposed, we have still to give an analysis of will in the third sense, for deliberative action is always a highly complex grouping of elements. In such action the individual both feels (is pleasantly or unpleasantly affected) and has vivid ideas (of movement, of results to be attained, etc.). We shall most easily understand its nature, its constituent parts, and its relation to other forms of consciousnesss by bringing it into connection with attention (q.v.) and action. In voluntary choice, attention is always active, i.e. there is more than a single claimant for the attention. In impulse, on the other hand, a single sensation or idea draws the attention and leaves no room for hesitation or choice. The first peculiarity of will (in the third sense) is, then, the turning of the attention to a thing which is not sufficiently attractive to hold the attention *in the given situation*. Under ordinary circumstances food is passively attended to by a hungry man, but it may happen that a toothache bids so strongly for the attention that a powerful volition is required in order to continue the process of eating. The effort involved in such a case and its subsequent success are (apart from social and ethical traditions) responsible for the belief in the subject's initiative in voluntary actions There is no proof in the action itself that the accompanying consciousness of 'willing' is causally related to the issue. (For freedom of the will, see Determinism.) Psychology prefers to regard the will as mechanically determined in the sense that, so far as the 'self' is the agent, it is the psychophysical organism as modified by the individual's whole experience and his inherited tendencies. (See Self; Self-Consciousness; Tendency; Disposition; Mental Constitution.) In deliberative action, then, the issue is not decided by the alternative 'attractions' set before consciousness, neither is the decision made by an occult power which intervenes and carries the day, but it is made by the predominance of one group of ideas over another in accordance with the habitual tendencies of discharge in the nervous system. Now one of these groups is attended to, now another. Attention (q.v.). it must be noted, is both an inhibiting and a facilitating process. As soon as one group has clarified and completed itself by the addition of associations and has inhibited the rise of its rival, deliberation ceases, for lack of material, and choice, the final term in the volition, ensues. The choice may take the form of resolve and may not issue in external action for days or even years. In the case of a profession to be chosen, the various associations which cluster around the verbal ideas, 'law' or 'medicine' or 'engineering,' together with the pleasantness or unpleasantness which is always present in the state of attention, form the motive to action. It is the composition of this motive, and not the resulting movements, which distinguishes the 'willed' action from the impulsive, ideomotor, instinctive, and reflex types. (See Apperception.) It is clear that the concept 'will' stands in need of further delimitation and definition. Probably it will, in the future, find its most useful application in the sphere of deliberative action, i.e. in the last of the three uses indicated above.

Bibliography. James, *Principles of Psychology* (New York, 1890); Sully, *Human Mind* (ib., 1892); Wundt, *Physiologische Psychologie* (Leipzig, 1893); Külpe, *Outlines of Psychology* (London, 1899); Bain, *Emotions and Will* (ib., 1888); Schneider, *Der menschliche Wille* (Berlin, 1882); Münsterberg, *Die Willenshandlung* (Freiburg, 1888).

WILL. A legal act to take effect at death, by which a person disposes of his property. In civil law such an act is called a testament. Power to testate has not been discovered in any primitive system of law; the primitive method of modifying succession is the adoption (q.v.) of the intended heir, who thereby receives the right to succeed as a son. The modern will is a Roman invention. Its general diffusion was effected, in the ancient world, through the expansion of the Roman Empire; in the modern world, through the influence of the Roman Church.

Roman Law. The Roman testament grew out of 'mancipation.' This was originally a sale, in which the price was paid in a certain weight of copper. When the payment of price became symbolic, the transaction became a conveyance. A mancipation involved the presence of the conveyor and conveyee, a scale-holder, and five witnesses. The evolution of testament out of mancipation was accomplished as follows. Originally, the estate (*familia*) was conveyed to the intended heir (*emptor familiæ*), on the understanding that he was not to assert his right until the conveyor's death. Later, a fiduciary conveyee was substituted, who took title to the estate not in his own interest, but in 'commission' (*mandatela*), to dispose of it according to the instructions of the conveyor. These instructions (*nuncupatio*) were at first given publicly and orally; later, the conveyor produced written and sealed tablets, and declared that these contained his instructions. To the tablets were then attached, for identification, the seals of the conveyee, the scale-holder, and the five witnesses. It is probable that the conveyee discharged, at this stage in the evolution of testament, the duties of an executor; later, he became, like the scale-holder, a purely ceremonial person. At the close of the Republican period the prætors accepted testamentary tablets bearing the seals of seven witnesses, and gave effect to the dispositions contained in such tablets, without inquiring whether the forms of mancipation had been observed; and in the second century of the Empire Marcus Aurelius enacted that an allegation that there had been no mancipation should not be heard. At this point the substitution of the written, secret, and revocable testament for the oral, public, and irrevocable conveyance was complete; but the ceremony 'with copper and the scales' was long retained 'in imitation of the old law.'

The rules governing the Roman testament at the close of the Republican period were very technical. It must create one or more lines, or universal successors, who were to take the whole estate, pay debts and special bequests (*legata*), and retain the residue. The heir or heirs, accordingly, were at once executors and residuary legatees. If the heir was under age, or insane, his guardian acted as executor. If a testator had natural heirs under his household authority (*sui*, see Patria Potestas) he could indeed give the inheritance to others, but he must first expressly disinherit the *sui*.

At the older civil law, again, only a Roman citizen of the age of puberty and not under *patria potestas* (q.v.) could make a testament; and only a person in existence at the time of the testator's death could take as heir. 'Uncertain persons' (like 'the poor') could not be instituted as heirs, nor could juristic persons (corporations).

Informal dispositions of property in contemplation of death were made possible by the enactment of Augustus that trust-bequests (*fidei commissa*, q.v.) should be enforced whenever the intention of the decedent could be proved. By such trusts nearly all the technical limitations upon testation were ended. Such trusts were usually (but not necessarily) made in documents termed codicils, and they might apply to the whole estate (universal *fidei commissa*). In the later Empire there was a reaction toward stricter forms. Except in the case of soldiers in the field, who might testate informally, every declaration of last will must assume the form either of a regular testatment with seven witnesses, or of a codicil with five witnesses. Codicils might be added to a testament, but they could be established independently (*codicilli ab intestato*). Justinian introduced several alternative forms of testation for the benefit of persons who, by reason of their infirmities or their situation at the moment of testation, could not observe the usual forms.

Canon Law accepted the Roman law of testation with few modifications. It accepted a testament made in the presence of the parish priest and two witnesses, and it introduced testamentary executors.

Modern Civil Codes recognize various forms of testation. That most favored is the testament certified by a judge or by notaries and by at least two witnesses. Less formal testaments may be made at sea, in time of pestilence (especially in quarantine), by soldiers in the field, etc., but such testaments usually become invalid soon after the emergency has passed and the testator is able to observe the usual forms.

In French, Italian, and Spanish law a testament wholly written by the testator himself and also dated and signed by him ('holographic' testament) is valid without witnesses or formalities of any sort. This rule has been much criticised, on the ground that it facilitates forgeries and bases the succession essentially on expert testimony as to handwriting.

Inheritance Contract. In Roman law and in all modern legislations successions to the property of a husband or wife may be granted, in part at least, by the term of an ante-nuptial contract. In the late mediæval customs of Germany reciprocal rights of inheritance might be established between any persons by contract (*Erbverbrüderung, Erbvertrag*), and the same result was attainable in Northern France by the establishments of 'reciprocal' testaments, which, unlike other testaments, were not revocable. In France reciprocal testaments were abolished by an ordinance of 1735; but the inheritance contract was recognized in nearly all the State codes of Germany and is recognized in the German Imperial code. The inheritance contract must be in writing and must be certified by a judge or a notary.

Limitations on the Power of Testation.

At Rome in the later Republican period efforts were made to limit the amount of legacies or special bequests. This end was attained, B.C. 40, by the Lex Falcidia, which provided that legacies should not exceed three-fourths of the net value of the entire estate. This did not affect the power of the testator to make a stranger heir, to the total exclusion of his nearest kin. It was, however, possible for children or parents disinherited without cause, or for a brother or sister to whom 'a disgraceful person' was preferred, to attack as 'undutiful' a testament under which such natural heirs received less than one-fourth of their intestacy share; and such an attack was quite likely to be successful if mental weakness could be shown on the part of the testator or undue influence on the part of the stranger heir. Justinian gave descendants and ascendants an absolute right to one-third, or, in some cases, to one-half of their intestacy shares, unless there was good ground for their disherision. All the modern civil codes give statutory shares to descendants and to parents, and nearly all give a share (or at least usufruct in a share) to a surviving spouse. See HEIR; INHERITANCE; SUCCESSION AB INTESTATE; TESTAMENT.

WILLS AT COMMON LAW. At early common law a gift by will of personal property was valid without writing or other formality. As knowledge of the art of writing became more general, the courts came to look askance at verbal or nuncupative wills, holding that they were valid when executed in that manner only by force of necessity. An early statute (29 Charles II., ch. 3) placed various restrictions upon the power of disposing of personal property of less than thirty pounds in value by nuncupative wills. It required such wills to be executed by the testator in the presence of three witnesses in his own house and during his last sickness. This statute with unimportant modification was generally enacted into the statute law of this country. In all of the States wills of personal property may now be executed with the same formalities as wills of real estate, and in a number of States, as in New York, all wills of personal property are now required to be executed in that manner, with the exception that nuncupative wills of soldiers in actual service and of sailors while at sea are still deemed valid.

It seems probable that by the Anglo-Saxon law land held by grant from the King, sometimes known as 'book land,' was to a limited extent devisable. Disposition of land by will, however, was inconsistent with feudal tenure, as it deprived the overlord of his feudal rights and privileges, and, following the Norman Conquest, the practice of making gifts of lands by will ceased with the gradual establishment of the feudal system. There were exceptions in some of the ancient cities as to lands held in burgage (q.v.) and in the County of Kent as to lands held by gavelkind (q.v.), where the power of disposition of land by will was preserved by local custom.

The development of the system of uses by the English Court of Chancery admitted of gifts of land by will by means of a conveyance of the land to such uses as the grantor might appoint by his will. (See TRUSTS.) This method of making devises was temporarily destroyed by the Statute of Uses (27 Hen. VIII.), but the power of devising was completely restored as to all socage estates and as to two-thirds of the testator's lands held by knight service by the Statute of Wills (32 Hen. VIII.) enacted in 1540. By the abolition of feudal tenures (12 Charles II., ch. 14) in 1656, the Statute of Wills was indirectly extended in its application to all lands.

No particular formality was required by the Statute of Wills for the execution of a valid will except that it was required to be in writing. By the Statute of Frauds (29 Charles II., ch. 3) a will was required to be signed by the testator and to be subscribed by three or more witnesses. Other statutory changes have been made in the English Law of Wills which are substantially embodied in the Wills Act (7 Wm. IV. and in I. Vict., ch. 26).

Statutes based on the Statute of Wills and the Statute of Frauds have been enacted in most of the United States, in all of which there are statutes authorizing gifts of land by will. While varying in numerous particulars, these statutes are alike in requiring generally that the will shall be in writing and signed by the testator at the end of the will. Generally two and in some States three witnesses are required, who must subscribe the will as witnesses in the presence of the testator and in the presence of each other. In some States a smaller number of witnesses is required for a will of personal property than for a will of real property. In some States, also, as in New York, the testator is required to publish his will, that is, announce at the time of executing it that the document is his last will and testament. In Louisiana holographic wills without witnesses are valid; also nuncupative wills, provided the will is transcribed by a notary in the presence of witnesses numbering three or five according to circumstances. There are also in that State other rules as to the execution and proof of wills which are not generally in force in the other States of the United States.

The person executing a will must have testamentary capacity, that is, he must be twenty-one years of age in case of wills of real estate, and in most States eighteen years of age in case of wills of personal property. He must be of sound mind and act without undue influence on the part of others. For a fuller consideration of this topic, see INSANITY; INFANCY; MARRIED WOMEN.

In general, any property may be disposed of by will. Such limitations as there now are upon such dispositions are properly limitations on the powers of beneficiaries to take, and only indirectly affect the power of giving property by will. (See CHARITIES.) As a will only takes effect at the death of the testator, it may affect all property acquired by him after its execution as well as before, provided the property falls within the description of the will. Formerly wills were held to affect only the property owned by the testator at the time of execution.

The rules governing the construction of wills, particularly of wills of real estate, are too numerous and complex for discussion here. The most important rule of interpretation is that the intention of the testator as it appears from the will shall be carried out wherever legally possible, and when the will is ambiguous the circumstances surrounding its execution may be examined for the purpose of ascertaining the testator's intention.

A codicil, which is in effect a supplementary will, is to be construed with the will which it supplements. See Devise; Bequest; Interpretation; Legacy.

A will remains revocable until the time of the testator's death. The method of revocation is usually provided for by the statute giving authority to make wills. A will may be revoked by the express language of a subsequent will or by gifts made by it inconsistent with the earlier will, and generally a will may be revoked by cancellation, tearing, or burning by the testator with intention to revoke it. The accidental destruction of a will does not affect its validity or efficacy if its contents can be proved. Disposition of his property by the testator before his death in effect works a revocation of his will, and under the earlier statutes marriage of the testator or the birth of a child revoked his will. There are now various statutory rules on this subject.

For further discussion of this subject, see Conveyance; Executors; Personal Property; Real Property; and the several topics above referred to. Consult Jarman on *Wills*.

WILLAERT, vĭl′lärt, Adrian (c.1480-1562). A Flemish composer, founder of the older Venetian school of composition. He was born at Bruges or at Roulers, West Flanders, studied with Jean Mouton and Josquin Deprés, and in 1516 went to Rome. In 1527 he received the appointment of maestro di capella at Saint Mark's, Venice, where he established a music school. He is known as the originator of the style of writing for two choirs, the idea of which was suggested to him from the two opposed organs at Saint Mark's. Among his works are two masses for from four to seven voices; books of motets (1539-45); *Canzone villanesche* (1545); madrigals; vesper-psalms; hymns; *Musica nova* (1559); and psalms for vespers and compline (1571).

WILLAMETTE, wĭl-lä′mĕt. A river of western Oregon. It rises in the Cascade Mountains, and flows northward through a fertile and well-settled valley, emptying into the Columbia River after a course of 250 miles (Map: Oregon, B 5). It is always navigable to Portland, about 15 miles, and by means of a canal and lock around the Willamette Falls small steamers can for the greater part of the year ascend it about 150 miles to Eugene.

WILLARD, Ashton Rollins (1858—). An American art critic. He was born at Montpelier, Vt., and was educated at Dartmouth College and at Harvard University. He at first practiced law, but subsequently directed his attention to literature and the criticism of art. In 1895 appeared his first book, *The Life and Work of the Painter Domenico Morelli.* This was followed in 1898 by *The History of Modern Italian Art,* an authoritative work on the subject. For this book he received the highest recognition in European art circles, and in 1902 was created by King Victor Emmanuel III. a Chevalier of the Crown of Italy. *The Land of the Latins* appeared in 1902.

WILLARD, Edward S. (1853—). An English actor. He was born at Brighton and made his début upon the stage at Weymouth in 1869. In 1881 he came to London, and with Wilson Barrett at the Princess Theatre played in *The Lights o' London, The Silver Key,* and other well-known pieces. In 1886 he made a hit as *Jim the Penman* at the Haymarket. One of his greatest successes was his production of *The Middleman,* by H. A. Jones, at the Shaftesbury in 1889, he himself creating the part of Cyrus Blenkarn. The next year he produced Jones's *Judah Llewellyn.* He came to America in 1890 and in 1892 appeared in J. M. Barrie's *The Professor's Love Story,* with which he reappeared in London in 1894. His *Hamlet* he brought out in Boston in 1893. Among his subsequent plays may be mentioned *Alabama* (1895) and *The Cardinal* (1902). In 1898 his health broke down, in Chicago, and he was obliged to leave the stage for a short time.

WILLARD, Emma C. (Hart) (1787-1870). A pioneer in the field of higher education for women, born at Berlin, Conn. In 1803 she became a teacher in the village school; three years later she received a position in an academy at Westfield, Conn., but after a few weeks became principal of an academy for girls at Middlebury, Vt. In 1809 she married Dr. John Willard. In the same year she established at Middlebury a girls' boarding-school with improved methods of teaching. Five years later she submitted to Governor Clinton of New York a manuscript entitled *A Plan for Improving Female Education.* The ideas she advanced met with favor, and in 1821 she was able to establish at Waterford, N. Y., a girls' seminary, partly supported by the State. Two years later she removed the school to Troy, where it acquired a wide reputation. Her husband died in 1825, but she continued to manage the institution until 1838, when she placed it in the hands of her son. In 1830 she made a tour in Europe, and three years later published *Journal and Letters from France and Great Britain.* The proceeds from the sale of the book she gave to a school for women that she had helped to found in Athens, Greece. In 1838 she married Dr. Christopher C. Yates, but was divorced from him in 1843. Among her other published works are: *The Woodbridge and Willard Geographies and Atlases* (1823); *History of the United States* (1828); *Universal History in Perspective* (1837); *Treatise on the Circulation of the Blood* (1846); and *Last Leaves of American History* (1849). In 1830 she also published a book of poems, of which the best known is *Rocked in the Cradle of the Deep.* Her *Life* was written by John Lord (New York, 1873). In recognition of her services to the cause of higher education for women a statue was unveiled in her honor at Troy in 1895.

WILLARD, Frances Elizabeth (1839-98). An American educator and reformer, born at Churchville, N. Y. She graduated at the Northwestern Female College at Evanston, Ill., in 1859; taught in various Western towns, and in 1866-67 was principal of the Genesee Wesleyan Seminary at Lima, N. Y. After two years of travel in Europe and the East, she became professor of æsthetics at Northwestern University, and dean of the Woman's College there. In 1874 she became corresponding secretary of the

Woman's Christian Temperance Union, and from 1879 till her death was its president. Under her guidance the organization of the Union was perfected and its sphere of activity greatly enlarged. In 1882 she became a member of the executive committee of the Prohibition Party; in 1883 she founded the World's Woman's Christian Temperance Union and in 1888 became its president. Besides contributing frequently to the magazines, she wrote a number of books and pamphlets, including: *Nineteen Beautiful Years* (1868); *Woman and Temperance* (1883); and *Glimpses of Fifty Years* (1889). She edited for a time the Chicago *Evening Post*, and in 1892-98 *The Union Signal* (Chicago), the official organ of the Union. Miss Willard probably did more for the cause of temperance than any other person of her time. Consult an article in *The Methodist Review*, vol. lxxx. (1898).

WILLARD, JOSEPH (1738-1804). An American clergyman and educator, born in Biddeford, Maine, a great-grandson of Samuel Willard (q.v.), who was acting president of Harvard, 1701-07. He graduated at Harvard, 1765, and was tutor till 1772, when he became colleague pastor of the Congregational Church at Beverly, Mass. He was president of Harvard, 1781-1804. Among his published writings are several sermons; a Latin address on the death of Washington; and scientific papers in the *Memoirs of the American Academy* and the *Philosophical Transactions*.

WILLARD, JOSIAH FLYNT. See FLYNT, JOSIAH.

WILLARD, SAMUEL (1640-1707). A colonial clergyman. He was born in Concord, Mass.; graduated at Harvard in 1659; was minister at Groton from 1663 to 1676, whence he was driven by the Indians during King Philip's War; was pastor of the Old South Church, Boston, from 1678 until his death; strenuously opposed the witchcraft persecutions in 1692; and was acting president of Harvard from 1701 until his death. He published many sermons, including: *The Duty of a People that Have Renewed Their Covenant with God* (1680); *Brief Animadversions upon the New England Anabaptists' Late Fallacious Narrative* (1681); and *Mourner's Cordial Against Excessive Sorrow* (1691). A folio volume entitled *A Compleat Body of Divinity* was published posthumously, by Joseph Sewall and Thomas Prince, in 1726.

WILL'COX, ORLANDO BOLIVAR (1823—). An American soldier, born in Detroit, Mich. He graduated at West Point in 1847; served under General Scott in the latter part of the Mexican War; became a first lieutenant in the Fourth Artillery in 1850; resigned from the army in 1857; and then began the practice of law in Detroit. He reëntered the service in May, 1861, after the outbreak of the Civil War, as colonel of the First Michigan. In the first battle of Bull Run he was wounded and captured, and was exchanged in February, 1862. He fought at South Mountain, Antietam, and Fredericksburg; commanded the District of Indiana and Michigan for a short time; took part in the operations in East Tennessee in the fall and winter of 1863-64; led a division of the Ninth Corps in the Wilderness and Richmond campaigns; was brevetted major-general of volunteers on August 1, 1864; and was the first to break into Petersburg, receiving the surrender of that place. In January, 1866, he was mustered out of the service, but reëntered it in the following July as colonel of the Twenty-ninth Infantry. In March, 1867, he was brevetted brigadier-general and major-general in the Regular Army for services at Spottsylvania and Petersburg respectively. He reached the regular rank of brigadier-general in 1886, and retired in the following year. He published: *Shoepack Recollections* (1856); and *Faca: An Army Memoir, by Major March* (1857).

WILLCOX, WALTER FRANCIS (1861—). An American teacher, writer, and statistician, born at Reading, Mass. He graduated at Amherst in 1884 and at the Columbia University Law School in 1887, was an instructor in philosophy at Amherst in 1888-89, studied at Yale in 1889-90 and at Berlin, Germany, in 1890-91, and received the degree of Ph.D. at Columbia in 1891. In the same year he became an instructor in the Sage School of Philosophy, Cornell University; and in 1892 was appointed assistant professor of social science and statistics in the same institution, becoming an associate professor in 1894, and a full professor in 1898. In 1899-1901, on leave of absence from Cornell, he was one of the five chief statisticians of the Twelfth Census, and in 1902 became dean of the faculty of arts and sciences, Cornell University. For some years he was secretary of the American Economic Association. Besides essays and magazine articles, he published *The Divorce Problem, A Study in Statistics* (1891, 2d ed. 1897).

WILLEMITE (named in honor of William I., Dutch *Willem I.*, King of Holland). A mineral zinc silicate crystallized in the hexagonal system. It has a resinous lustre, and is of various shades of light yellow, green, red, and brown in color. It is found in Prussia, in Greenland, and with the zinc deposits in Sussex County, N. J., where it occurs massive and also intimately mixed with franklinite and zincite. The transparent specimens from New Jersey have been cut as cabinet gems. The reddish colored crystals found in New Jersey are known as *troostite*.

WILLEMS, vĭl′lĕms, FLORENT (1823—). A Belgian genre painter, born in Liège. He was a pupil of the Mechlin Academy, but formed his art chiefly after the old Dutch masters, famous for their minute execution, and achieved especial success in painting fabrics. In 1844 he removed to Paris, where he received first-class medals in 1855, 1867, and 1878, and many other honors. He is well known in the United States, good examples of his works being in the Metropolitan Museum (New York), the Art Institute of Chicago, and other public and private collections.

WILLEMS, JAN FRANS (1793-1846). A Flemish philologist, historian, and poet. He was born at the village of Boechout, near Antwerp, and at the age of twelve was sent to the town of Lierre, to learn singing and music. His talents attracted the notice of several influential persons there, through whose agency he was sent to Antwerp, to study in the office of a notary; and in 1812 he won the prize awarded for the best poem on the battle of Friedland and the Peace of Tilsit. From this period his poetical and dramatic compositions followed each other in rapid succession.

His ode *Aen de Belgen*, which appeared in 1818, in which he exhorted his countrymen to resume the use of their native Flemish, and his treatise *Over de nederduitsche taal en letterkunde* (1819-24), in which he traced the history of the Flemish and Dutch tongues from their common origin through their gradual but slight divergencies, mark an epoch in the literary history of Belgium. The Dutch Government gave him the post of keeper of the archives at Antwerp, but the Catholic Party in Belgium, resenting the attempt made by Willems to attribute the decline of Belgian national renown to the abandonment of the Flemish vernacular, looked upon his writings with mistrust; and in 1830, when Belgium was definitely separated from Holland, the dominant Belgian party deprived Willems of his office. In 1835 he was, however, promoted to the place of keeper of the archives at Ghent, where he continued to reside until his death. Among the numerous Flemish works published by Willems, special notice is due to his version of the mediæval poem of *Reinaert de Vos*, while among the more important of his strictly national works were his editions of the rhymed chronicles of Jan de Klerk (1836) and Jan Van Heelu (1840), *De brabantsche Yeesten* (1839-43), and his *Mengelingen van vaderlandschen Inhoud*, and his posthumous *Oude vlœmsce liederen* (1848); *Brieven* (1874); and *Keus van Dicht- en Prozawerken* (1875). He founded and edited the quarterly *Belgisch Museum voor de Nederlandsche taal- en letterkunde* (10 vols., 1837-46). Biographies of Willems have been written by Snellaert (Ghent, 1847) and Rooses (Antwerp, 1874). Consult also Rooses, Buylsteke, and Bergmann, *Jan Frans Willems* (Ghent, 1893).

WILLEMSTAD, vĭl′lĕm-städ. The capital of the island of Curaçao (q.v.).

WIL′LENHALL. A manufacturing town in Staffordshire, England, 3 miles east of Wolverhampton. It has iron foundries, and metal works of all kinds. The town's industrial importance dates from the reign of Elizabeth. Population, in 1901, 18,513.

WILLESDEN, wĭlz′den *or* wĭl′ĕs-dĕn. A town in Middlesex, England, a suburb of London, 7 miles west-northwest of Saint Paul's (Map: London, D 5). Dollis Hill House was the occasional residence of William E. Gladstone. Public libraries, several parks and recreation grounds, and an isolation hospital are maintained. Population, in 1891, 61,265; in 1901, 114,815.

WILLET (so called in imitation of its cry). A large North American snipe or 'tatler' (*Symphemia semipalmata*), with long wings, and long strong legs, making the bird tall and a fast flyer; it measures about 15 inches in length. It is dark ash-color above, spotted with brown, and white on the rump and under surface. It resides in the Southern States, breeding as far North as New Jersey or occasionally farther; and in the fall is seen in flocks along the seacoast, where it is a favorite object of sport. Compare YELLOWLEGS.

WIL′LETT, MARINUS (1740-1830). An American soldier, born at Jamaica, N. Y. During the French and Indian War he served as a lieutenant in the Ticonderoga and Fort Frontenac expeditions, and subsequently became prominent as a leader of the Sons of Liberty (q.v.) in New York City. He entered the Continental Army in 1775, accompanied Montgomery to Canada, served in the vicinity of New York in 1776, and, as second in command (under Gansevoort) at Fort Stanwix (then Fort Schuyler), distinguished himself and earned the thanks of Congress by making a brilliant sortie (August 7, 1777) against the besieging enemy. He then penetrated the British lines and procured reënforcements, under Arnold, from General Schuyler, then facing Burgoyne near Stillwater. By successive promotions he attained the rank of colonel in December, 1779. In 1779 he accompanied Sullivan's expedition against the Iroquois, and in 1780-83 commanded the New York militia in the Mohawk Valley, making the last attack of the war on the British, at Oswego, in February, 1783. After the war he was a member of the New York Assembly in 1783-84, was sheriff of New York from 1784 to 1792, and was Mayor of New York City in 1807-08. Consult *A Narrative of the Military Actions of Col. Marinus Willett* (1831), by his son William M. Willett.

WIL′LETTS POINT. See FORT TOTTEN.

WILLIAM I., THE CONQUEROR (c.1027-87). King of England from 1066 to 1087. He was an illegitimate son of Robert II., Duke of Normandy, by Herleva, or Arlette, a tanner's daughter, and in early life was known as William the Bastard. When Duke Robert set out on his pilgrimage to the Holy Land in 1033 he caused William to be chosen by the nobles as his successor, and on Robert's death in 1035 William became Duke of Normandy. Rebellions broke out almost immediately, and attempts were made to seize the person of the young Duke. These rebellions continued during the whole time of his minority, the most serious taking place in 1047. In that year, in alliance with the French King, Henry I. (q.v.), William won a brilliant victory over the rebels at Val-ès-dunes. In 1051 William visited Edward the Confessor (q.v.) in England, and probably was promised the English crown after Edward's death. During the succeeding years until 1060, William was engaged in very frequent warfare with the King of France, the Count of Anjou, and some of his own subjects, but he succeeded in establishing his authority firmly, and in 1063 gained possession of Maine. In 1061 he had established the curfew (q.v.) in Normandy, whence later it was carried over into England.

About 1064 Harold, Earl of Wessex, appears to have spent some time in Normandy, perhaps after a shipwreck which placed him as a prisoner in the hands of the Normans. According to the Norman chroniclers, whose story is discredited by Freeman, Harold took an oath to aid William in securing the English crown on the death of Edward the Confessor. On Edward's death Harold was chosen King of England and was crowned by the Archbishop of York (1066). William had determined that the crown of England should be his, and at once proceeded to claim it, although he had no valid claim whatever. He pretended to be the rightful heir by Edward's bequest and through the failure of Harold to abide by his sworn engagements. Through the agency of Hildebrand, later

Gregory VII., he obtained the sanction of the Pope for the conquest of England, on the ground that Harold was guilty of perjury. He collected an army made up in part of volunteers from France and Flanders, and landed in England on September 28, 1066. The size of his army is not known, the most reliable estimates varying from 25,000 to 60,000. At the same time the English had to face an onslaught by the Norwegians. On October 14th William won the battle of Hastings (q.v.), or Senlac, in which Harold was slain. After wasting the whole country about London, he finally secured his admission into the city, and on December 25th was crowned King at Westminster, after having been duly elected by the Witan. Five more years of ravaging and fighting completed the conquest of England, the revolt under Hereward (q.v.) being put down only in 1071. In 1070, in order to make all further resistance impossible, he laid waste the whole Vale of York. Many thousand people were killed or perished from starvation. In 1072 he invaded Scotland and received the homage of Malcolm Canmore. See MALCOLM.

During the next ten years William divided his time between Normandy and England. He was compelled to carry on war against the Count of Anjou, the French King, and his own son Robert. In 1075 a serious revolt occurred in England, where the two most powerful earls had plotted treason. After subduing them, William put to death Waltheof, the last earl of purely English stock. About 1076 William created the New Forest in the southwest of Hampshire. In 1082 he imprisoned his brother, Odo, Bishop of Bayeux, whom he had made Earl of Kent and had left as his regent in England during his absences. He retained him in captivity almost until the time of his own death. In 1085 he prevented an invasion by Canute the Saint (q.v.), and in the same year ordered a survey of England. (See DOMESDAY BOOK.) In 1086 he required all vassals of mesne lords, as well as direct vassals, to do fealty to him, thus introducing into England the Norman custom by which the Duke had direct authority over all his subjects. This was the most important feudal innovation that William made in England. In 1087, while waging war against Philip I. of France, he received an internal injury, and died September 9th.

William was a man of remarkable ability, and owed his success almost entirely to his own exertions. He ruled strictly and kept excellent order, but he was unscrupulous and merciless in punishing any opposition to his own will. He confiscated all of the land held by his opponents under the pretext of law, as he considered them traitors, and he extorted very heavy fines on all possible occasions. The taxation also bore very heavily upon his subjects. He was religious and blameless in his private life. Although very liberal to the Church, he ruled absolutely over its officials, and refused to give up to the Papacy anything which he regarded as a royal prerogative. In 1076, when Gregory VII. demanded of him fealty and the payment of Peter's pence, he sent the latter, but refused to hold his kingdom as a fief from the Papacy. In his later years he became tyrannical and avaricious. His tyranny was all the more oppressive because it was cloaked with a pretense of law, and he accomplished his purposes by legal subtleties, maintaining as far as possible the old English customs, which he shaped to suit his own wishes. In his later years he was often called William the Great. His wife was Matilda, heiress of the Count of Flanders. Their marriage was long delayed because forbidden by Leo IX. (q.v.) on account of consanguinity; but it took place in 1053 in spite of the opposition of the Pope. Finally, in 1059 William secured a Papal dispensation sanctioning his marriage. He had four sons and five daughters. The eldest of the sons died before his father; of the others, Robert inherited the Duchy of Normandy, William the Kingdom of England, and Henry, who was later King of England, a considerable sum of money.

Consult: Freeman, *History of the Norman Conquest*, vols. ii., iii., iv. (Oxford, 1870-71); id., *William the Conqueror* (London, 1894); Stubbs, *Constitutional History of England*, vol. i. (6th ed., Oxford, 1897); Palgrave, *Normandy and England*, vol. iii. (London, 1864); Green, *Conquest of England* (London, 1884); Round, *Feudal England* (London, 1895); and Lappenberg, *England Under Norman Kings*, translated by Thorpe (Oxford, 1857).

WILLIAM II. RUFUS (c.1056-1100). King of England from 1087 to 1100. He was the third son of William the Conqueror, and was educated by Lanfranc (q.v.), Archbishop of Canterbury. William was the favorite son of his father, who, after having recommended him to the barons and prelates as successor to the crown, sent him to England the day before he himself died. Landing at Dover, William presented himself to Lanfranc, who brought him before the nobles and prelates as their King. No opposition was offered, and William was crowned on September 26, 1087. But in less than three months his uncle, Odo, headed a rebellion in favor of the King's brother, Robert (q.v.), Duke of Normandy, who was considered less stern. William put down the rebellion by the aid of his English subjects, and in revenge he invaded Normandy in 1090. Peace was made in 1091 and Robert and William then turned their united arms against their brother Henry, later Henry I. (q.v.), who had purchased from Robert the district of Cotentin. The fortune of war went against Henry, who was driven into exile. Returning to England, William's next enterprise was an invasion of Scotland, whose King did homage to him. In 1094 he again invaded Normandy, but accomplished little. William was recalled to England by disturbances in Wales and in the North. In the year 1096 Robert, who had resolved to go to Palestine, pledged his Duchy of Normandy to William for 10,000 marks. In 1098 William attempted to conquer Maine, but was only partially successful. He was shot while hunting in the New Forest, August 2, 1100. It is not known by whom the arrow was shot, or whether it was done accidentally. William was a stern ruler and was feared by his subjects. His justiciar was the notorious Ranulf Flambard (q.v.). His private life was extremely immoral. After Lanfranc's death in 1089 he oppressed the Church. In February, 1093, he was ill, and, fearing death, became repentant. Then he consented to the appointment of Anselm (q.v.) to the see of Canterbury, left vacant by Lanfranc's death, but, soon recovering, he fell back into his evil ways. From this time he was in constant strife with Anselm, and in 1099 was threatened by the Pope with excommunication. When he was buried at Winchester no religious services were held. The English chronicle says "he was loathsome to well-nigh all his people, and abominable to God." For full details and references consult: Freeman, *History of the Norman Conquest,* vol. v. (Oxford, 1876); id., *William Rufus* (2 vols., Oxford, 1882).

WILLIAM III. (1650-1702). King of England, Scotland, and Ireland from 1689 to 1702. He was the posthumous and only son of William II. of Orange, Stadtholder of the United Netherlands. His mother was Mary, eldest daughter of Charles I. of England. He was born on November 14 (old style, November 4), 1650. The ambitions of the elder William to increase the power of the Stadtholder had aroused an aristocratic reaction under Jan De Witt which created much trouble for the young prince. The alliance of his family with the Stuarts excited the jealousy of Oliver Cromwell, by whose influence William and his descendants were excluded, in 1654, from the Stadtholdership. The restoration of the Stuarts to the English throne, however, caused the revocation of this act, and on the invasion of Holland by Louis XIV. of France in 1672 William was elected Stadtholder, Captain-General, and Admiral. A few weeks later (August, 1672) some partisans murdered his great opponent Jan De Witt (q.v.), in a riot. By the wisdom and determination of the young Stadtholder the contest with France was brought to a close by the Treaty of Nimeguen in 1678, which left the United Netherlands unimpaired. As their ruin had seemed inevitable, William's unexpected success made him famous throughout Europe. Before the close of the war he had married his cousin, the Princess Mary, eldest daughter of the Duke of York, who became King James II. (q.v.) of England in 1685. As the tyranny of James soon began to estrange the affections of every class of his subjects, the eyes of all were turned toward the Stadtholder as their only hope. Accepting an invitation signed by seven representative leaders of the two English parties, William with an army of 15,000 English and Dutch landed at Torbay, November 5, 1688. His success was rapid and bloodless, and on December 18th he entered London as a national deliverer. On February 13, 1689, William and Mary, after accepting the Declaration of Rights, were proclaimed King and Queen of England. The adherents of James held out for some time in Scotland and Ireland. The death of Dundee (see GRAHAM, JOHN) in 1689 ended their resistance in the former country, but in the latter they kept up a vigorous contest until the battle of the Boyne (July, 1690) broke the power of the Jacobites. William was now able to combat Louis XIV. with the united forces of England and Holland. He himself took the field in the Belgian Netherlands, but was unable to cope with Marshal Luxembourg, who defeated him at Steenkerke in 1692 and at Neerwinden in 1693. Reluctantly he signed the Peace of Ryswick (1697), which, however, proved highly popular. In spite of his sterling qualities, and of the debt which they owed him, the English never really liked William III. The death in 1694 of his wife, on whom the crown had been conferred jointly with himself, materially injured his position. His schemes were thwarted by Parliament and continual plots for his assassination were hatched by the adherents of James. The succession of Philip of Anjou to the throne of Spain on the death of Charles II. in 1700, tending to the aggrandizement of France, was a blow to William's policy. He persevered with unflagging vigor in his determination to unite Europe against France, and he left England at the head of the 'Grand Alliance.' (See SUCCESSION WARS.) He died on March 19 (old style, March 8), 1702, in consequence of a fall from his horse. The massacre of the Macdonalds of Glencoe (q.v.) is a blot on William's reputation which his most thoroughgoing apologists have been unable to efface. His services, however, both to England and to his native country can hardly be overrated. In his reign the Bank of England was founded, the modern system of finance introduced, ministerial responsibility recognized, and the liberty of the press secured. William's manner was wholly Dutch, and even his countrymen thought him blunt. "In his intercourse with the world in general," says Macaulay, "he appeared ignorant or negligent of those arts which double the value of a favor, and take away the sting of a refusal."

Consult: Grimblot, *Letters of William III. and Louis XIV.* (London, 1848); Traill, *William the Third* (ib., 1888); Hippold, *William III., Prinz von Oranien, Erbstatthalter von Holland, König von England* (Berlin, 1900); Klopp, *Der Fall des Hauses Stuart,* i.-ix. (Vienna, 1875-78), critical and exhaustive; Burnett, *History of His Own Time* (6 vols., Oxford, 1833); Ranke, *History of England* (6 vols., Oxford, 1875). See FRANCE; NETHERLANDS.

WILLIAM IV. (1765-1837). King of Great Britain and Ireland from 1830 to 1837. He was the third son of George III., and was born on August 21, 1765. At the age of fourteen, after receiving an elementary education, he entered the navy as an 'able seaman' on board the *Prince George.* After seeing considerable service, Prince William was made lieutenant in 1785, and in the year following he received his commission as captain. In 1789 he was created Duke of Clarence and of Saint Andrews, and Earl of Munster. At this time he abandoned active naval service, but was formally promoted through the successive ranks until he was made admiral of the fleet in 1811. Although as a naval officer he had won the eulogy of the great Nelson, no one can believe that he was really efficient. His utter inability to understand the fitness of things and his incoherence of thought gained for him the name of 'Silly Billy.' For many years he lived with Mrs. Jordan (q.v.), a celebrated actress, by whom he had a family of five sons and five daughters, who became known by the surname FitzClarence, and were raised to titular dignities. In 1818 he married Adelaide, eldest daughter of the Duke of Saxe-Meiningen. The issue of this marriage was two daughters, both of whom died in infancy. By the death of his brother, the Duke of York, in 1827, the Duke of Clarence became heir presumptive to the throne, to which he succeeded on the death of George IV., on June 26, 1830. He was mentally incapacitated for the kingly office, but government by the Ministry was now well developed, so that his eccentricities could do no mischief. So far as William had political sentiments, he probably sympathized with the efforts of his Ministers to bring about the reform of Parliament. Although he at first refused to create a new batch of peers to overcome the majority opposed to the Reform Bill (see Reform Bills) he finally consented to apply this extreme remedy in case of necessity. Overawed by the threat, the Lords passed the bill on June 4, 1832, and three days afterwards it received the royal assent. This was the great event of his reign. The first reformed Parliament met on January 29, 1833. The abolition of colonial slavery, and the reform of the poor laws and of the Irish Church, were the immediate results of the great constitutional change. King William died after a short illness on June 20, 1837, and was succeeded by his niece, Victoria.

Consult: Fitzgerald, *Life and Times of William IV.* (2 vols., London, 1884); Walpole, *History of England from the Conclusion of the Great War in 1815* (5 vols., London, 1878-86).

WILLIAM I. (Ger. Wilhelm) (1797-1888). King of Prussia and German Emperor. He was the second son of Frederick William III. of Prussia and Queen Luise, and was born March 22, 1797. He took part in the campaigns of 1814 and 1815 against Napoleon. On the accession of his elder brother, Frederick William IV. (q.v.), to the Prussian throne in 1840, William received the title of Prince of Prussia and became Governor of Pomerania. His Absolutist attitude provoked such popular enmity that on the outbreak of the revolution of 1848 he had to flee to England. He returned some months later, and was elected to the Prussian National Assembly, where in a brief address he placed himself on record as favoring a constitution, but took no further part in the discussion. In 1849 he commanded the Prussian forces sent to put down the revolutionists in the Palatinate and Baden. In October, 1857, the King having become mentally incapacitated, William assumed charge of the government temporarily, and in October, 1858, became Regent. He was a soldier by talent and inclination, and while Regent contended steadily, against the opposition of the Diet, for the reorganization of the Prussian Army. On the death of his brother, January 2, 1861, William became King of Prussia, and at his coronation, at Königsberg, October 18th, he declared that he "ruled by the favor of God, and of no one else." The result of the elections to the Prussian Diet being in favor of the Liberal Party, William declared in his address at the opening of the chambers that he "never could permit the progressive development of our inner, political life to question or to endanger the rights of the Crown and the power of Prussia." This principle he maintained and the contest over the army continued. At last, in 1862, he found Bismarck a Minister who was able to govern without a Parliamentary majority. The struggle between the King and the Liberal majority in the chambers was thrown into the background at the close of 1863, by the strategy of Bismarck, who made Prussia champion the cause of Schleswig-Holstein against Denmark —an intervention in which Austria was forced to participate—and, contriving to make the Schleswig-Holstein question one of 'German' interest, silenced, for the time being, the Liberal opposition in Prussia. In 1866 came the war between Prussia and Austria, in which the King took the field as commander-in-chief of the Prussian forces. William became the head of the North German Confederation in 1867. At Ems, in July, 1870, took place the memorable interviews between William and the French ambassador, Benedetti, which precipitated the outbreak of the war of 1870-71. William was at the head of the united German army, and commanded personally at the decisive battles of Gravelotte and of Sedan. On January 18, 1871, he was proclaimed German Emperor in the palace of the French kings at Versailles. On March 21st he opened in Berlin the first Reichstag of the new German Empire. (For the events of his reign as German Emperor, see Germany, Bismarck, Kulturkampf, Socialism, and Political Parties, section on *Germany*.) In 1878 two attempts were made on the life of the Emperor. The second time he was seriously wounded. These attempts were attributed, directly or indirectly, to socialist influence. He died in Berlin March 9, 1888. William married, June 11, 1829, the Princess Augusta of Saxe-Weimar, by whom he had one child, Frederick William, who succeeded his father as Frederick III. (q.v.). Consult: Marcks, *Kaiser Wilhelm I.* (Leipzig, 1899), the best biography; Oncken, *Das Zeitalter des Kaisers Wilhelm* (2 vols., Berlin, 1890-92); Lavisse, *Trois empereurs d'Allemagne: Guillaume I., Frédéric III., Guillaume II.* (Paris, 1888); Forbes, *Life of Emperor William* (London, 1889).

WILLIAM II. (1859—). German Emperor and King of Prussia, son of Emperor Frederick III. and Victoria, Princess Royal of Great Britain. He was born January 27, 1859. Following the tradition of his house, he received a thorough military training, which began in his early youth. He was made a second lieutenant in 1869 and entered the gymnasium at Cassel in 1874. In 1877 he was commissioned as a first lieutenant and entered the University of Bonn, where he studied especially law and political science until 1879, when he entered the military service. He was raised to the rank of major-general by his grandfather. On the death of his father he succeeded to the throne of Prussia and to that of the German Empire, June 15, 1888. He showed himself at once to be a man of aggressive temperament and disposed to take an exalted view of the duties and responsibilities of his office. His insistence in his earlier utterances upon his grandfather's favorite idea of divine right gave rise to a feeling that a reactionary course might be looked for from him. He speedily came into collision with Prince Bismarck. The great Minister was forced to resign and went into a discontented retirement (March 20, 1890), while General von Caprivi (q.v.) took the Chancellorship, to be succeeded by Hohenlohe (1894), who in turn gave way to Von Bülow (1900). The Emperor followed the policy of Bismarck in maintaining the Triple Alliance and in some other respects. He deviated widely from it by taking an interest in the affairs of the Orient, cultivating relations with the Ottoman Government, and pushing German activity in Asia Minor. In the Farther East he was similarly active. Aside from the emphasis laid upon his own authority and divine right, he soon showed himself a very modern ruler, restlessly active and keeping in close touch with the world's affairs. One of his chief interests has been the cultivation of German industries and commerce, and the parallel development of the German navy to rank with that of the first naval powers. Soon after the beginning of his reign he secured the passage by the Reichstag of a law providing for the compulsory insurance of workingmen against disability arising from old age or infirmity, and he showed in other ways his keen interest in the welfare of the laboring classes. Of late he has, however, shown himself an uncompromising foe of socialism. He has been in hearty sympathy with the policy of colonial expansion in Africa. Educational matters have claimed much of his attention, and he has remodeled the curriculum in the higher schools of Prussia. Feared as a 'war lord' at the beginning of his reign, he has begun to show a profound sense of the value of international amity, and he has cultivated his cosmopolitan interests by frequent visits to foreign courts. In 1902, on the occasion of the launching of a yacht built for him in the United States, he sent his brother, Admiral Prince Henry of Prussia, to the United States as his representative and gave the visit international importance by his official attitude and his gifts to the American people. William married, February 27, 1881, Princess Victoria of Schleswig-Holstein-Sonderburg-Augustenburg, who was born October 22, 1858. Seven children were born to them. Frederick William, the Crown Prince, was born May 6, 1882.

Consult: Bigelow, *The German Emperor* (London, 1889), a personal study made at the beginning of William II.'s reign; Frederic, *The Young Emperor, William II. of Germany* (ib., 1891), another early estimate by an American newspaper correspondent; Lowe, *The German Emperor, William II.* (ib., 1896); Meister, *Kaiser Wilhelm II.* (Berlin, 1894); Lavisse, *Trois empereurs d'Allemagne* (Paris, 1888).

WILLIAM I. (1772-1843). The first King of the Netherlands. He was the son of William, the last Stadtholder of the Dutch Republic, and was born at The Hague, August 24, 1772. He commanded the Dutch army in 1793-95 in the war with France, and after the conquest of his country he went to Berlin. His father in 1802 bestowed upon him the principality of Fulda, with other districts, but they were taken from him in 1806 because of his refusal to join the Rhenish Confederation. In the same year he succeeded to the hereditary possession of the House of Nassau-Dietz through the death of his father. He held a high commission in the Prussian army, was captured at Jena, and upon his release entered the Austrian service. After the battle of Wagram (1809) he went to Berlin, and in 1813 he returned to Holland, where he was received as legitimate ruler by the people. In accordance with the act of the Congress of Vienna constituting Belgium and Holland the Kingdom of the Netherlands, he was proclaimed ruler of the new kingdom March 16, 1815. His hereditary possessions in Germany were transferred to Prussia, and he received in lieu thereof the Grand Duchy of Luxemburg. Belgium revolted in 1830 and achieved its independence in 1832. King William protested ineffectually and obstinately refused to recognize the settlement, which was recognized by the Powers, provoking much bitter feeling. Finally he abdicated, October 7, 1840, took the title of Count of Nassau, went to Berlin, where he married the Countess d'Oultremont in 1841, and died December 12, 1843. His first wife, whom he married in 1791, was Frederike Luise Wilhelmine, daughter of Frederick William II. of Prussia.

WILLIAM II. (1792-1849). King of the Netherlands from 1840 to 1849. He was the son of King William I. and was born at The Hague, December 6, 1792. He studied at Berlin and Oxford, and in 1811 joined the English army in the Peninsular War. He served as adjutant and colonel on Wellington's staff, distinguishing himself at Fuentes de Onoro, Ciudad Rodrigo, and Badajoz, Salamanca, and Vitoria, and in the battles of the Pyrenees. On the return of the Orange family to the Netherlands, William I. made him commander of the army. The last campaign of Napoleon brought the Prince again into active service, and he was wounded at Quatre-Bras and Waterloo. He married, February 26, 1816, Anna Pavlovna, youngest sister of the Emperor Alexander I. of Russia. When the Belgian Revolution broke out in 1830 he was called again into public life, and, as governor of the loyal districts, tried by concessions to allay the storm. On the abdication of William I. (1840) the Prince of Orange assumed the reins of government as William II. The political movements of 1848 were felt in the Netherlands, as in other countries, and the ministerial plans of reform not having satisfied the party of progress, the King announced his willingness to sanction whatever changes in the Constitution were thought necessary, and the storm was averted. The new Constitution was proclaimed November 3, 1848. William II. died March 17, 1849.

WILLIAM III. (1817-90). King of the Netherlands from 1849 to 1890. He was born at The Hague, February 19, 1817, and succeeded to the throne on the death of his father, William II., in 1849. He married, June 18, 1839, Princess Sophie of Württemberg. The kingdom enjoyed uninterrupted peace during his reign; material prosperity increased, and the public debt was considerably reduced. By his first wife William had two sons, neither of whom survived him; his second wife, Princess Emma of Waldeck, gave birth to a daughter, Wilhelmina, who succeeded him as Queen. He died, November 23, 1890. His private life was not above reproach. Consult Ling, *William III., König der Niederlande* (Luxemburg, 1889).

WILLIAM I., FRIEDRICH WILHELM KARL (1781-1864). King of Württemberg, born at Lüben, Silesia. His father became Frederick I., King of Württemberg, and his mother was the Princess Augusta of Brunswick-Wolfenbüttel. In 1800 he entered the Austrian army as a volunteer, and distinguished himself at the battle of Hohenlinden. Having returned to Württemberg in 1806, he lived at Stuttgart for six years, and then took command of the Württemburg contingent in Russia against the advance of Napoleon, but, on account of illness, was detained for some time at Vilna. After the battle of Leipzig (1813) his father joined the Allies, and the Prince commanded the Seventh Corps, which included Austrian and Russian regiments, in the early part of 1814, distinguishing himself at La Rothière, Bar-sur-Aube, Arcis-sur-Aube, and La Fère- Champenoise. At Montereau (February 18, 1814) he was defeated by Napoleon. In the campaign of 1815 he commanded the Third Corps in Alsace. Upon the death of his father, in 1816, he succeeded to the throne. William was a practical man of liberal tendencies, and soon succeeded in bringing order out of the confused conditions existing in Württemberg as a result of the Napoleonic wars. In 1819, by the promulgation of a constitution, he further advanced the prospects of his country, which passed through the troublous year 1848 undisturbed. William married in 1808 the Princess Charlotte of Bavaria (divorced 1814); in 1816, the Grand Duchess Catherine, widow of Prince George of Holstein-Oldenburg (d.1819); in 1820, his cousin Pauline of Württemberg (1800-73). His daughter Sophie (1818-77) became the consort of William III., King of the Netherlands, and his son Charles (1823-91) succeeded to the throne in 1864.

WILLIAM (commonly called the Lion) (1143-1214). King of Scotland from 1165 to 1214. He succeeded his brother, Malcom IV. He attended Henry II. of England in his Continental wars, and is supposed, while doing so, to have pressed for a portion at least of the long disputed districts of Northumberland, and other territories of what is now the north of England. In 1168 he made an alliance with France. This is the first recorded alliance between Scotland and that kingdom. In 1173 he conspired with the sons of Henry II. against their father, and invaded Northumberland. On July 13, 1174, he fell almost by accident into the hands of an English party. For security, he was conveyed to Normandy, and there he consented, as the price of his liberation, to perform that homage for his kingdom, which the English kings had so long in vain attempted to extract from the Government of Scotland. The treaty of Falaise, as the transaction was termed, from the place where it was adjusted, was revoked in the year 1189 by Richard I. of England, in consideration of a payment of 10,000 marks, which he wanted for his expedition to Palestine. William secured the freedom of the Scottish Church, was one of the early benefactors of the regular ecclesiastics, and founded in 1178 the great Abbey of Arbroath, which he dedicated to Saint Thomas à Becket. He founded many burghs, and extended the boundaries of the kingdom, especially in the north. He died December 4, 1214. Consult Robertson, *Scotland Under the Early Kings* (2 vols., Edinburgh, (1862).

WILLIAM I. (the SILENT). Prince of Orange, Count of Nassau (1533-84). Leader of the revolt of the Netherlands against Spain. He was the eldest son of William, Count of Nassau-Dillenburg, and was born at Dillenburg, April 16, 1533. In 1544 he inherited from his cousin, René of Nassau, the Principality of Orange. On his succession to the family estates in the Low Countries, he was sent to the Queen Regent's court at Brussels and brought up in the Catholic faith. At the age of fifteen he became page to the Emperor Charles V., who in 1555 promoted him to the command of the Imperial army on the French frontier. Charles V. on his abdication recommended William to his son, Philip II., who employed him in the negotiation of the Treaty of Cateau-Cambrésis with France (1559). On returning to the Low Countries, he became the leader of the party which devoted itself to the assertion of the liberties of the country, agitated for the recall of the Spanish troops, and finally entered into open opposition to Cardinal Granvella (q.v.), the president of the council, and the willing agent of Philip's tyranny. The King, nevertheless, proceeded to more extreme measures, the edicts against heretics being made still more stringent. William steadily refused to allow these enactments to take effect in his provinces of Holland, Zealand, and Utrecht, of which he had been made Stadtholder. Up to Alva's arrival as Governor (1567) William had labored conjointly with Hoorn and Egmont, but, failing to convince his two associates of the duplicity of the King, of which he himself was assured by means of the spies in his pay at the Spanish Court, he was compelled to leave them to their fate, and retired to his German estates. Cited as a rebel, he refused to appear, on the ground of being a Knight of the Golden Fleece and a sovereign prince, and was outlawed.

William now became convinced that the only means of resisting the Spanish tyranny was by force. An army under his brother Louis of Nassau gained some success, but was finally driven from the country. William in person invaded Brabant, but failed to effect anything of importance, for lack of means. In 1569 he went to France to aid the Huguenots, and later (1572) made an unsuccessful attempt to relieve his brother Louis, who was besieged by Alva in Mons. In the same year the provinces of Holland, Zealand, Gelderland, Overyssel, and Utrecht proclaimed him as their Stadtholder for the King, whose authority he and they still acknowledged. The fortune of the Spaniards on land, however, was in the ascendant, fortress after fortress fell into their hands despite William's utmost efforts to relieve them, and though Holland and Zealand still remained faithful he found it impossible to raise an army which could fairly cope with the enemy. In April, 1574, Louis and Henry of Nassau were defeated and slain in the battle of Mooker-Heide. William succeeded, however, in rescuing Leyden from the terrible fate which had befallen Haarlem. It was at this period that William openly professed himself a Calvinist, though he disclaimed the fanaticism which characterized his co-religionists and continually urged Calvinists and Lutherans to harmonize their differences. In October, 1575, the provinces of Holland and Zealand pronounced Philip's deposition, and gave power to William to choose the country under whose protectorate they were to be placed. Meantime, the rapacity of the Spanish soldiery had roused the fifteen provinces which still remained loyal to Philip, and the league known as the Pacification of Ghent (October, 1576), the object of which was to drive out the Spanish troops, and establish, at least for a time, toleration in religion, was the consequence. This was a brilliant success for William, and Don John of Austria, the new Governor, was compelled to ratify the Pacification by the Perpetual Edict (February 12, 1577).

Owing, however, to the Spanish monarch's lack of faith, war was resumed, and the patriots suffered a great defeat. At Gembloux (January 31, 1578) John of Austria's successor, Alexander Farnese, succeeded in detaching the Walloon provinces from the league. On the other hand, William brought about the formation of the Union of Utrecht (1579), which comprised the provinces of Holland, Zealand, Utrecht, Guelderland, Groningen, Friesland, and Overyssel, and marked the birth of the Dutch Republic. In 1581 the United Provinces declared Philip deposed and, in accordance with William's desire, chose as their ruler the Duke of Anjou, brother of Henry III. of France. The Duke, however, abandoned the country in 1582. In 1580 Philip had, by Granvella's advice, put a price of 25,000 gold crowns on William's head, and on July 10, 1584, he was assassinated at Delft by Balthasar Gerard. In personal relations William was frank and generous. His piety and integrity were unquestioned, and his sagacity, courage, and determined will made him a leader of men.

Consult: Harrison, *William the Silent* (London, 1897); Putnam, *William the Silent, Prince of Orange* (New York, 1895); Motley, *Rise of the Dutch Republic;* Gachard (ed.), *Correspondance de Guillaume le Taciturne, Prince d'Orange* (Brussels, 1847-66); Klose, *Wilhelm I. von Oranien* (Leipzig, 1864); Juste, *Guillaume le Taciturne d'après sa correspondance et les papiers d'état* (Brussels, 1875).

WILLIAM I. Landgrave (as such William IX.) and later Elector (William I.) of Hesse-Cassel. See Hesse-Cassel.

WILLIAM II. Elector of Hesse-Cassel. See Hesse-Cassel.

WILLIAM IX., Duke of Aquitaine and Count of Poitou (as such William VII.) (1071-1127). The first Provençal poet whose songs have come down to us. He began his reign in 1087, and much of his life was spent in warfare with his neighbors. He twice conquered Toulouse, led a plundering expedition into Normandy, and engaged in other sanguinary conflicts. In 1100 he undertook a crusade with 60,000 men, but met with a disastrous defeat and fled almost alone. He succeeded, however, in reaching Jerusalem. On his way home he suffered shipwreck, but he reached his native land in 1103. His experience as a warrior of the cross did not amend his life, which was notoriously licentious and irreligious. In his conflicts with the Church he was twice excommunicated. Most of his poetry is as loose as was his life. It is, however, of special historical interest as marking the transition from popular to art forms. A romance dealing with a disreputable adventure is closest to the folk-poetry, though some of his songs also are simple in structure. Some, on the other hand, are decidedly conventional and show him making use of the formulas of devoted lady service, a fact which tends to demonstrate the existence of a previous lyric literature which has been lost. One song, probably composed just before his death, expresses repentance, renunciation of worldly pleasures, and the turning of his heart to God. An incomplete edition of his works was published by Holland and Keller (Tübingen, 1850). Consult Sachse, *Ueber das Leben und die Lieder des Troubadours Wilhelm IX., Graf von Poitou* (Leipzig, 1882).

WILLIAM, Order of. (1) A Hessian order with four classes, founded in 1851 by the Elector Frederick William and extinguished in 1866. The red cross of the order shows a golden lion with the inscription *Virtute et fidelitate*, with a crown and the initials W. K. on the reverse. (2) A military order of the Netherlands with four classes, founded by King William in 1815. The decoration is a white cross with Burgundian crosses of laurel between the arms, on which is the legend *Voor moed, beleid, trouw* ('for valor, prudence, fidelity.') The medallion shows the initial W with a laurel wreath. (3) A Prussian order with one class for men and women, founded in 1896 by King William II. It is designed to commemorate the Imperial proclamation at Versailles and is conferred as a distinction for services in elevating the people. The decoration is a medal surrounded by a wreath, bearing the bust of Emperor William I., and on the reverse the initials of William II. with a crown and the legend, *Wirke im Andenken an Kaiser Wilhelm den Grossen.*

WILLIAM AND MARY COLLEGE. An institution of learning at Williamsburg, Va., founded in 1693, the second oldest college in the United States. Grants of land had already been obtained in 1619 for the establishment of a collegiate institution near Richmond, and a collegiate school was established at Charles City in 1621, but the plan was frustrated by the Indian massacres of 1622. In 1660 the grants were renewed and in 1693 a charter was secured from King William and Queen Mary by the Rev. James Blair, who became the first president of the college. The institution received a penny a pound on exports of tobacco and various other privileges, including the profits from the office of Surveyor-General of Virginia. The college attained rapid prosperity, but it suffered heavily in the Revolution through the loss of its endowments and the occupation of its buildings by the contending troops (1781), but with the exception of a short interval it was in session until the Civil War, when it was occupied by the Federal troops and much of its property was destroyed. It was reopened in 1869, but from 1881 to 1888 was so crippled financially that it was forced to suspend instruction. In the latter year an annual State appropriation of $10,000, later increased to $15,000, enabled it to resume work, and in 1893 Congress granted an indemnity of $64,000 for its losses during the Civil War. The college offers two courses—the collegiate, leading to the degrees of B.A. and M.A., and the normal. With the latter the Matthew Whaley Model and Practice School is connected. In 1903 it had a student attendance of 165, 12 instructors, a library of about 10,000 volumes, and an income of $21,600. Its endowment was $132,500, and the buildings and grounds were valued at $150,000. The college has a distinguished list of graduates, among them Presidents Jefferson, Monroe, Tyler, and Harrison, Chief Justice John Marshall, and Gen. Winfield Scott. The Phi Beta Kappa Fraternity (q.v.) was established at William and Mary in 1776.

WILLIAM AUGUS'TUS, Duke of Cumberland (1721-65). An English commander. He was the third son of King George II., and was born in London, April 26 (15), 1721. He became Duke of Cumberland in 1726. He was intended by his father for the navy, and in 1740 saw some service in the Channel under Sir John Norris, but in the same year he became colonel of the Coldstream Guards and thenceforth devoted himself to a military career. He fought with distinction at Dettingen in 1743, and, made commander-in-chief of the British land forces in 1745, was defeated in that year by Marshal Saxe at Fontenoy (q.v.). The British troops were now recalled to meet the invasion of the Young Pretender, and in November, 1745, the Duke was placed at the head of an army of some 9000 men to operate against the Highland forces which were then in the north of England. These he drove across the border. After the defeat of General Hawley at Falkirk (January, 1746), the Duke once more assumed command, took Stirling and Perth, and on April 27 (16) crushed the Highlanders at Culloden (q.v.). He followed up his victory by sending detachments of soldiery throughout the country to hunt down the fugitives, and, though he does not seem to have been guilty of the relentless cruelty with which he was charged and which gained him the name of Butcher among the conquered inhabitants, he doubtless did pursue a course of extreme severity. It was his desire to render all future uprisings impossible by wiping out the entire clan system. In 1747 he commanded in Flanders and was defeated for a second time by Marshal Saxe at Laffeld, July 2d, becoming in consequence extremely unpopular at home. Ten years later he was placed at the head of an army of 40,000 men, composed largely of Hanoverians and Hessians, intended to coöperate with Frederick II. of Prussia against the French. On July 26, 1757, he was defeated by Marshal D'Estrées at Hastenbeck, and on September 8th he signed the convention of Kloster Zeven by which he agreed to disband his army, thus leaving Hanover to the French. The English Government repudiated these terms, and the Duke thereupon retired to private life. He died October 31, 1765.

WILLIAM JEWELL COLLEGE. An educational institution under control of the Baptist Church, at Liberty, Mo., a suburb of Kansas City, founded in 1849. It has three departments of instruction, academic, collegiate, and theological, and confers the degrees of B.A. and M.A. The attendance in 1903 was 350, when the faculty numbered 30, and the library contained 13,000 volumes. The productive funds of the college amounted to $400,000, and its property in land, buildings, and equipment was estimated at $200,000.

WILLIAM (or **WYLLYAM**) **OF CLOUDESLEY.** A famous archer and outlaw, in an old ballad edited by Bishop Percy. See CLIM.

WILLIAM OF HOLLAND (1227-56). Titular King of Germany. In 1234 he succeeded his father as Count of Holland. In 1247 he was chosen German King by the Papal legatee, and after he had besieged and taken Aschen he was crowned there in November, 1248. So strong, however, was the opposition brought against him by the supporters of Frederick II. that he returned to Holland. Upon the death of Frederick in 1250 William began to regain his influence, and when Conrad IV., who had gone to Italy, died there in 1254, he was generally recognized as King by the German princes. He was killed in a battle with the Frieslanders.

WILLIAM OF MALMESBURY, mämz′-bẽr-ĭ (c.1090-c.1143). An early English historian. He was born probably in Somersetshire, and was educated in the monastery whence he derived his name, and of which he became librarian. Malmesbury's principal works, which are written in Latin, are *De Gestis Regum Anglorum*, a history of the kings of England from the Saxon invasion to 1127-28; *Historiæ Novellæ*, a continuation of the first, to December, 1142; *De Gestis Pontificum Anglorum*, containing an account of the bishops and principal monasteries of England from the conversion of Ethelbert of Kent by Saint Augustine, to 1123. The first of these was translated into English by Sharpe (London, 1815), and has been reprinted in Bohn's Antiquarian Library, under the editorship of Giles (1847). In addition Malmesbury wrote a number of other works, including *Lives* of Saint Dunstan and Saint Wulfstan, and a work on the Antiquities of Glastonbury. Consult: Gray Birch, *Life and Writings of William of Malmesbury* (London, 1874); Stubbs's Prefaces in the *Rolls Series*, which contains the best editions of the first three works; Norgate, *England Under the Angevin Kings*, vol. i. (London, 1887).

WILLIAM OF NEW′BURGH (1136-c.98). An English chronicler, born at Bridlington, Yorkshire. He was brought up, lived all his life, and died at the Augustinian Priory of Newburgh, near Coxwold, in Yorkshire. As far as we know, he never traveled farther from his priory than to the neighboring religious houses of Rievaux, Byland, and Finchale. His extant works show, nevertheless, a wide knowledge of ecclesiastical, political, and social affairs which must have come to him indirectly through the communication which his house kept up with the great foundations of the Cistercian world. His works consist of three sermons and the great *Historia Rerum Anglicarum*, which he undertook, so he says, at the request of the Abbot of Rievaux. The history covers the period from 1066 to 1198, and is a marvel of fair-minded and temperate writing. Even more than William of Malmesbury among all the Latin chroniclers he was the successor of Bede. Though his statements were often inaccurate, he had such wide interests and such a well-balanced mind that his history is one of the most important records of mediæval England. Consult Howlett, *Chronicles of Stephen, Henry II., and Richard I.* (Rolls Series, London, 1884).

WILLIAM OF SAINT-AMOUR, säN′tȧ′-mōōr′ (?-1272). A mediæval theologian. He was born at Saint-Amour, Franche-Comté. By 1238 he was a master of arts and canon law at Paris; became professor in that university, and led the other non-monastic teachers in their opposition to the Dominican and Franciscan Orders. Pope Innocent IV. interfered on the side of the friars, and eventually William was banished (1257). He went to Saint-Amour, and probably died there. His most famous treatise is *De Periculis Novissimorum Temporum* (1255), which describes the perils of the time as signs of the end of the world, and exhorts the prelates to arouse themselves. It was one of the earliest pieces printed, both in Latin and in a French translation, and on the basis of its contents the wits of the day built up their satirical verses against the mendicant Orders. William's works, lacking, however, the important treatise on Antichrist, and containing at least one piece which was falsely attributed to him, appeared with a memoir in Paris (1632).

WILLIAM OF TYRE, tīr (c.1137-c.84). A mediæval historian and Archbishop of Tyre. He was born perhaps in Palestine, but of his family and early life nothing is known. In 1167 he was appointed Archdeacon of Tyre, and about 1170 tutor to Baldwin, son of Amalric, King of Jerusalem. Upon the accession of his pupil as Baldwin IV. (1174) he was made Chancellor of the kingdom, and in the following year Archbishop of Tyre. He was one of the commission which met Philip of Flanders in 1177, and in 1179 he represented the Latin Church of the East at the Lateran Council. The date of his death is only to be conjectured from the fact that his great *Historia Rerum in Partibus Transmarinis Gestarum*, from which most of the events of his career are gleaned, breaks off at the end of 1183. This work, the only one of his now extant, is one of the best histories of the Middle Ages. It is our chief authority for the history of the Latin kingdom in the East between 1127 and 1184, and except for somewhat faulty chronology is remarkably accurate as well as painstaking and clear-sighted. William had the power of depicting the characteristics of men, countries, and events in a manner which few mediæval historians approached.

WILLIAM OF WYKEHAM, wĭk'am (1324-1404). An English prelate, statesman, and architect, one of the most remarkable men of the Middle Ages. He was born at Wickham (or Wykeham), in Hampshire, and was educated at Winchester School. Having won the favor of Bishop Edington and of Sir John Scured, by whom he was recommended to the notice of King Edward III., he was appointed royal chaplain in 1349 and made surveyor and chief warden of Windsor, Leeds, Dover, and Hadleigh castles. Windsor Castle is largely his work, and he was also the builder or architect of Queensborough Castle. Turning from architecture again to divinity, he was promoted through a series of clerical posts and offices of State to be Bishop of Winchester and Lord Chancellor in 1367, being at that time the foremost subject in the kingdom, "without whom they did nothing," as Froissart declares. He promoted education by founding New College at Oxford and Saint Mary's College at Winchester. In 1376, by reason of his patriotic opposition to John of Gaunt and his party, he was deprived of his offices; but on the accession of Richard II. (1377) he was pardoned. He was again Chancellor, 1389-91, after which he retired from public life, residing at his seat of South Waltham, Hampshire, until his death, September 27, 1404. His last years were spent in remodeling the interior of Winchester Cathedral, though he did not live to witness its entire completion. This consisted in nothing less than to hew the heavy masonry of the Norman nave and aisles into the lighter and more elegant forms of the early Perpendicular style then coming into use and already applied by his predecessor, Edington, to the rebuilding of the four bays next the transepts. But while the latter tore down the old work before rebuilding, Wykeham effected his transformation without destroying the Norman structure, by a skillful recutting of the masonry and the addition of a rich vault of masonry in place of the earlier wooden ceiling. This achievement did much to fix the tendencies of the style which developed into the perfected Perpendicular of the fifteenth century. Consult Moberly, *Life of William of Wykeham* (London, 1893).

WILLIAM PENN CHARTER SCHOOL. A noted preparatory school for boys in Philadelphia, Pa., founded in 1689, incorporated in 1698, and chartered by William Penn in 1701, on the same day on which he chartered the city. The original corporate title was "the overseers of the public school founded in Philadelphia at the request, costs, and charges of the people of God called Quakers." Subsequent charters from Penn, in 1708 and 1711, broadened the scope of the school and freed it from denominational control. The school is organized in nine classes, each covering one year, four classes constituting the senior school, three the junior, and two the lower school. In the senior school the course provides for a classical and a modern side. The school has well-equipped buildings in the heart of the city and playing fields of six acres in the suburbs, together valued at $250,000, with scholarship funds amounting to $50,000. The school has about 500 students.

WILLIAMS, Alpheus Starkey (1810-78). An American soldier, born at Saybrook, Conn. He graduated at Yale in 1831; studied law in the same institution, and in 1836 began practice in Detroit, where at different times he held the positions of recorder, postmaster, and other offices. During the Mexican War he served as colonel of the First Michigan Regiment. In May, 1861, after the outbreak of the Civil War, he was commissioned brigadier-general of volunteers. He commanded a division at Cedar Mountain and a corps at South Mountain, Antietam, Fredericksburg, Chancellorsville, and Gettysburg. He then served under General Sherman in the Atlanta campaign and in the march to the sea, and after the capture of Savannah was brevetted major-general of volunteers. From 1866 until 1869 he was United States Minister to San Salvador; in 1870 was the Democratic candidate for the Governorship of Michigan; and from 1874 until his death was a member of Congress.

WILLIAMS, Sir Charles Hanbury (1708-59). An English diplomatist and satirical writer. He was born probably at Pontypool, Monmouthshire. His father was John Hanbury, whose friend, Charles Williams, left him an estate of £70,000 in 1720, with remainder to his son Charles, on condition that the latter should assume the name of Williams when he came of age. The boy was educated at Eton, where he was intimate with Henry Fox, Lyttelton, and Fielding. He was a member of Parliament from 1734 to 1747 and again from 1754 to 1759. In 1740 appeared his *Isabella, or the Morning;* in 1742, *The Country Girl;* and in 1743, several elegant satires, of which the *Letter to Mr. Dodsley, Solomon's Porch*, and *Peter and My Lord Quiden* were among the best. In 1746 Williams entered upon a successful diplomatic career, being successively envoy at Dresden, at

Berlin (1750), at Dresden again (1751), and at Vienna (1753). He made a Latin distich on Maria Theresa, that was repeated throughout Europe. Afterwards he was appointed to Saint Petersburg with the mission of helping form a triple alliance between Russia, Austria, and England, which did not come about. Williams's occasional verse is worthy to be regarded as a link between that of Prior and Cowper, and his conversation was exceedingly brilliant. His writings were collected in 1763, and were republished in 1775 and 1822. Consult Coxe, *Historical Tour in Monmouthshire* (London, 1801).

WILLIAMS, Edward (bardic name, Iolo Morgannwg) (1746-1826). A Welsh bard, born March 10, 1746, in the parish of Llan Carfan, Glamorganshire, Wales. He was self-taught. From the age of nine he followed for many years the trade of stone-mason, and eventually took up land-surveying. After much wandering, he settled at Flemingston, in the vale of Glamorgan, where he died December 18, 1826. His published verse comprises mainly *Poems, Lyric and Pastoral*, in English (1794), and the *Psalms of the Church in the Desert*, in Welsh (1st vol. 1812; 2d vol. posthumous, 1834). With Owen Jones and William Owen Pughe, he edited from manuscripts the collection of Welsh verse and prose called the *Myvyrian Archaiology* (3 vols., 1801-07). A continuation of the work, known as the *Iolo MSS.*, was issued by the Welsh Manuscripts Society in 1848 (reprint 1888). A treatise on the bardic system, called *Cyfrinach y Beirdd* (English, *The Mystery of Bardism*), almost complete at his death, was prepared for the press in 1829 by his son Taliesin Williams. Consult the interesting *Recollections and Anecdotes of Edward Williams*, by Elijah Waring (London, 1850).

WILLIAMS, Eleazar (1787-1858). An American missionary, who claimed to be the 'lost dauphin' (Louis XVII.) of France. He was born probably in Caughnawaga, N. Y., and is supposed to have been the great-grandson of Eunice Williams, who was carried away from Deerfield, Mass., at the time of the massacre of February, 1704. Eleazer was educated at Long Meadow and Westhampton, Mass. At the outbreak of the War of 1812 he was superintendent in the Northern Indian Department, served with the American troops, and was wounded at Plattsburg. Subsequently he took orders in the Episcopal Church and became a missionary among the New York Indians. In 1820 he accompanied the Oneidas, who were removed from New York State to a reservation near Green Bay, Wis., and remained there with them for thirty years. A rather striking likeness to the Bourbons, coupled with the fact that there were some discrepancies in the accounts of his early years, probably gave rise to the story that he was the 'lost dauphin,' the son of Louis XVI. and Marie Antoinette, whose fate was shrouded in mystery. Williams had a strong imagination and he probably exaggerated the rather weak evidence in behalf of his assertion until he really believed its truth. His claim that, in 1841, he had an interview with the Prince de Joinville, then in America, who asked him to sign an 'abdication' of the French throne was subsequently denied by the Prince. In 1850 he returned to New York and settled at Hogansburg, where he died. For a statement of his claim consult an article by Hanson in *Putnam's Magazine* for February, 1853, entitled "Have We a Bourbon Among Us?" also *The Lost Prince* (1854), by the same author. Williams was an authority on Indian language and history, and published *A Spelling Book in the Language of the Seven Iroquois Nations* (1813); *A Caution Against Our Common Enemy* (1813, in Iroquois; translated into English 1815); *Life of Te-ho-ra-gwa-ne-gen* (Thomas Williams) (1859), a sketch of his reputed father, the grandson of Eunice Williams. He translated into Iroquois *The Book of Common Prayer* (1853).

WILLIAMS, Ephraim (1715-55). An American soldier and pioneer, founder of Williams College. He was born in Newton, Mass., and after following the sea for several years settled in western Massachusetts, where he distinguished himself in frontier warfare with the Indians. At the outbreak of the war with France in 1744 he commanded a company which took part in the Louisburg expedition, and later commanded the forts in the Connecticut River valley in western Massachusetts. In recognition of his services he received from Massachusetts in 1750 a large grant of land near the present sites of Williamstown and Adams. At the beginning of the French and Indian War (1755) he was commissioned a colonel of one of the Massachusetts regiments raised to take part in Sir William Johnson's expedition against Crown Point. While in camp at Albany he made his will, leaving money and lands for the founding of a free academy at Williamstown, which eventually became Williams College (q.v.). He led the advance toward Crown Point and was killed at the head of his troops during a skirmish, known as the "Bloody Morning's Scout," that preceded the battle of Lake George, September 8, 1755.

WILLIAMS, Sir George (1821—). The founder of the Young Men's Christian Association. He was born at a farm house in the parish of Dulverton, Somersetshire, England. He was converted at Bridgewater in 1837. In 1841 he became junior assistant in the dry goods firm of George Hitchcock & Co., in London. Two years afterwards he induced some of the employees to hold a prayer meeting at regular intervals, and in June of the following year twelve persons, including Williams, formed themselves into a society under the name of the Young Men's Christian Association. There can be no doubt that to him belongs the chief credit of originating the society. From 1863 to 1885 he was treasurer of the organization, and in 1885 became president. He also became head of the firm of Hitchcock, Williams & Co., and in 1894 was knighted. Consult, Stevenson, *Historical Records of the Young Men's Christian Association from 1844 to 1884* (London, 1884).

WILLIAMS, George Henry (1823—). An American jurist, born in New Lebanon, N. Y. He was admitted to the bar in 1844, and from 1847 to 1852 was judge of the First Judicial District of Iowa. From 1853 to 1857 he was Chief Justice of Oregon Territory, and from 1865 to 1871 he was a member of the joint high commission that prepared the Treaty of Washington as an adjustment of the '*Alabama* claims.' From 1872 to 1875 he was Attorney-General in the Cabinet of President Grant, by whom in 1873 he was nominated for Chief Justice of the United States Supreme Court, but the nomination was not confirmed.

WILLIAMS, George Huntington (1856-94). An American geologist, born at Utica, N. Y. He graduated at Amherst, studied at Göttingen and Heidelberg, and in 1885 was appointed an associate professor in the Johns Hopkins University. In 1892 he was appointed professor of inorganic geology there. He was a member of many American and foreign scientific societies, was vice-president of the Geological Society of America, and published seventy-two valuable geological papers, including one on the *Volcanic Rocks of Eastern North America.* He also published *Elements of Crystallography* (1890).

WILLIAMS, Helen Maria (1762-1827). An English authoress. She was born in London, where, through the influence of Dr. Andrew Kippis, her legendary poem of *Edwin and Eltruda* was published in 1782 and was speedily followed by other works. In 1788, just before the Revolution, she visited a married sister in Paris; there she wrote in favor of the Girondists, and was imprisoned by Robespierre, but was released after his death. The rest of her life was passed in Amsterdam and in Paris. Among her published works relating to France and the Revolution are *Letters Written in France* (1790); *Letters Containing a Sketch of the Politics of France* (1795); *Sketches of Manners and Opinions in the French Republic* (1801). She translated Saint-Pierre's *Paul et Virginie* (1795), Von Humboldt's *Researches* (1814), and several other works; and wrote the favorite hymn, "While Thee I Seek, Protecting Power." Collections of her poems were published in 1786 and 1823. From her story *Perourou* (1801), Lord Lytton adapted his drama *The Lady of Lyons.*

WILLIAMS, Henry Shaler (1847—). An American geologist and paleontologist, born at Ithaca, N. Y. He graduated at the Sheffield Scientific School of Yale in 1868, and from 1879 to 1892 was professor of geology and paleontology at Cornell University. In 1892 he was appointed to the chair of geology at Yale. He was secretary of the International Congress of Geologists at Washington in 1891, and chairman of the geological and geographical section of the American Association for the Advancement of Science in 1892. His publications include: *The Classification of the Upper Devonian* (1885); *The Cuboides Zone and Its Fauna* (1890); and *Correlation Papers, Devonian and Carboniferous* (1891).

WILLIAMS, Isaac (1802-65). A Welsh clergyman and author, born near Aberystwith, Wales, and educated at Harrow and Trinity College, Oxford. He took orders in the Church of England in 1829 and became a fellow of Trinity in 1831. Previously he made the acquaintance of Keble and of Richard Hurrell Froude, with whom he was associated in the Tractarian movement. As curate he had charge at Windrush, Saint Mary the Virgin's at Oxford, and at Bisley. He was a successful imitator of Keble in sacred poetry, contributed to *Lyra Apostolica,* and published *The Cathedral, or the Catholic and Apostolic Church of England,* in verse (1838); *Hymns* (1839); *Harmony and Commentary on the Whole Gospel Narrative* (1842); *The Christian Scholar* (1849); *The Apocalypse* (1852); and *The Psalms Interpreted of Christ* (1864).

WILLIAMS, Jane (1806-85). An English writer, usually known by her pseudonym of Ysgafell. She was born at Chelsea, London, but because of ill health lived till 1856 at Neuadd Felen in Brecknockshire, where she acquired Welsh. Her publications, which had some success, include *Miscellaneous Poems* (1824); *Twenty Essays on the Practical Improvement of God's Providential Dispensations,* etc. (1838); *The Origin, Rise, and Progress of the Paper People* (1856); *The Autobiography of Elizabeth Davis, a Balaclava Nurse* (1857); *The Literary Women of London* (1861); *Celtic Fables, Fairy Tales, and Legends* (1862); and *A History of Wales* (1869), her best work.

WILLIAMS, Jesse Lynch (1871—). An American journalist and author, born at Sterling, Ill. He graduated in 1892 at Princeton, where he later took a post-graduate course; was a member successively of the staffs of the New York *Sun,* the New York *Commercial Advertiser,* and *Scribner's Magazine;* and in 1900 removed to Princeton, N. J., where he became editor of the *Alumni Princetonian.* As a writer he attracted attention by his college stories and his stories of newspaper life. The latter have been ranked as perhaps the best in their field. He published: *Princeton Stories* (1895); *The Stolen Story and Other Newspaper Stories* (1899); *The Adventures of a Freshman* (1899); *New York Sketches* (1902); and, with John DeWitt, a *History of Princeton University* (1898).

WILLIAMS, John (1582-1650). An English archbishop. He was born in Wales, was educated at Ruthin and at Saint John's College, Cambridge, where he was distinguished in a wide range of studies and graduated in 1603. He was appointed chaplain to the Lord Chancellor in 1609, and afterwards to James I., with whom he was a favorite. After being installed in various prebends, he became keeper of the great seal and Bishop of Lincoln in 1621. He offended Charles I., and after eight years' proceedings before the star chamber was condemned on the charge of betraying the King's secrets; suspended from his bishopric; fined £10,000; and imprisoned in the Tower, 1636-40. He was released by the Long Parliament and restored to his diocese; became Archbishop of Canterbury, 1641; was again imprisoned and released 1643, and was one of the King's adherents during the rebellion. He was the author of various theological treatises, of which the chief is *The Holy Table* (1637), directed against Archbishop Laud's ritualistic changes.

WILLIAMS, John (1664-1729). A colonial clergyman. He was born in Roxbury, Mass., and graduated at Harvard in 1683. In 1686 he became the first minister of Deerfield, then a struggling frontier settlement, and when that place was destroyed in 1704 (see Deerfield), the Indians killed two of his children, and started with him and the rest of his family (excepting one son, then absent), along with the other pioneers, toward Canada. On the second day his wife, unable to proceed, was killed. In Canada he was treated kindly and in 1706 was redeemed, with two of his children. Returning to Deerfield, he there remained as pastor, until his death. In 1707 he published a celebrated narrative of his captivity (since frequently reprinted), entitled *The Redeemed Captive Returning to Zion.* He also published a number of his sermons, and left in manuscript many papers on scientific subjects. Consult S. W. Williams, *Biographical Memoir of Rev. John Williams* (Greenfield, Mass., 1837).

WILLIAMS, John (1792-1858). An English scholar and clergyman, born at Ystradmeurig, Wales. He was educated at Balliol College, Oxford, and from 1840 to 1847 was rector of the Academy, a day school at Edinburgh. He took the post at the wish of Sir Walter Scott and Lockhart, the latter a close personal friend; and he had in some respects an even more remarkable career there than did Arnold at Rugby. In 1848 he opened at Llandsbery a new school founded by Thomas Phillips, and in the course of five years made it one of the best known schools in Wales. His studies were largely in the classics and Celtic, and were valuable in their day. They include *Two Essays on the Geography of Ancient Asia* (1829); *The Life and Actions of Alexander the Great* (1829); *Homerus* (1842); *The Life of Julius Cæsar* (1854); *Gomer: or a Brief Analysis of the Language and Knowledge of the Ancient Cymry* (1854); and *Essays on Various Subjects* (1858).

WILLIAMS, John (1796-1839). An English missionary. He was born at Tottenham, London, and at fourteen was apprenticed to an ironmonger. In 1816 he offered himself to the London Missionary Society, as a missionary to the South Seas, was ordained and sent Eimeo, one of the Society Islands. After laboring with much success among the natives of the Society group, in 1823 he established missions on Raratonga and others of the Hervey Islands. He translated the New Testament into the Raratongan language, and prepared books for the schools which he established. In a vessel built by himself during the next four years he visited many of the South Sea Islands, extending his missionary labors to the Samoa Islands. In 1834 he visited England, where he remained for nearly four years, during which he procured the publication of his Raratongan New Testament by the Bible Society, and raised £4000 for the purchase and outfit of a missionary ship for Polynesia. In 1838 he returned, visited many of the islands, and finally the New Hebrides, where he hoped to plant a mission, but was killed, November 20, 1839, by the natives of Erromanga. He published *A Narrative of Missionary Enterprise in the South Sea Islands* (1837). Consult his *Life* by Campbell, (London, 1842), and Prout (ib., 1843).

WILLIAMS, John (1817-99). An American bishop of the Episcopal Church. He was born at Deerfield, Mass., and educated at Trinity College, Hartford, where he graduated in 1835. He was ordained in 1841, and held the rectorship of Saint George's Church, Schenectady, N. Y., from 1842 to 1848, after which he became president of his *alma mater,* and at the same time professor of history and literature. In 1851 he was elected Assistant Bishop of Connecticut, and on the death of Bishop Brownell, in 1865, succeeded him in the sole charge of the diocese. At the same time, from 1854 on, he held the office of dean of the Berkeley Divinity School, at Middletown, and was its principal instructor in Church history and theology. He succeeded Bishop Lee, of Delaware, in 1887, as presiding Bishop, and earned the reputation of a wise and conservative leader in ecclesiastical affairs. Among his published works are: *Thoughts on the Gospel Miracles* (1848); *The English Reformation* (Paddock Lectures, 1881); *The World's Witness to Jesus Christ* (Bedell Lectures, 1882); and *Studies in the Book of the Acts* (1888).

WILLIAMS, John Joseph (1822—). An American Roman Catholic prelate. He was born in Boston, April 27, 1822, and educated at the Sulpician College in Montreal and at the Seminary of Saint Sulpice in Paris. After his ordination he became assistant at the Boston Cathedral in 1845, and rector in 1855. In 1857 he took charge of Saint James's parish, and in 1866 became Bishop of Boston. His title was changed to Archbishop in 1875, when the see was raised to metropolitan dignity.

WILLIAMS, Jonathan (1750-1815). An American soldier. He was born in Boston, entered business life, made several voyages to England and the West Indies, and was secretary to Franklin, his grand-uncle, when the latter was Ambassador to France. Here he made a careful study of military science, and, after serving as Judge of Common Pleas at Philadelphia, from 1785 to 1801, became a major in the artillery and engineer corps, and an inspector of fortifications. He was in command of the military post at West Point in 1801-02, and was superintendent of the United States Military Academy in 1802-03, giving instruction to the engineers and artillerists. In June, 1803, owing to a dispute over a question of rank, he resigned from the army, but in 1805 reëntered the service as lieutenant-colonel and chief engineer, and was reappointed superintendent at West Point. He also had charge of the fortifications in New York harbor, planning and building Fort Columbus, Castle Clinton (Castle Garden), and Castle Williams, the last being, at the time of its erection, the only casemated battery in the United States. He was the first to introduce in the United States principles of scientific military engineering, and has therefore been called the 'Father of the Corps of Engineers.' In 1812 he claimed command of Castle Williams, and, on refusal, resigned. In 1814 he was elected to Congress, but never took his seat. He wrote *The Use of the Thermometer in Navigation* (1799), and translated *Elements of Fortification* (1801) and Kosciusko's *Manœuvers for Horse Artillery* (1808).

WILLIAMS, Sir Monier Monier- (1819-99). An English Sanskrit scholar, born at Bombay. He studied at King's College, London; entered Oxford in 1838; soon obtained an Indian writership, and studied at the East India College, Haileybury, gaining the first prize in all the Oriental subjects. He resigned his Indian appointment, however; returned to Oxford, and graduated in 1844. He was professor of Sanskrit at Haileybury from 1844 to 1858, and at Cheltenham College from 1858 to 1860. He became Boden Sanskrit professor at Oxford in 1860 and visited India in 1875. In 1896 he superintended the completion of the Indian Institute, of which he was curator till his death. Among his works are *A Practical Grammar of the*

Sanskrit Language (4th ed. 1877); *An English and Sanskrit Dictionary* (1851); *Indian Epic Poetry* (1863); an edition of *Śakuntalā* (2d ed. 1876), and a translation of the same drama (6th ed. 1890); *A Sanskrit and English Dictionary* (1872); *Indian Wisdom* (3d ed. 1876); *Brāhmanism and Hinduism* (3d ed., 1887); *Buddhism* (1889); *Hinduism* (1877); and *Modern India and the Indians* (2d ed. 1878).

WILLIAMS, Otho Holland (1749-1800). An American soldier. He was born in Prince George County, Md., became an orphan at twelve, and in 1775 entered the American army as lieutenant in a Maryland regiment, becoming a major in June, 1776, a colonel in December, 1776, and a brigadier-general in May, 1782. At Fort Washington (November 16, 1776) he was badly wounded and was captured, and for fifteen months was a prisoner in New York, being treated, for part of the time, with great severity. Subsequently he was deputy adjutant-general under Gates, and adjutant-general under Greene in the South, and served with gallantry at Guilford, Hobkirk's Hill, and Eutaw Springs, where he led a charge. After the war he was collector of the port of Baltimore, and held the position until his death. He wrote an excellent *Narrative of the Campaign of 1780*, printed in the *Appendix* of Johnson's *Life of Greene*. Consult Tiffany, *A Sketch of the Life and Services of Gen. Otho H. Williams* (Baltimore, 1851).

WILLIAMS, Roger (c.1604-1683). The founder of the State of Rhode Island, born probably in London in either 1604 or 1605. In his youth he attracted the attention of Sir Edward Coke by his shorthand notes of sermons and speeches in the Star Chamber, and was sent by him to Sutton's Hospital, now the Charterhouse School, in 1621. He entered Pembroke College, Cambridge, in 1625, and took the degree of bachelor of arts in 1627. Williams probably took orders in the Church of England, but he soon became an extreme Puritan, and emigrated to New England, arriving at Boston February 5, 1631. He refused to join the congregation at Boston because the people would not make public declaration of their repentance for having been in communion with the Church of England; he therefore went to Salem as assistant preacher, but was soon in trouble for denying the right of magistrates to punish Sabbath-breaking and other religious offenses, as belonging to the first table of the law. Being thus in opposition to the Massachusetts Bay Government, he went to Plymouth, where he assisted its minister, and studied Indian languages. In 1633 he returned to Salem, and was settled as pastor of the church, but was opposed by the Government for denying the validity of the Massachusetts Bay charter and for denying its right to take the Indian's land without purchase, and the right to impose faith and worship. He held that it was not lawful to require a wicked person to swear or pray, which were both forms of worship; and that the power of the civil magistrate extends only to the bodies, goods, and the outward state of man, and not to their souls and consciences. Banished from the colony in 1635 by order of the General Court and threatened with being sent back to England in order to prevent the spread of his new doctrines, he escaped in midwinter to the shores of Narragansett Bay, accompanied by a few adherents, and here purchased lands of the Indian chiefs, founded the city of Providence in 1636, and established a government founded on complete toleration. Having adopted the belief in baptism of believers by immersion, Williams was baptized by a layman, and then baptized him and ten others, and founded the first Baptist church in America. Later he doubted the validity of his baptism, and withdrew from the Church he had founded. In 1643 he went to England to procure a charter for Providence and Rhode Island settlements, and while there published a *Key into the Language of America*, and *The Bloudy Tenent of Persecution for Cause of Conscience Discussed* (1644), his chief work on the nature and sphere of civil government (reprinted in the Narragansett Club Publications, 1st series, vol. iii.). In 1645 he wrote a tract entitled *Christenings Make Not Christians* (reprinted 1881, as No. 14 of the Rhode Island Historical Tracts). After returning to Rhode Island he went a second time to England on business of the colony in 1651, when he published *Experiments of Spiritual Life and Health and Their Preservations*, also *The Hireling Ministry None of Christ's* and *The Bloody Tenant Yet More Bloody by Mr. Cotton's Endeavor to Wash It White in the Blood of the Lambe*, a reply to a pamphlet by John Cotton. This last was reprinted in 1870 by the Narragansett Club, 1st series, vol. iv. At this period Williams engaged in an experiment of teaching languages by conversation, and made the acquaintance of Milton. He returned to Rhode Island in 1654, and was elected President of the colony. He refused to persecute Quakers, but engaged in a controversy with them, and published *George Fox Digg'd Out of His Barrows* reprinted, 1872, by the Narragansett Club 1st series, vol. i). Through his influence over the Indians he was of great service to the other colonies, but they refused to remove their ban, or to admit Rhode Island into the New England Confederation. Consult: *Memoirs*, by Knowles (Boston, 1834); Gammell, *Life of Williams* (ib., 1845); and the biography by Straus (New York, 1894). Also Dexter, *As to Roger Williams* (Boston, 1876); and Williams's letters and other works published by the Narragansett Club (1866). The latest contribution to the literature of Roger Williams is Richman, *Rhode Island, Its Making and Its Meaning* (New York, 1902).

WILLIAMS, Rowland (1817-70). A clergyman of the Church of England. He was born at Halkyn, Wales, graduated B.A. at King's College, Cambridge, in 1841, and was fellow and tutor, 1839-50. He was vice-principal and professor of Hebrew in the Welsh theological college of Saint David's, Lampeter, 1850-62, and did much to improve the teaching and finances of the college. He was made select preacher at Cambridge in 1854, and vicar of Broad Chalke, Wiltshire, in 1858. Certain views on inspiration expressed in one of his sermons at Cambridge were unacceptable to many of the Welsh clergy; and in 1860 he published an appreciative review of Bunsen's *Biblical Researches* in *Essays and Reviews*, which led to his prosecution for heresy. He was condemned in the Court of Arches in 1862, but the judgment was reversed in 1864. Among his works were *Rational Godliness* (1855); *Christianity and Hinduism* (1856); *Broad Chalke Sermon Essays* (1867); and *The Hebrew Prophets* (1866-71). Consult his *Life and Letters*, edited by his wife (London, 1874).

WILLIAMS, Samuel Wells (1812-84). An American missionary, Sinologist, and diplomat, born in Utica, N. Y. He studied at the high school there and at the Rensselaer Institute at Troy, and in 1833 went to Canton, China, where he took charge of the newly established mission press of the American Board of Commissioners for Foreign Missions. Unsettled conditions in Canton necessitated his removal to Macao in 1835. In 1845 he returned to the United States. In the fall of 1848 he resumed his labors at Canton. He was interpreter to Commodore Perry in his mission to Japan, 1853-54, severed his connection with the Mission Board in 1857, and was appointed secretary and interpreter to the United States legation. In this capacity he assisted in negotiating the treaty of 1858, and accompanied Minister Ward to Peking in 1859 to exchange ratifications. In 1861 he again visited the United States, and when, in 1862, the first United States legation was established at Peking under Burlingame, he took up his residence in that city and remained until 1876, when he resigned and returned to the United States. He settled at New Haven, Conn., and filled the chair of Chinese language and literature at Yale until his death. He edited the *Chinese Repository* during nineteen years of its existence (1832-51), and was a voluminous contributor to it. He also carried through the press Medhurst's *Dictionary of the Hokkien Dialect* (1837), and prepared (with Bridgman) and brought out *Chinese Chrestomathy* (1841). His independent works include *Easy Lessons in Chinese* (1842); *The Chinese Commercial Guide* (1844); *The Topography of China* (1844); *English Vocabulary in the Court Dialect* (1844); *The Middle Kingdom* (1848); and *A Syllabic Dictionary of the Chinese Language* (1874), his greatest work. Consult his *Memoirs* by his son, F. W. Williams (London and New York, 1889).

WILLIAMS, Seth (1822-66). An American soldier, born at Augusta, Me. He graduated at West Point in 1842, entered the artillery, served on the frontier, and participated in the Mexican War. He was promoted to be first lieutenant in March, 1847, and was brevetted captain for gallantry at Cerro Gordo a month later. In 1861 he was commissioned brigadier-general of volunteers, and from November 14, 1862, to March 10, 1864, he served as inspector-general in the adjutant-general's department of the Army of the Potomac, taking part in the Peninsular, Maryland, Rappahannock, Pennsylvania, Rapidan, and Richmond campaigns. He received several brevets, including that of major-general in the Regular Army for gallantry and meritorious services in the field during the war. In February, 1866, he was appointed adjutant-general of the Military Division of the Atlantic, but died less than a month after receiving his appointment.

WILLIAMS, William (1717-91). A Welsh hymn-writer. He was born at Cefn-y-Coed, Wales, became a deacon in the Church of England in 1740, but was never ordained priest, and served as an itinerant minister in the Methodist body all his life. He published his first volume of hymns in Welsh in 1744, and since then has been accorded first place among Welsh hymnwriters. Many of his hymns are still sung by his countrymen, and one of them in its English translation, "Guide Me, O Thou Great Jehovah," is very familiar. The most recent collection of his works is by Cynhafa Jones (Newport, 1891). He himself published two volumes of hymns in English (1759 and 1771).

WILLIAMS, William (1731-1811). A signer of the Declaration of Independence, born at Lebanon, Conn. He graduated at Harvard in 1751; in 1755 was on the staff of his relative, Colonel Ephraim Williams, in the battle of Lake George; and at the age of twenty-five became town clerk, a position he continued to hold for forty-five years. About the same time he became a member of the Assembly, and was reëlected to that body until 1804. In October, 1775, and again in 1776, he was sent to the Continental Congress, and in the latter year was one of the signers of the Declaration of Independence. He also held numerous other positions; was for forty years a judge of probate for the district of Windham; and was a member of the Connecticut convention that ratified the Federal Constitution.

WILLIAMS, Sir William Fenwick (1800-83). A British general, the 'hero of Kars.' He was born at Annapolis, Nova Scotia, was educated at the Royal Military Academy, Woolwich, and entered the British army as second lieutenant in the Royal Artillery, 1825. After serving on various European stations, in 1841, then being a captain, he was employed in diplomatic work in Turkey, and was brevetted major and colonel. In 1848 he was appointed a commissioner for the settlement of the Turco-Persian boundary, and in 1854, during the Crimean War, British commissioner with the Turkish army in Asia, of which, with the brevet of a ferik or lieutenant-general and the dignity of a pasha, he virtually took the command. In 1855 he heroically defended Kars against the Russians under Muravieff, who was repulsed in a great assault on September 29th. After Williams was forced by famine to surrender (November) he was created Baronet of Kars, and received a pension of £1000. From 1856 to 1859 he was a member of Parliament and general commandant at Woolwich. He was subsequently in command of the forces in Canada, 1859-70, and at Gibraltar, 1870-76. Two years before his death he received the appointment of constable of the Tower of London.

WILLIAMS, William George (1822-1902). An American Methodist educator. He was born at Chillicothe, Ohio, and graduated from Woodward College, Cincinnati, 1844. He was professor of the Greek language and literature in Ohio Wesleyan University, Delaware, Ohio, from its foundation in 1844 until his death. He joined the Central Ohio Conference in 1856, and was its secretary for twenty-eight years; he was chaplain of the 145th regiment Ohio Volunteer Infantry, 1864. He published *Baptism: a Discussion of the Words "Buried with Christ in Baptism"* (1901), and *Exposition of the Epistle of Saint Paul to the Romans* (1902).

WIL'LIAMSBURG. A former city of King's County, N. Y., united with Brooklyn in 1855 and now forming part of the borough of Brooklyn in the city of New York.

WILLIAMSBURG. The county-seat of James City County, Va., 48 miles east by south of Richmond, on the Chesapeake and Ohio Railroad (Map: Virginia, H 4). It is on a peninsula about midway between the James and York rivers, in a region of great historic interest. The chief feature of the city is the William and Mary College (q.v.), the second oldest college in the United States, having been opened in 1693. There is also the Eastern State Hospital for the Insane, erected in 1769. Other features are Bruton Parish Church, dating from 1678 and rebuilt in 1715; the Powder Horn building (1714); the old court house (1769); and Fort Magruder. Williamsburg is the shipping point for the farm and garden produce of the vicinity, and manufactures knit goods, brick, lumber, etc. There are also important fish and oyster interests. Population, in 1890, 1831; in 1900, 2044. Williamsburg was settled in 1632, and was called Middle Plantations until 1699. In 1698 it supplanted Jamestown as the capital of Virginia, and in 1722 obtained a city charter, the oldest in the State. Here in 1765 Patrick Henry offered his resolutions against the Stamp Act, and delivered his famous Cæsar-Charles I. speech. In 1779 the capital was removed to Richmond. At Williamsburg, on May 5, 1862, during the Civil War, occurred the first serious engagement of the Peninsular campaign, a part of Magruder's Confederate troops under Longstreet, which had evacuated Yorktown on May 3d, checking the pursuit of a part of the Army of the Potomac, under General Sumner. The fighting began at about 7:30 A.M. and continued during the greater part of the day, gallant though ill-organized attacks being made by Federal divisions under Hooker and Hancock; but neither side gained any decisive advantage, and during the night the Confederates continued their retreat toward Richmond. The Federal loss in killed, wounded, and missing was 2228; the Confederate, as reported by Longstreet, 1560. Consult a sketch of Williamsburg by Lyon G. Tyler in Powell's *Historic Towns of the Southern States* (New York, 1900); and for the battle, Webb, *The Peninsula* (New York, 1881), in the Campaigns of the Civil War series.

WILLIAMS COLLEGE. An institution of higher learning at Williamstown, Mass., chartered in 1793. It was developed from a free school established by the will of Col. Ephraim Williams (q.v.). The studies of the Freshman year are prescribed, with a wide election of courses in the remaining years. Admission is by examination or by certificates from approved schools. A student who is able to anticipate at entrance two college courses may complete the required work in three years. The degrees of B.A. and M.A. are conferred, and partial courses are provided for special students. All examinations are conducted on the honor system. The laboratories are supplied with the best modern appliances. The astronomical department possesses two observatories, the Hopkins and the Field Memorial. Among the other buildings are the Lasell Gymnasium and a college infirmary. In addition to prizes and honor scholarships, there is a large number of endowments, the income of which, amounting to over $11,000 annually, is available for distribution among needy students. In 1903 the college had an attendance of 423 students and a faculty of 30 instructors. Its endowment was $1,168,708, its income $110,130. The estimated value of the college property was $1,603,833, and of the grounds and buildings $435,125. The college library contained in 1903 50,500 volumes and 17,400 pamphlets. The high rank of Williams as a small college is in large part due to the work and influence of Mark Hopkins (q.v.), who was its president from 1836 to 1872.

WIL'LIAMSON, ALEXANDER WILLIAM (1824-—). An eminent English chemist, born at Wandsworth, near London. He was prepared for college by private masters, and entered the University of Heidelberg. From Heidelberg he went to Giessen, where he spent several years in chemical research under Gmelin and Liebig. After three years spent in studying higher mathematics at Paris he became, in 1849, professor of practical chemistry in University College, London, and in 1855 was chosen also to fill the chair of pure chemistry in the same institution. A memoir published in 1850 on *Ætherification and the Constitution of Salts* attracted wide attention in the scientific world, and had a great influence on the theories of chemical action. In addition to *A Chemistry for Students*, which attained considerable recognition, he was the author of memoirs and papers on etherification, the atomic theory, and the composition of gases, in which he advanced new and original views, now generally accepted as distinct contributions to chemical knowledge. He was twice chosen president of the Chemical Society, was president of the British Association in 1873, and was elected a corresponding member of the French Institute. In 1887 he resigned his chairs and was elected professor emeritus.

WILLIAMSON, HUGH (1735-1819). An American physician and legislator. He was born in West Nottingham, Pa., graduated at the College of Philadelphia (now the University of Pennsylvania) in 1757, studied theology and preached for two years (1759-61), was professor of mathematics in the College of Philadelphia from 1760 to 1763, studied medicine at Edinburgh and Utrecht, and subsequently attained eminence as a physician in Philadelphia. He visited the West Indies (1772) and England (1773) in behalf of the Newark (Del.) Academy, and in February, 1774, was examined on colonial matters by the Privy Council. After spending some time on the Continent, he removed first to South Carolina and then to North Carolina. He served as surgeon in the North Carolina militia in 1780-82, was a member of the Continental Congress from 1782 to 1785 and in 1787-88, was a delegate to the Constitutional Convention of 1787 and to the State convention, which ratified the Federal Constitution in 1789, and was a member of Congress from 1790 to 1793, when he removed to New York City. He published several essays on *Paper Currency* (1786); a *Discourse on the Benefits of Civil History* (1810); *Observations on the Climate of*

America (1811); and a *History of North Carolina* (1812).

WILLIAMSON, William Crawford (1816-95). An English naturalist, born at Scarborough. In 1834 he presented his first work on the Mesozoic fossils of his native district to the London Geological Society. He became curator of the Manchester Natural History Society Museum in 1835. He finished his medical course at University College, London, in 1841. He was instrumental in founding the Manchester Institute for diseases of the ear in 1855 and was consulting surgeon there. From the founding of Owens College at Manchester in 1851 until 1892 he held the chair of botany. In zoölogy he made valuable investigations of the development of the teeth and bones of fishes; in geology he studied the zones of distribution of Mesozoic fossils and the part played by microscopic organisms in the formation of marine deposits; and by his work on the structure of fossil plants established British paleobotany on a scientific basis. His *Reminiscences of a Yorkshire Naturalist* (1896) contains a nearly complete bibliography of his writings.

WILLIAMSON FREE SCHOOL OF MECHANICAL TRADES. An educational institution at Williamson School Station, Pa., 16 miles from Philadelphia, founded in 1888 by Isaiah V. Williamson for the education of poor and deserving boys. Candidates for admission must be between sixteen and eighteen years of age, preference being given in the following order: to natives of Philadelphia; of Bucks, Montgomery, and Delaware counties; of other parts of Pennsylvania; of New Jersey; of other States. The school is only for pupils who intend to follow for a livelihood the trades there acquired. After a moderate preliminary trial all who prove satisfactory are bound as indentured apprentices to the trustees for the term of three years from their entrance. In addition to the academic training, the following trades are taught, the selection being made by the trustees, and each scholar taking but one trade: carpentering, bricklaying, machine trade, pattern-making, steam and electrical engineering. The school and shops are in session eight hours a day for five days a week and three hours on Saturday, the proportion of shop work gradually increasing toward the close of the apprenticeship. The school term continues the entire year. The pupils live in families of 24 in distinct cottages. In 1904 the school had 11 instructors, 212 students, a library of 2500 volumes, an endowment of $2,250,000, and an income of 98,000. The buildings were valued at $380,000.

WIL′LIAMSPORT. The county-seat of Lycoming County, Pa., 94 miles north by west of Harrisburg, on the West Branch of the Susquehanna River, and on the Philadelphia and Reading, the Northern Central the Philadelphia and Erie, and other railroads (Map: Pennsylvania, D 2). It is in a region of attractive scenery, and is well laid out. Among the prominent features are Dickinson Seminary, the city hall, the United States Government building, the Masonic Temple, the Scottish Rite Cathedral, and the Home for the Friendless. There are four parks, Brandon and Vallamont, within the city limits, and Starr Island and Sylvian Dell within easy reach by trolley and steamboat service. Williamsport has for a long time been known for its extensive lumber interests. It is also an important coal-mining and industrial centre. In the census year 1900 the various manufacturing industries had $9,863,811 capital, and an output valued at $11,199,600. Aside from the numerous lumber establishments, there are large clothing factories, foundries and machine shops, tanneries, furniture factories, dye works, silk mills, and manufactories of boilers and engines, boots and shoes, mirrors, sandpaper, wire rope, building, paving, and fire brick, stacks, tanks, band instruments, nails, radiators, sewing machines, woolen goods, heaters, gas and gasoline engines, pumps, etc. The government is vested in a mayor, chosen every three years, and a bicameral council. Of the subordinate officials, the majority are elected by the council. The board of education, however, is chosen by popular vote. Founded in 1795 by Michael Ross, Williamsport became the county-seat in the same year, and was incorporated as a borough in 1806, and as a city in 1866. In 1850 it had a population of only 1615, but in that year the development of the lumber trade began, and the subsequent growth of the city was rapid. Population, in 1890, 27,132; in 1900, 28,757.

WIL′LIAMSTOWN. A town in Victoria, Australia, 9 miles southwest of Melbourne, on Port Phillip Bay (Map: Australia, G 6). It is interested in shipbuilding. Basalt and coal are mined in the vicinity. Population, in 1901, 14,083.

WILLIAMSTOWN. A town, including several villages, in Berkshire County, Mass., 5 miles west of North Adams, on the Green River, and on the Boston and Maine Railroad (Map: Massachusetts, A 2). It is the seat of Williams College (q.v.), opened in 1793. Other features include the public library and Mission Park. Although primarily a residential place, Williamstown has a bleaching establishment, a cotton mill, and large freight yards. Market gardening is an important industry. The government is administered by town meetings. Williamstown was permanently settled in 1753 and was called West Hoosic until 1765, when it was incorporated under its present name, given in honor of Colonel Ephraim Williams. Population, in 1890, 4221; in 1900, 5013. Consult: Perry, *Origins in Williamstown* (New York, 1894); id., *Williamstown and Williams College* (Norwood, Mass., 1899).

WIL′LIBRORD, WIL′BRORD, or **WIL′BROD, Saint** (c.658-739). The 'apostle of the Frisians.' He was born in the Kingdom of Northumbria, and began his education at the monastery at Ripon, near York. At the age of twenty he was sent to the schools of Ireland. After a sojourn of twelve years in that country, he resolved to devote himself to the conversion of Friesland. In 690 he sailed with eleven companions, and arrived soon after the victory of Pepin of Herstal over the Frisians. They were warmly received by Pepin. Willibrord, having established the first beginnings of his mission, went to Rome in 692, whence he returned, with the sanction of the Pope, Sergius I., and continued his labor till 695, when he again visited Rome, and received episcopal consecration, together with the pallium of an archbishop. Fixing his see at Utrecht, he converted a large number of the inhabitants, and, although he received some check upon the death of Pepin in 714, yet the successes of Charles Martel enabled him soon afterwards, under similar favorable auspices, to resume the work, which, after many alternations, ended in the successful establishment of Christianity. Willibrord died in 739 at the monastery which he had founded at Echternach, near Trèves. His festival is November 7th. His *Life* was written by Alcuin (Eng. trans., London, 1877).

WIL'LIMAN'TIC. A city in Windham County, Conn., 16 miles northwest of Norwich, on the Natchaug River, and on the New York, New Haven and Hartford and the Central Vermont railroads (Map: Connecticut, G 3). It is the seat of a State normal training school, and has a public library with more than 5000 volumes and the Dunham Hall Library. The city is favored with excellent water power, and is noted for the manufacture of cotton thread. Other important products are cotton goods, silk goods, and fine machinery. The government, under the revised charter of 1896, is vested in a mayor, chosen every two years, and a bicameral council. The water-works are owned and operated by the municipality. First settled about 1822, Willimantic was incorporated as a borough in 1833, and became a city in 1893. Population, in 1890, 8648; in 1900, 8937.

WIL'LING, Thomas (1731-1821). An American merchant and financier. He was born in Philadelphia, was educated at Bath, Eng., and in the Temple, London, and, returning to Philadelphia, organized, with Robert Morris (q.v.), the famous mercantile firm of Willing & Morris, which, during the Revolutionary War, supplied naval and military stores to the Government. After holding various less important positions, he was elected Mayor of Philadelphia in 1763, was an associate justice of the Pennsylvania Supreme Court from 1767 to 1774, was a member of the Pennsylvania Committee of Correspondence, was a delegate to the Assembly in 1775, and was a member of the Continental Congress in 1775-76. In 1780 he, with several associates, organized the Pennsylvania Bank as a means of procuring supplies for the Continental Army, he himself subscribing £5000. He was president of the Bank of North America from 1781 to 1792, and was the first president of the Bank of the United States, organized in 1791.

WIL'LIS, Bailey (1857—). An American geologist, born at Idlewild-on-Hudson. He graduated in 1878 at the Columbia School of Mines, of Columbia University, and from 1879 to 1881 was expert on iron ores for the Tenth Census. In 1881-84 he was geologist of the Northern transcontinental survey, undertaken by the Northern Pacific Railway and other companies; subsequently he was appointed geologist of the United States Geological Survey, in charge of the Appalachian division, and afterwards of the Cascade Range and Puget Sound division. He edited the *Geologic Atlas of the United States,* and published many technical papers.

WILLIS, Nathaniel Parker (1806-67). An American author, born in Portland, Maine. He graduated at Yale College in 1827, where, as an undergraduate, he became known as a writer of religious verse. Some of these verses were published in a book, *Sketches* (1827). For S. G. Goodrich (q.v.), of Boston, he edited two annuals, *The Legendary* (1828) and *The Token* (1829). In the latter year Willis established at Boston *The American Monthly Magazine;* this in 1831 was merged with the New York *Mirror,* of which he became associate editor. From 1831 to 1836 he traveled in Europe and Asia Minor and contributed sketches to the *Mirror,* which were later published in *Pencillings by the Way* (3 vols., 1835). On his return to America he conducted a short-lived weekly journal, *The Corsair* (1839-40), and later two papers of brief existence, *The New Mirror* (1843-44) and *The Evening Mirror* (1844-45). In 1845 he went again to Europe, returning in 1846. The same year he established *The Home Journal,* which occupied him until his death at his estate, "Idlewild," near Newburg, N. Y. His published works include: *Inklings of Adventure* (1836, 3 vols.); *Loiterings of Travel* (1840, 3 vols.); *Lady Jane, and Other Poems* (1844); *People I Have Met* (1850); *Life Here and There* (1850); *Hurry-graphs, or Sketches of Scenery, Celebrities, and Society* (1851); *A Summer Cruise in the Mediterranean on Board an American Frigate* (1853); *A Health Trip to the Tropics* (1853); *Famous Persons and Places* (1854); *Out-Doors of Idlewild* (1855); *The Rag-bag, a Collection of Ephemera* (1855); *Paul Fane* (1856), a novel; *The Convalescent* (1859); and others, chiefly prose. His complete poems appeared in 1868. His work was ready, fluent, light, graceful, and various, in the main that of a dilettante, and it was exceedingly popular during Willis's lifetime, but is without enduring character. Some of his Scriptural poems and society verses are still read, and his prose yields interesting sketches of contemporaries. Willis was generous to contemporary authors, but made many hostile critics by his indiscreetly personal tone of writing. There is a *Life* by H. A. Beers in the "American Men of Letters Series" (1885).

WILLIS, Robert (1800-75). An English archæologist and professor of mechanism, born in London. He graduated at Caius College, Cambridge, in 1826, was soon afterwards elected Frankland fellow and in 1829 foundation fellow. After his graduation he gave his attention chiefly to mechanism, and in 1837 he was chosen Jacksonian professor of applied mechanics at Cambridge. Meanwhile he devoted his spare time to the study of architecture and archæology, and his *Remarks on the Architecture of the Middle Ages* (1835) won a high place among works on the subject. In 1844 he became a member of the newly organized Archæological Institute, before which he delivered some of his most important lectures. Among his publications are: *Principles of Mechanism* (1841); *Architectural History of the Church of the Holy Sepulchre of Jerusalem* (1849); *The Architectural History of the Conventual Buildings of the Monastery of Christ Church, Canterbury* (1869); and a series of lectures on the English cathedrals delivered between 1844 and 1865.

WILLIS, Thomas (1621-75). An English anatomist and physician, born at Great Bedwin, Wiltshire. He was graduated in 1839 at Oxford, where he began practice in 1846. He fought as a Royalist in the Revolution, studied medicine during the Protectorate, and at the Restoration was made Sedleian professor of natural philosophy at Oxford. He afterwards settled in London, where he became a founder of the Royal Society, and in 1666 he became physician in ordinary to Charles II. Willis made important medical discoveries concerning the brain. A system of connecting arteries at the base of the brain is called the 'circle of Willis' after him. It is claimed that he first suggested the possibility of localization of function in the brain, and published two treatises on the subject: *Anatomy of the Brain* (1664) and *Pathology of the Brain and Nervous System* (1667). He was buried in Westminster Abbey. Besides many other works, he published *Cerebri Anatome, cui Accessit Nervorum Descriptio et Usus* (London, 1664); *Pathologiæ Cerebri, etc.* (Amsterdam, 1668); *Affectionum quæ Dicuntur Hystericæ et Hypochondriacæ Pathologia Spasmodica Vindicata* (Leyden, 1671); and *De Anima Brutorum* (London, 1672). His complete works, *Opera Omnia*, were published in Geneva (1676), and a translation into English in London (1684).

WILL′MAR. The county-seat of Kandiyohi County, Minn., 90 miles west of Minneapolis, on the Great Northern Railroad (Map: Minnesota, C 5). It is the shipping point of a farming and stock-raising section, and has grain elevators, brick works, a creamery, and manufactories of flour, gasoline engines, lumber products, etc. Willmar Seminary is here; and there are a handsome court-house, public library (Carnegie), and public parks. The water-works and the electric light plant are owned by the municipality. Population, in 1890, 1825; in 1900, 3409.

WILL′MORE, JAMES TIBBITS (1800-63). An English engraver, born at Handsworth, Staffordshire. He studied engraving under Radclyffe in Birmingham and under Charles Heath in London. He was made an associate of the Royal Academy in 1843. In execution he was clever and forceful, and his tone and shading are remarkably good. Among his prints are many from Turner, e.g. "Mercury and Argus" and "Ancient Italy;" also some from Eastlake, Landseer, Stanfield, and Creswick.

WILL O' THE WISP. See IGNIS FATUUS.

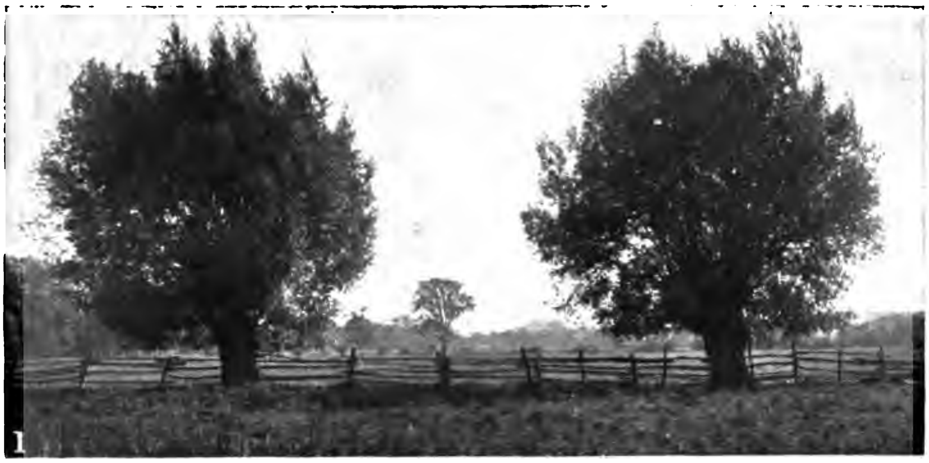
WILLOUGHBY, wĭl′ō-bĭ, Sir HUGH (1500?-54?). An English Arctic explorer. He was born at Risby, Derbyshire, and was knighted for his services in the expedition to Scotland in 1544. In 1553 he was made admiral of a fleet of three vessels sent out at the expense of the merchants of London with license from Edward VI. "to discover strange countries and a northeastern passage to Cathay and India." The vessels took out 136 persons, of whom 18 were merchants having a share in the expenses of the expedition. In July, 1553, a storm on the coast of Norway dispersed the fleet. Two of the ships went into the harbor of Arzina, in Lapland, where the crews and passengers perished during the rigors of the winter, the ships and bodies being found some years later together with Willoughby's journal and will. The third vessel was wrecked, but a few of her crew escaped to Archangel.

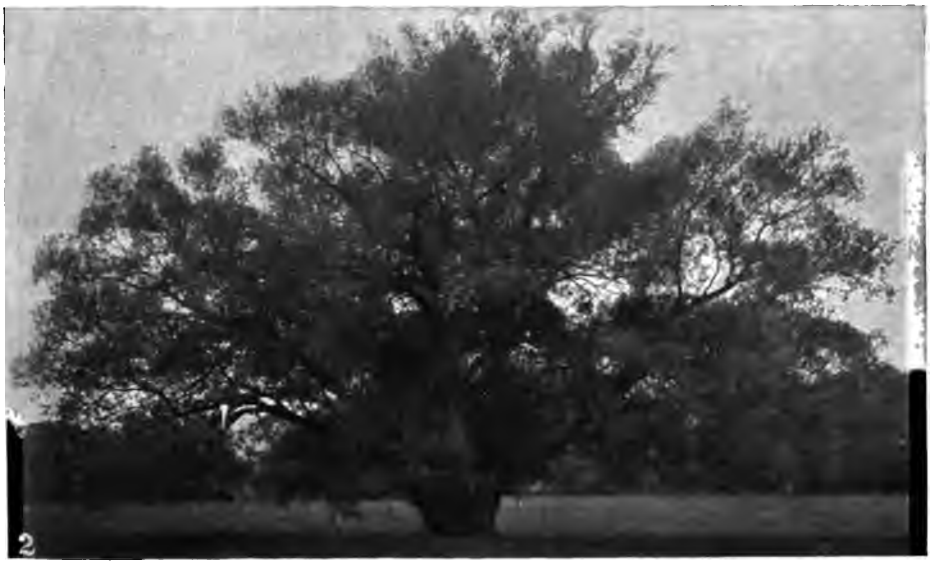
WILLOW (AS. *welig*, of uncertain etymology), *Salix*. A genus of plants of the natural order Salicaceæ. The flowers are naked, the stamens from one to five in number, the leaves simple and deciduous. There are fully 160 species, but their precise number is not likely to be soon determined, as varieties are very numerous and many hybrids are known to exist. They are mostly natives of the colder temperate regions of the Northern Hemisphere, although some are found in warm countries, as *Salix tetrasperma* in the hottest parts of India. Most of them are shrubs, and some are of very humble growth, particularly those of Arctic and Alpine regions. Thus, *Salix herbacea*, which is common on the mountains of Scotland and farther north, seldom rises more than an inch from the ground. *Salix arctica* and *Salix polaris* are the most northern woody plants. Other small species are also found at the limits of perpetual snow in various countries. Some of those which more generally receive the popular name willow are trees of large size and remarkably rapid growth. The wood of some of them, as the white willow or Huntingdon willow (*Salix alba*), and the crack willow (*Salix fragilis*), is used for many purposes, being remarkably light and soft, but tough and durable, especially in damp situations. Cork-cutters and others employ it for whetting sharp-edged implements. It is used for making paddles of steamboats, because it wears better in water than any other kind of wood. Willows are often planted as ornamental trees, especially near streams and in moist grounds. Many kinds are also planted on the banks of rivers to retain the soil in its place and restrain the encroachment of the water. They are peculiarly adapted for this purpose, as they grow readily from cuttings. Willow stakes driven into a moist soil strike root, and soon become luxuriant.

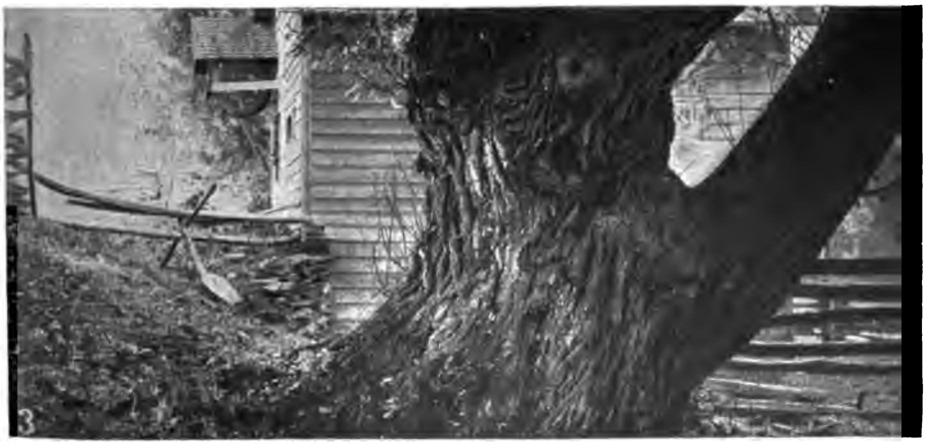
SHINING-LEAVED WILLOW (*Salix lucida*).

The twigs of most of the willows are very tough and flexible, and are used by coopers for making hoops, and by gardeners for tying large plants. They are much used for basket-making and other kinds of wicker work. (See OSIER.) Willow

WILLOWS







1. POLLARDED WILLOWS. 2. WHITE WILLOW (Salix alba).
3. BARK OF WHITE WILLOW.

trees are often treated as pollards and grown in copses, because they stand cutting remarkably well, and the stems are useful for many purposes, such as hoops, poles, fuel, etc. The leaves and young shoots are in some countries used as food for cattle, and even dried and stacked for that use. A fragrant water is distilled in Northern India from the catkins of the Egyptian or caliph willow (*Salix ægyptiaca*). The flowers of the willow, which in many species appear before the leaves, are much sought after by bees. The male catkins of many species are very beautiful, the prominent anthers being yellow, or in *Salix purpurea* of a rich purple. The weeping willow (*Salix Babylonica*) is a very ornamental species, a native of the East, now much planted in America and on the Continent of Europe, on account of its beautiful pendant twigs. (See WEEPING TREE.) The so-called Napoleon's willow is a variety of it. The white willow or Huntingdon willow (*Salix alba*) is far the largest species known in America. It grows with great rapidity to a height of 80 feet. Its head is much branched and spreading, its leaves narrow, elliptical-lanceolate, silky beneath, and sometimes also above.

The popular name sallow is given to a number of species, among them the gray sallow (*Salix cinerea*), the round leaved sallow (*Salix Caprea*), the round-eared sallow (*Salix aurita*), and the long-leaved sallow (*Salix grandifolia*). These are common British species. They are not as pliable as the osier willows, but are used for hoops, implements, etc. At least half of the known species of willow occur in the United States. Among the best known are the black willow (*Salix nigra*), a tree 30 to 50 feet high, and *Salix cordata* and *Salix lucida*, shrubs or small trees along streams from New England west and north. See plate of FLOWERS.

WILLOW GROUSE. See PTARMIGAN.

WILLOW INSECTS. In Europe 386 species of insects feed upon the various willows; in the United States Packard records 223, but this list must be largely increased. Many species which attack poplar, especially lepidopterous larvæ, attack the willows. The American cimbex (*Cimbex Americana*), the largest of the native sawflies, lays its eggs in the leaves and the larvæ sometimes cause excessive defoliation. Among other sawflies dependent upon these trees *Nematus ventralis*, whose yellow-spotted black larva is the 'yellow-spotted willow-slug,' is especially injurious. There are at least five generations annually, and the insect frequently multiplies excessively, sometimes menacing the willow-ware industry through its destruction of the osier willow. The willow-shoot horntail (*Phyllœcus integer*) lays its eggs in the twigs and the larvæ burrow in the terminal shoots, causing them to wilt. The wilting is begun by the mother insect, which girdles the twigs below the place where the egg is laid. The cocoon is spun within the burrow and the larva remains in it through the winter, changing to pupa in the early spring. Several leaf-beetles attack the foliage, and the larvæ of two longicorn beetles (*Xylotrechus annosus* and *Pogonocherus mixtus*) bore in the wood. A number of plant-lice affect the leaves and twigs; several species of scale insects are found upon the bark; and two gall-mites produce excrescences upon the leaves. Consult Packard, *Insects Injurious to Forest Trees* (Washington, 1890).

WILLOW WARBLER. See WARBLER.

WILLS, WILLIAM GORMAN (1830-91). A British playwright and painter. He was born in County Kilkenny, Ireland, and studied at Trinity College, Dublin. His early life was divided between painting and story-writing. About 1868 he established himself as a portrait painter in London and attained a considerable reputation, while he was noted for the Bohemian eccentricities of his life. He began play-writing about 1865, and among his dramatic works are: *The Man o' Airlie* (1867); *Charles I.* (1872), in which Henry Irving secured one of his early triumphs; *Eugene Aram* (1873); *Marie Stuart* (1874); *Olivia* (1878), based on *The Vicar of Wakefield*, and a great success; *Nell Gwynne* (1878); *Faust*, as produced at the Lyceum (1885); and *A Royal Divorce* (1891). He died in London. Consult: Freeman Wills, *W. G. Wills, Dramatist and Painter* (London, 1898); Archer, *English Dramatists of To-Day* (London, 1882); Cook, *Nights at the Play* (London, 1883).

WILLS, WILLIAM HENRY (1810-80). An English writer, born at Plymouth. He was one of the original literary staff of *Punch* (q.v.), to which he contributed dramatic criticisms and much witty verse. In 1846 he became a subeditor of the London *Daily News*, under the management of Charles Dickens. He was also made assistant editor of *Household Words* (1849) and of *All the Year Round* (1859). He was a lifelong friend of Dickens. His chief publication was *Old Leaves Gathered from Household Words* (1860). Among his contributions to *Punch* were a *Natural History of Courtship* and *Comic Mythology*.

WILLS, WILLIAM JOHN (1834-61). An Australian explorer, born at Totnes, in Devonshire, England. He studied medicine in London, and then in 1852 emigrated with his brother to Victoria, where he worked for a time as a shepherd. Three years later he became a surveyor of Crown lands, and in 1860 was appointed third in command of an expedition sent out under Robert O'Hara Burke (q.v.) to discover a route to the north across Australia. Soon after the expedition started, Wills was made second in command, and on February 12, 1861, he and Burke succeeded in reaching tidal water on the Flinders River. They then turned back, but on the return journey both died of starvation near Cooper's Creek, and only one man succeeded in getting back to the settlements. The bodies of the two leaders were recovered and were given a public funeral in 1863. A national memorial to them was erected at Melbourne in front of the Parliament House. Consult: *Will's Successful Exploration Through the Interior of Australia*, consisting of Will's recovered journal edited by his father (London, 1863); and Howitt, *History of Discovery in Australia* (London, 1865).

WILL'S COFFEE HOUSE. A famous resort of the 'wits' during Queen Anne's reign, situated on the corner of Bow and Russell Streets, London. Dryden's corner in it is celebrated in literary history, and it was also the resort of Wycherley and Waller, who lived on Bow Street, near by. It was so called from the first name of its original proprietor and was succeeded by Button's.

WILLUGHBY, wĭl'lŭ-bĭ, Francis (1635-72). An English naturalist, born at Middleton, in Warwickshire. He graduated from Trinity College, Cambridge, in 1556. He became much interested in natural history, and about 1662 he and his former teacher, John Ray (q.v.), planned a work on natural history, the botany to be written by Ray and the zoölogy by Willughoy. The two traveled on the Continent and in England collecting material, but before the work was completed Willughby died. Ray later published some of the results of Willughby's study, first in Latin in 1676, and then in English in 1678, under the title of *The Ornithology of Francis Willughby.* In the work there was for the first time a rational system of classifying birds, which has been asserted to be the basis of the Linnæan classification. In 1686 Ray published also the results of Willughby's study of ichthyology. Other results of his researches were collected by Ray in the *Methodus Insectorum* (1705), and by Derhorn, in his *Historia Insectorum* (1710).

WIL'MERDING. A borough in Allegheny County, Pa., 8 miles southeast of Pittsburg, on the Pennsylvania Railroad (Map: Pennsylvania, B 3). It has the extensive foundries and machine shops of the Westinghouse Air Brake Company. The growth of the borough has been very rapid, a population of 419 in 1890 having increased to 4179 in 1900.

WIL'MINGTON. The largest city in the State of Delaware, and the county-seat of New Castle County, 27 miles southwest of Philadelphia and 69 miles northeast of Baltimore, at the junction of the Delaware River and Christiana and Brandywine creeks, and on the Philadelphia, Baltimore and Washington, the Baltimore and Ohio, and the Wilmington and Northern railroads (Map: Delaware, P 2). It is picturesquely situated on hilly ground, the abundant provision of shade-trees adding to the beauty of the streets. The historic Holy Trinity (Old Swedes') Church was built in 1698 and is the oldest church building in continuous occupation in the United States. Other notable edifices are the fine county courthouse, the new post-office and United States Government building, and the building of the Equitable Guarantee and Trust Company. In or near the city are the Delaware and Homœopathic hospitals, the State Hospital for the Insane, the Ferris Industrial School for Boys, the Delaware Industrial School for Girls, and the Home for Friendless and Destitute Children. The Friends' School is an old and prominent institution. The free library, incorporated in 1788 as the Wilmington Institute, but now public, contains more than 40,000 volumes. The Law Library Association of the county has 15,000 volumes, and the Historical Society 3000. Wilmington is the leading industrial city in the State, its manufactures in the census year 1900 having an aggregate capital of $28,372,043, and a product valued at $34,053,324. Shipbuilding is a prominent industry, the Harlan & Hollingsworth Company having its works here. The Jackson & Sharp Company is an important car-building concern, and the Pullman Company also has shops here. Wilmington is the centre of the morocco industry in the United States. The manufacture of paper-making machinery is another important industry, the plant of the Pusey & Jones Company being one of the leading establishments of its kind in the United States. About four miles from the city is one of the largest powder-manufacturing establishments in the world, that of the E. I. du Pont de Nemours Company, founded in 1801 by Pierre Samuel du Pont (q.v.) and his sons. Large quantities of foundry and machine-shop products and iron and steel are also manufactured. The Pennsylvania Railroad maintains extensive car shops at Wilmington. The city is a prominent distributing centre and a port of entry for the customs district of Delaware, the foreign trade of which in 1901 was valued at $4,911,144, including exports to the amount of $4,679,370. The government is vested in a mayor, elected every two years, and a unicameral council of thirteen members. The mayor appoints the board of directors of the street and sewer departments and the board of water commissioners. The council appoints the city clerk, city auditor, milk, meat, oil, and market inspectors, etc. Members of the board of police commissioners are appointed by the judge of the Supreme Court. Besides the mayor and council, the city treasurer, city solicitor, and board of education (two from each ward) are chosen by direct popular vote. Wilmington spends annually in maintenance and operation about $720,000, the principal items of expenditure being: Schools, $200,000; police department (including police courts, jails, etc.), $85,000; interest on debt, $80,000; water-works, $56,000; fire department, $40,000. The water-works are owned by the municipality, which constructed them in 1827. The system comprises about 106 miles of mains, and has cost $1,875,000. Population, in 1890, 61,431; in 1900, 76,508, including 10,478 persons of foreign birth and 9736 of negro descent.

In 1638 Peter Minuet, with the first Swedish expedition to America, cast anchor in the Christiana, or Minquas, as the Indians called it, and erected a fort named Fort Christina in honor of the infant daughter of Gustavus Adolphus. He also founded a little village, Christinaham, where Wilmington now stands. Peter Stuyvesant, the Dutch Governor of New Netherland, stirred by the activity of Minuet's successor, Prinz, bought the region from the Indians, and in 1655 took Fort Christina and ended Swedish supremacy in Delaware. The Dutch rulers were in their turn succeeded nine years later by the English. Under William Penn's proprietorship the city acquired the sober Quaker character which it has never entirely lost. In 1737 Thomas Willing laid out a new town which bore his name, though Willingstown became Wilmington eight years later in honor of the English peer of that name. The battle of Brandywine (q.v.) was fought at Chadd's Ford, about 12 miles away. The first borough charter was issued in 1739. Consult: Ferris, *History of the Original Settlements on the Delaware* (Wilmington, 1846); Powell (editor), *Historic Towns of the Middle States* (New York, 1899).

WILMINGTON. The largest city of North Carolina, a port of entry, and the county-seat of New Hanover County, 148 miles south by east of Raleigh, on the Cape Fear River and on the Seaboard Air Line, the Atlantic Coast Line, and other railroads (Map: North Carolina, E 3). It is situated 20 miles from the mouth of the Cape Fear River, and has steamship connection with

New York and other Atlantic ports. The city is well laid out. Among the prominent structures are the United States Government building, the city hall, the county court-house, and the Masonic Temple. There are also Cape Fear Academy, a public library, the City and County Hospital, and the United States Marine Hospital. Wilmington is primarily a commercial city. Its foreign trade for the year ending June 30, 1901, aggregated $12,194,571, including exports to the value of $12,013,659. Cotton, lumber, and naval stores constitute the principal shipments. In manufacturing the city ranks fourth in the State, its various industries in the census year 1900 having $2,968,199 capital and a production valued at $2,960,028. There are lumber mills, cotton presses, cotton mills, cottonseed-oil mills, rice mills, dye works, and manufactories of fertilizers, tea chests, etc. Under the charter of 1866, the government is vested in a mayor, chosen biennially, and a unicameral council. A board of audit and finance, appointed by the State Governor, fixes salaries and controls the city finances. The subordinate administrative officials are elected by the council. Population, in 1890, 20,056; in 1900, 20,976.

Settled as 'Newtown' in 1730, Wilmington was incorporated in 1739 as a town under its present name. In 1743 it became the capital of the province. It was occupied by the British in 1781-82. During the Civil War it was the centre of communication between the Confederate States and foreign governments. Consult Powell (editor), *Historic Towns of the Southern States* (New York, 1900).

WILMINGTON. The county-seat of Clinton County, Ohio, 55 miles northeast of Cincinnati, on the Baltimore and Ohio and the Cincinnati and Muskingum Valley railroads (Map: Ohio, C 7). It is the seat of Wilmington College (Friends), opened in 1870. Farming is the leading industry of the surrounding country, and the city manufactures auger bits, bridge work, bentwood products, furnaces, and butter. Population, in 1890, 3079; in 1900, 3613.

WILMOT, Alexander (1836—). A British colonial official, born at Edinburgh, and educated at the universities of Glasgow and Edinburgh. For many years he served in various offices in Cape Colony, and in 1889 became a member of the Legislative Council. In politics he adhered to the 'Progressive' (Rhodes) party. Among his published works are: *The History of the Cape Colony* (with J. C. Chase, 1869); *The History of the Zulu War; The Geography of Cape Colony* (1882); *The Story of the Expansion of South Africa;* and *The History of Our Own Times in South Africa* (1897-99).

WILMOT, David (1814-68). An American political leader and jurist, born in Bethany, Pa. He was admitted to the bar at Wilkes-Barre in 1834, and practiced at Towanda. In time he became prominent as a Democratic politician, and from 1845 to 1851 was a member of the National House of Representatives. Although elected as a Democrat, he opposed the extension of slavery into the territory that it was expected the United States would acquire from Mexico, and in 1846 he moved his famous amendment, known as the Wilmot Proviso (q.v.). In 1848 he supported Van Buren for the Presidency instead of the regular Democratic candidate, and afterwards became a Republican. He was president-judge of the thirteenth district of Pennsylvania during 1853-61, was defeated as a candidate for Governor on the Republican ticket in 1857; served in the United States Senate 1861-63; and then held the office of judge of the United States Court of Claims until his death.

WILMOT, Robert Duncan (1809-91). A Canadian statesman, born at Fredericton, New Brunswick. When the boy was only five years old, the family removed to Saint John, where he was educated. After engaging in shipping, and after a short period spent in England, he entered the Parliament of his province in 1846, holding his seat down to the union of 1867. He was Mayor of Saint John (1849); Surveyor-General of New Brunswick (1851-54); Provincial Secretary (1856-57); and delegate to the colonial conference in London (1866-67). Upon the formation of the Union (1867) he was called to the Senate by royal proclamation. In 1878 he became a member of Sir John Macdonald's Ministry and Speaker of the Senate. In 1880 he resigned to become Lieutenant-Governor of New Brunswick, a post which he held till 1885.

WILMOT PROVISO. The name applied to an amendment proposed in the United States Congress in 1846 by David Wilmot (q.v.), a Democratic Representative from Pennsylvania, to a bill appropriating money for the purchase of territory from Mexico. On August 8, 1846, President Polk sent to Congress a special message asking that body to appropriate money to be used in adjusting the boundary dispute between the United States and Mexico. In response a bill appropriating $2,000,000 was introduced in the House, and it was expected that the money would be used in buying the Mexican claims to the disputed territory. In the debate that followed, Wilmot moved an amendment which provided "that neither slavery nor involuntary servitude shall ever exist in any part of said territory, except for crime, whereof the party shall first be duly convicted." This amendment was adopted in the House by a vote of 83 to 64, and the entire bill was then passed. When it was taken up in the Senate, however, Lewis, of Alabama, moved to strike out the proviso; but Davis, of Massachusetts, spoke against the motion, and continued his opposition until Congress adjourned. In the following December the President again asked for the measure, and, as most of the Northern State Legislatures had declared in favor of it, bills were soon reported in both Houses. On February 8. 1847, Wilmot again moved his proviso to one of these bills (appropriating $3,000,000 instead of the original $2,000,000), and it was again adopted, on February 15th, by a vote of 115 to 106. Meanwhile, however, the Democratic Senate had passed a similar bill without the proviso, and this bill came up before the House. That body in committee of the whole voted to amend the Senate bill by adding the proviso, but the proviso was rejected by the Senate and the bill was finally passed without it.

In the contest the pro-slavery men had naturally fought the proviso, and in the effort to preserve harmony between the Northern and Southern wings of their party the Democrats were forced to evolve the doctrine of popular sovereignty (q.v.). Those who, like Wilmot, were unwilling to accept this doctrine split off from the party. The principle contained in the proviso continued to be a burning issue even after its temporary rejection. Attempts were made to apply the principle in organizing the territory that was acquired from Mexico, and it formed the basis, in part, of the Free-Soil Party, and later of the Republican Party. It was rejected in the Compromise of 1850, and its previous application in the Missouri Compromise (q.v.) of 1820 was wiped out by the Kansas-Nebraska Bill (q.v.) of 1854; and in the famous case of Dred Scott it was held to be out of harmony with the Constitution. Ultimately, however, it was established by the act of June 19, 1862, which forbade slavery in "any of the territories of the United States now existing, or which may at any time hereafter be acquired." Consult: Wilson, *Rise and Fall of the Slave Power* (Boston, 1872-77); Schouler, *History of the United States of America Under the Constitution* (New York, new ed. 1899); Von Holst, *Constitutional and Political History of the United States* (Chicago, new ed. 1899); and Stephens, *Constitutional View of the Late War Between the States* (Philadelphia, 1868-70).

WILNA, vĭl′nȧ, RABBI ELIAS (1720-97). A name applied to Elijah or Elias ben Solomon, one of the greatest of Hebrew scholars, born at Wilna (Vilna), in Lithuania; also known as Elijah Gaon and The Gaon of Wilna. As a child he displayed remarkable gifts of memory and reasoning powers, and, beginning the study of the Talmud at the age of seven, he speedily mastered the subject. He was almost entirely self-taught, and to this was probably due the originality of method which he applied to Talmudic study. Unlike most Talmudists, whose efforts were directed to weaving about the text elaborate webs of the most subtle casuistry leading nowhere in particular, he made it his chief object always to arrive at the simple meaning of words. He even applied, in some degree, the methods of philology and higher criticism to the emendation of the Talmudic text, and at a time when the Talmud was practically the exclusive subject of study among the Jews, he laid great stress on the value of the biblical literature and the importance of Hebrew grammar. He went further still in advocating the cultivation of the profane sciences, a view at that time amounting almost to heresy, and himself did work of a very high order in the fields of mathematics and astronomy. He had also a great fondness for the Cabbala. With the exception of some travels in his youth he spent his entire life in semi-seclusion at Wilna, declining numerous calls which his great reputation brought him, and content to impart instruction in grammar, the Bible, and the Mishna to a select number of pupils. The only event of moment in his life was his struggle with the Chasidim (q.v.), of whom he was one of the most inveterate persecutors; he repeatedly excommunicated them and forbade intermarriage with them. He wrote commentaries in every classic field of Hebrew literature, none of which, however, were published during his lifetime. These include commentaries on the Pentateuch, the Prophets and the Hagiographa, on portions of the Babylonian and Jerusalem Talmud, and on the Holachia, Haggada, and Cabbala (qq.v.), e.g. the Shulchan Aruch and the Zohar. He was also the author of a Hebrew grammar and treatises on geometry, algebra, trigonometry, and astronomy.

WIL′SON. The county-seat of Wilson County, N. C., 44 miles east by south of Raleigh, on the Atlantic Coast Line Railroad (Map: North Carolina, E 2). The district is engaged in farming and cotton-growing, and especially in the cultivation of tobacco. The industrial establishments of the town include cotton and flour mills, carriage and wagon factories, foundries and machine shops, lumber mills, etc. The water-works and the electric light plant are the property of the municipality. Population, in 1890, 2126; in 1900, 3525.

WILSON, ALEXANDER (1766-1813). An American ornithologist, born at Paisley, in Scotland. He worked for some time as a weaver, and then became a peddler. In 1790 he published a volume of poems, the third edition of which appeared in 1791. In the following year he published anonymously *Watty and Meg*, the authorship of which was by some ascribed to Robert Burns. A little later he got into trouble by writing a satire upon an individual in Paisley, and after his release sailed for America. He arrived at Newcastle, Del., July 14, 1794, and thence walked to Philadelphia. For several years he worked as a weaver, peddler, and school teacher; but having made the acquaintance of the naturalist William Bartram, he became interested in the drawing of birds, and evolved a plan to illustrate the ornithology of the United States. In 1804, partly to collect material, he and two friends walked to Niagara, and he gave an account of the trip in a poem called "The Foresters," published in the *Portfolio*. Two years afterwards he began to assist in editing the American edition of Rees's *Cyclopædia*, and was thereby given an opportunity to proceed with his scheme of publishing his *American Ornithology*, the first volume of which appeared in 1808, and the second in 1810. In order to collect material for the other volumes, he traveled in various parts of the country. After his return he completed five more volumes, but died in August, 1813. Volumes eight and nine of his work were brought out under the editorship of George Ord in 1814, and four supplementary volumes were afterwards published by Prince Charles Lucien Bonaparte. Editions of their united works were published by Jameson (4 vols., London, 1831), Jardine (3 vols., ib., 1832), and repeatedly afterwards. Another, edited by Sir William Jardine, with a memoir of Wilson, was published in the following year in three volumes. *Wilson's Miscellaneous Prose Works and Poems*, edited by the Rev. Alexander Grosart, with a memoir, were published in two volumes at Paisley in 1876. Wilson's scientific work was not systematic, but his descriptions were good, his pictures were superior to most of those of his day, and as a pioneer in his chosen field he is deserving of high honor. Consult: Brightwell, *Difficulties Overcome, Scenes in the Life of Alexander Wilson* (London, 1860); Paton, *Alexander Wilson, the Ornithologist* (ib., 1863); and his *Life* by William Peabody in Sparks's *Library of American Biography* (1834-56), vol. ii.

WILSON, Allen B. (1824-88). An American inventor, born in New York City. He learned the trade of a cabinet-maker. In 1849 he invented a sewing machine (q.v.), in which the material was carried forward by a feeding-plate. By this means an endless seam could be formed at any curve. The feeding device he greatly improved in 1850 by giving the roughened feeding-plate four motions. He also introduced the rotary hook and stationary bobbin. In 1850 he, with Nathaniel Wheeler, formed the Wheeler & Wilson Manufacturing Company for the manufacture of sewing machines, with works at Bridgeport, Conn.

WILSON, Alpheus Waters (1834—). A bishop of the Methodist Episcopal Church, South. He was born in Baltimore, and educated at Columbian College, Washington, D. C. He entered the ministry of the Methodist Episcopal Church, 1853. He became secretary of the board of missions of the Methodist Episcopal Church, South, in 1878, and was elected bishop in 1882. In his oversight of the missions of his Church, he traveled entirely around the world.

WILSON, Andrew (1831-81). A British traveler and author, son of John Wilson, the Indian missionary, born at Bombay and educated at Edinburgh and Tübingen. He edited the *China Mail* and the Bombay *Times*. He traveled a great deal in Southern China and sent articles on Eastern questions to *Blackwood's, The Daily News*, and to the *Pall Mall Gazette*. He wrote: *The Ever Victorious Army* (1878), a history of the campaign of 'Chinese' Gordon; and *The Abode of Snow* (1875), which is a description of an adventurous journey through the upper valleys of the Himalayas.

WILSON, Augusta Jane (Evans) (1835—). An American novelist, born in Columbus, Ga. She lived as a child in Texas, and after 1841 in Mobile, Ga., where she was educated by her mother. She wrote her first novel, *Inez, A Tale of the Alamo* (pub. 1856), at the age of seventeen. During the Civil War she opened a private hospital for the Confederate wounded. She wrote several novels, of which the chief were: *Beulah* (1859); *Macaria* (1864); *Saint Elmo* (1866); *Vashti* (1869); *Infelice* (1875); *At the Mercy of Tiberius* (1887); and *A Speckled Bird* (1902).

WILSON, Sir Charles Rivers (1831—). An English financier, born in London. He graduated at Balliol College, Oxford, in 1851; entered the Treasury as a clerk in 1856; was a private secretary to Disraeli in 1867-68, and to Low in 1868-73; and was Comptroller-General of the National Debt Office from 1874 till 1894. In 1876 he was appointed one of the British administrators of the Suez Canal; two years afterwards was chosen vice-president of the international commission of inquiry into the financial condition of Egypt; soon afterwards became Finance Minister to the Khedive; and was made president of the International Commission of Liquidation in 1880.

WILSON, Sir Daniel (1816-92). A distinguished Scotch-Canadian archæologist and educational reformer, born at Edinburgh, Scotland. He graduated at Edinburgh University; worked in London from 1837 until 1842 as a journalist; and then returned to Edinburgh, where five years afterwards he published the archæological work *Edinburgh in the Olden Time*, illustrated with sketches made by himself. In 1851 he followed up this work with the highly praised *Archæology and Prehistoric Annals of Scotland.* Two years later he went to Canada to become professor of history and English literature in the University of Toronto, of which he became president in 1881. In 1854 he became editor of the *Journal of the Canadian Institute;* in 1859 and 1860 was president of that body; in 1885 was president of the literature section of the Canadian Royal Society; and in 1888 was knighted. His publications, other than those already mentioned, include: *Prehistoric Man: Researches into the Origin of Civilization in the Old and New Worlds* (1863; 3d ed. 1876); *Chatterton: A Biographical Study* (1869); *Caliban, the Missing Link* (1873); *Spring Wild Flowers*, a collection of verse (1875); *Reminiscences of Old Edinburgh* (1878); and *Anthropology* (1885).

WILSON, Edmund Beecher (1856—). An American zoölogist, born at Geneva, Ill. He graduated from Yale College in 1878 and obtained his doctorate at Johns Hopkins University in 1881. He was lecturer at Williams College from 1883 to 1884; at the Massachusetts Institute of Technology in 1884-85; professor of biology at Bryn Mawr College from 1885 to 1891; and became professor of zoölogy at Columbia University in 1891. His publications include, besides many special papers on embryology: *An Introduction to General Biology* (with W. T. Sedgwick, 1886, 1895); *The Embryology of the Earthworm* (1889); *Amphioxus, and the Mosaic Theory of Development* (1893); *Atlas of Fertilization and Karyokinesis* (1895); and *The Cell in Development and Inheritance* (1896-1900).

WILSON, Francis (1854—). An American actor, born in Philadelphia. He began his career in a minstrel show, but by 1878 was playing at the Chestnut Street Theatre, Philadelphia, and the next year appeared in *M'liss* with Annie Pixley. After several years in regular comedy, he took up comic opera. In 1889, leaving the New York Casino, where he had attracted much attention as Cadeaux in *Erminie*, he made his appearance as a star in *The Oolah*. Among his later pieces have been: *The Lion Tamer* (1891); *The Devil's Deputy* (1894-95); *The Little Corporal* (1898-99); and *The Toreador* (1901-02). Consult Clapp and Edgett, *Players of the Present* (New York, Dunlap Society Publications, 1901).

WILSON, Henry (1812-75). An American political leader, Vice-President of the United States in 1873-75. He was born at Farmington, N. H., and his original name was Jeremiah Jones Colbaith, but when he reached manhood he legally assumed the name of Henry Wilson. From the age of ten till that of twenty-one he served an apprenticeship to a farmer. He then learned the shoemaking trade at Natick, Mass., and in two years earned enough money to enable him to attend academies at Stratford, Wolfborough, and Concord, in New Hampshire. The loss of some of his money through the insolvency of a friend forced him to return to Natick, where he once more took up the shoe business, and soon established a prosperous manufactory. In 1840 he was elected to the Massachusetts House of Representatives as a Whig; was reëlected in the following year; and then served two terms in the State Senate. About this time he began to be an active opponent of slavery, and in 1848 he bought the Boston *Recorder* and edited it in the interests of the Free-Soil Party. In 1850 he was again elected to the State Senate, and was chosen president of that body. In 1852 he presided over the Free-Soil Convention at Pittsburg. In 1855 he was chosen by a combination of Free-Soilers and Americans or Know-Nothings to succeed Edward Everett in the United States Senate, and retained his seat until 1873. He denounced the assault of Preston R. Brooks upon Charles Sumner, and was challenged by Brooks, but declined, although he expressed his determination to defend himself if attacked. Before the Civil War he was considered one of the most effective speakers against slavery, and one of the foremost leaders of those who believed in fighting that institution through the machinery supplied by the Federal Constitution. In March, 1861, he was made chairman of the Committee on Military Affairs. After hostilities began he raised the Twenty-second Massachusetts Regiment and took it to the field, serving on the staff of General McClellan until Congress met. In 1872 he was nominated for the Vice-Presidency by the Republicans on the ticket with Grant and was elected. In the following year he was stricken with paralysis, and died two years later. He was widely known during his political career as the 'Natick Cobbler,' a nickname given to him in allusion to his early life. Among his published works are: *History of the Anti-Slavery Measures of the Thirty-seventh and Thirty-eighth Congresses, 1861-64* (1864); *History of the Reconstruction Measures of the Thirty-ninth and Fortieth Congresses, 1865-68* (1868); and the almost completed *History of the Rise and Fall of the Slave Power in America* (1872-77), an exceedingly valuable work. Consult: Russell and Nason, *Life and Public Services of Henry Wilson* (Boston, 1872); and Stowe, *Men of Our Times* (Hartford, 1868).

WILSON, HORACE HAYMAN (1786-1860). An English Sanskrit scholar, born in London, and educated for the medical profession. In 1808 he went to India as assistant surgeon on the Bengal Establishment, and a short time afterwards obtained an appointment in the Calcutta mint as assistant to Leyden. He applied himself diligently to the study of Sanskrit, and upon the decease of Hunter in 1811 was appointed to succeed him as secretary of the Asiatic Society of Bengal, on the recommendation of Colebrooke. At Calcutta in 1813 Wilson published his first work, an edition of Kalidasa's *Mēghadūta*. His next publication was *A Dictionary, Sanskrit and English* (1819-40), which was followed by many other contributions. His works were published in a collective edition of twelve volumes (1864-70). Among them as written, edited, or translated by him are: *Select Specimens of the Theatre of the Hindus, translated from the Original Sanskrit* (3 vols., 1827); *The Raghu Vansa, or Race of Raghu, a Historical Poem, by Kâlidâsa* (1832); *The Vishn'u-Purân'a, a System of Hindu Mythology, translated from the Original Sanskrit* (1840); *An Introduction to the Grammar of the Sanskrit Language* (1841); *Ariana Antiqua, a Descriptive Account of the Antiquities and Coins of Afghanistan* (1841); *History of British India from 1805 to 1835* (1848); *Rig-Veda-Sanhita* (1850); *A Glossary of Judicial and Revenue Terms, from the Arabic, Persian, Hindustani, etc.* (1855). He became professor of Sanskrit in Oxford in 1832, and held this position till his death.

WILSON, JACK. See WOVOKA.

WILSON, JAMES (1742-98). An American jurist, and a signer of the Declaration of Independence. He was born near Saint Andrews, Scotland, was educated at Saint Andrews, Glasgow, and Edinburgh, and in 1763 emigrated to New York, whence he removed to Philadelphia in 1766. He taught Latin in the Philadelphia College (now University of Pennsylvania), studied law under John Dickinson (q.v.), and was admitted to the bar in 1767. He was a delegate to the Provincial Convention of 1775; was appointed Indian commissioner for the middle department in the same year; was a member of the Continental Congress in 1775-77 and in 1782-83, and of the Confederation Congress in 1785-87; was advocate-general for the French Government from 1779 to 1783; was appointed brigadier-general of militia in 1782; and, in the same year, was Pennsylvania's counsel in the suit with Connecticut over the possession of the Wyoming Valley. He was a delegate to the Constitutional Convention of 1787 and took a foremost part in the debates, emphasizing the contention that sovereignty rests ultimately with the people rather than with the constituent States. Subsequently he was a member of the Pennsylvania Convention, and with Thomas McKean secured the ratification of the Constitution by that State. His opening speech is still regarded as one of the clearest expositions ever made of the general character of the Constitution. Of this and his other speeches in the two conventions James Bryce has said that "They display an amplitude and profundity of view in matters of constitutional theory which place him in the front ranks of political thinkers of his age." In 1789-90 he was a prominent member of the convention which remodeled the State Constitution; in 1791 he became professor of law in the Philadelphia College; and from 1789 until his death he was an associate justice of the United States Supreme Court. He wrote several pamphlets, including *Considerations on the Nature and Extent of the Legislative Authority of the British Government* (1774) and *An Address to the Citizens of Philadelphia* (1784). His *Works* have been edited by his son, Bird Wilson (1803-04), and by James D. Andrews (Chicago, 1896). Consult an article by Justice J. M. Harlan, "James Wilson and the Formation of the Constitution," in the *American Law Review*, vol. xxxiv.

WILSON, JAMES (1795-1856). A Scottish zoölogist. He was a younger brother of John Wilson (q.v.), better known as 'Christopher North.' He was born at Paisley. He studied law and traveled several years in Holland, Germany, and Switzerland. He visited Paris and returned to buy the Dufresne collection of birds, which he arranged in the museum of Edinburgh University. In 1819 he visited Sweden and from 1820 to 1821 a disease of the lungs compelled him to live in Italy. In 1824 he settled in Woodville, near Edinburgh. In 1854 he declined the chair of natural history in Edinburgh University. He contributed many articles to *Blackwood's Magazine* and the quarterlies, and wrote several books on natural history and zoölogy. Consult *Memoirs*, by J. Hamilton (Edinburgh, 1859).

WILSON, James (1805-60). A British economist, born at Hawick, in Roxburghshire. He published in 1839 *Influences of the Corn Laws as Affecting All Classes of the Community* (3d ed. 1840), in which he showed that the duty on corn was really no more beneficial to the agricultural interest than it was to the manufacturing interest, and by so doing contributed much toward the ultimate success of the anti-corn-law movement. In 1840 he published *Fluctuations of Currency, Commerce, and Manufactures*, in which he pointed out the evil effects of the artificial operation of the corn laws. In the following year appeared his *The Revenue, or What Shall the Chancellor Do?* Two years afterwards he founded *The Economist*, in which he advocated the anti-corn-law movement. In 1847 he published *Capital, Currency, and Banking* (2d ed. 1859), which was a collection of essays already printed in *The Economist*. In the same year he was returned to Parliament from Westbury, and from 1853 to 1858 held the position of Financial Secretary to the Treasury. In October, 1859, he became financial member of the Council of India, where he carried through a budget that provided for an income tax, and established a sound paper currency redeemable in silver. A memoir was written by his son-in-law, Walter Bagehot (London, 1861).

WILSON, James (1835—). An American Cabinet officer. He was born in Ayrshire, Scotland, emigrated with his parents to the United States in 1852, lived for a short time at Norwich, Conn., and in 1855 removed to Tama County, Iowa, where after 1861 he engaged in farming. He was a member of the State Assembly for three terms, during the last of which he was Speaker, and from 1873 to 1877 and again in 1883-85 was a member of Congress. In 1870-74 he was regent of the State University of Iowa; in 1890-97 was director of the Agricultural Experiment Station; for a time was professor of agriculture in the Iowa Agricultural College; and in 1897 became Secretary of Agriculture in the Cabinet of President McKinley, in which position he was retained by President Roosevelt.

WILSON, James Grant (1832—). An American editor and author, born in New York City. He was educated chiefly by private tutors and through European travel, founded (1857) the Chicago *Record*, a journal of art and literature, and entered the Union Army as major and left it as brigadier-general (1865). He afterwards lived in New York, was a popular speaker, a frequent contributor to periodicals, president of the Society of American Authors, and, after 1885, of the New York Genealogical and Biographical Society. He edited Fitz-Greene Halleck's *Poems* (1868); *A Memorial History of the City of New York* (4 vols., 1892-93); *Appleton's Cyclopædia of American Biography* (6 vols., 1887-89, with John Fiske; vol. vii., 1900); and *The Great Commanders Series* (18 vols.). His chief books include: *Biographical Sketches of Illinois Officers* (1862-63); *Life of Fitz-Greene Halleck* (1869); *Sketches of Illustrious Soldiers* (1874); *Poets and Poetry of Scotland* (1876); *Centennial History of the Diocese of New York, 1775-1885* (1886); *Bryant and His Friends* (1886); *Commodore Isaac Hull and the Frigate Constitution* (1889); *Love in Letters* (1896); *Life of General Grant* (1897); *The Presidents of the United States, 1789-1901* (1902); and *Thackeray in the United States* (1903).

WILSON, James Harrison (1837—). An American soldier, born near Shawneetown, Ill. He graduated at West Point in 1860 and entered the topographical engineers. During the Civil War he acted as aide-de-camp to General McClellan in the Maryland campaign; was chief topographical engineer of the Army of the Tennessee from October, 1862, until March, 1863; was assistant engineer and inspector-general of the Army of the Tennessee at Vicksburg and took part in the operations about Chattanooga. He was made brigadier-general of volunteers in October, 1863. In February, 1864, he was put in charge of the cavalry bureau at Washington; then commanded the Third Cavalry Division under General Sheridan; was brevetted major-general of volunteers on October 5, 1864, for "gallant and meritorious services" during the war; and on October 24, 1864, was put in command of the cavalry corps of the Military Division of the Mississippi. He participated in the battles of Franklin and Nashville, and, in March, 1865, was sent on a cavalry expedition into Georgia and Alabama, and in twenty-eight days captured Selma, Montgomery, Columbus, Macon, and other places, with 288 guns and 6820 prisoners, including Jefferson Davis. As a reward for these services he was on April 20, 1865, made a major-general of volunteers. He resigned from the army in 1870, and engaged in large railroad and engineering operations at home and abroad. In May, 1898, he was appointed major-general of volunteers, and commanded the First Division of the First Army Corps in the campaign in Porto Rico. He took part in the China relief expedition of 1900. He published: *Life of General U. S. Grant* (1868), with Charles A. Dana; and *China: Travels and Investigations in the Middle Kingdom* (1887).

WILSON, John (1588-1667). A New England clergyman. He was born at Windsor, England, graduated at Cambridge in 1606, obtained a fellowship and studied law three years. He was ordained in the Church of England; became chaplain to Lady Scudamore; preached at Mortlake, Henley, Bumsted, Stoke, and Candish; was minister of Sudbury, Essex, but was repeatedly suspended by the Bishop's court because of his Puritan sympathies. He embarked for America (1630) at the Isle of Wight, with Winthrop and others of the Massachusetts Colony, and landed at Salem, Mass. At Charlestown he organized a church, which afterwards became the First Church of Boston; was ordained teacher in this church by the imposition of the hands of the members, and ordained as its pastor (1632). In 1634 he visited England, returning the next year with his wife, and Hugh Peters (q.v.), who was compelled to leave for non-conformity. With Governor Winthrop, Wilson opposed the Antinomian sentiments of John Wheelwright and Anne Hutchinson. He was chaplain to the troops sent against the Pequot Indians of Connecticut (1636), and was associated with John Eliot in his missionary labors among the Indians. He published in England, *Some Helps to Faith* (1625) and a poem, *Famous Deliverances of the English Nation* (1626); in America, a Latin poem to the memory of John Harvard, and *The Day Breaking, if Not the Sun Rising, of the Gospel,* relative to the Indians in New England (1647; new ed., New York, 1865).

WILSON, John, the Christopher North of *Blackwood's Magazine* (1785-1854). A Scottish writer, born May 18, 1785, at Paisley, and educated at Glasgow and Oxford. Inheriting from his father an estate of £50,000, he purchased the property of Elleray overlooking Lake Windermere, where he settled as gentleman and poet. There, in the Lake District, he associated intimately with Wordsworth and came to know well De Quincey, Southey, and Coleridge. To this period belong two volumes of graceful verse—*The Isle of Palms* (1812) and *The City of the Plague* (1816). Having lost his fortune through a dishonest uncle, he migrated to Edinburgh, where he took a memorable hand with J. G. Lockhart (q.v.) in the *Blackwood's Magazine* (q.v.) for October, 1817. Thereafter, till near his death, he was the leading writer for this famous Tory magazine, though he was never strictly its editor. In 1820 he was appointed professor of moral philosophy in the University of Edinburgh, defeating in the contest Sir William Hamilton. His only claim to the post was his rampant Toryism, then regarded as sufficient. Wilson nevertheless was an enthusiastic teacher and inspired his pupils, even if he had nothing very profound to impart to them. In 1822 he began in *Blackwood's* the symposium known as the *Noctes Ambrosianæ* (q.v.). Here Wilson is seen at his best—his wit, humor, and pathos. The "Ettrick Shepherd," an idealized portrait of James Hogg (q.v.), is a masterly creation. The death of the 'Shepherd' in 1835 necessarily put an end to these delightful banquets. In the earlier days Wilson also contributed to *Blackwood's* three good novels, afterwards published separately: *Lights and Shadows of Scottish Life* (1822); *The Trials of Margaret Lyndsay* (1823); and *The Foresters* (1825). Later came the substantial essays on Homer, Spenser, and all manner of papers on contemporary writers and subjects. For 1834 the number reached fully 54 distinct contributions. In 1837 Wilson lost his wife and never recovered from his grief. On resigning his professorship in 1851 he was granted a pension of £300 a year. He died in Edinburgh, April 3, 1854. In 1865 a statue was erected to his memory in Princess Street Gardens. Consult his *Works,* edited by P. J. Ferrier (12 vols., Edinburgh, 1855-58); the *Noctes Ambrosianæ,* edited by R. S. Mackenzie (5 vols., New York, 1854); *Memoir* by his daughter, M. W. Gordon (2 vols., Edinburgh, 1862); and for a good estimate, G. Saintsbury's *Essays in English Literature* (London, 1890).

WILSON, John (1804-75). An English missionary and Orientalist, born at Lauder, in Berwickshire. Educated at the University of Edinburgh, he went in 1828 to Bombay as a missionary. His mastery of the languages of Western India, his command of the literature, the history, the faiths, and the social usages of the races of India, combined with his energy, insight, and sympathy with native feeling, enabled Wilson to exercise a wide and powerful influence. His linguistic labors, especially in Avestan, were especially valuable. He was twice president of the Bombay Branch of the Royal Asiatic Society, and was vice-chancellor of the Bombay University. Among his writings other than those connected with his missionary work are: *The Parsi Religion* (1843); *The Lands of the Bible* (1847); *The History of the Supression of Infanticide in Western India* (1855); and *India Three Thousand Years Ago* (1858).

WILSON, John M. (1837—). An American soldier and military engineer, born in the District of Columbia. He graduated at West Point and was appointed brevet second lieutenant of artillery in 1860. He served throughout the Civil War, first in the artillery, after July, 1862, in the topographical engineers, and finally, after March, 1863, in the corps of engineers; earned the brevets of captain and major in the Regular Army for gallantry at Gaines's Mill and Malvern Hill, respectively; attained the regular rank of captain (June, 1863), and the volunteer rank of lieutenant-colonel (May, 1864); and at the close of the war was brevetted colonel in the volunteer service and both lieutenant-colonel and colonel in the regular service for gallantry in the campaign against Mobile. After the war he was engaged on various important engineering works for the United States Government, was assistant to the Chief of Engineers at Washington from 1882 to 1886, was in charge of the public buildings and grounds in the District of Columbia from June, 1885, to September, 1889, had charge of the completion of the Washington Monument and of the building of other memorials and monuments, and in August, 1889, became superintendent of the United States Military Academy. In March, 1895, he was promoted to the rank of colonel, and in February, 1897, was made Chief of Engineers, U.S.A., with the rank of brigadier-general. In April, 1901, he was retired from the service, at his own request.

WILSON, John Mackay (1804-35). A British author, born at Tweedmouth, Scotland. He settled at Berwick-on-Tweed in 1832 as editor of the Berwick *Advertiser.* He wrote several poems and dramas of no value; but in 1834 began the publication in weekly numbers of *The Tales of the Borders,* which brought him fame. He had published 48 numbers before his early death. The series was continued by other hands till 1874, and Wilson's tales were collected in 1854-55.

WILSON, Richard (1714-82). An English landscape painter, born in Pinegas, Montgomeryshire. He began as a portrait painter and studied with Thomas Wright in London. Several of his portraits are at the Garrick Club and a group picture of the Prince of Wales, the Duke of York, and their tutor is in the National Gallery. Soon after his arrival in Italy in 1759 he changed to landscape painting. Upon his return to England he painted his famous "Niobe" for the Duke of Cumberland, of which there is a replica in the National Gallery. He was not appreciated at home as in Italy, and consequently had a continual struggle with poverty until he was appointed librarian to the Royal Academy in 1776.

A few years later he fell heir to his brother's little estate at Llanberis, North Wales, where he spent the last two years of his life. Wilson was the founder of landscape painting in England. Though he painted some of England's rivers and the mountains of Wales, the influence of his study under Italian skies is always present, as is also the manner of Claude Lorraine. His originality lay chiefly in his treatment of light, air, and color. His pictures usually contain distant hills and classic ruins beyond placid water, with a foreground of trees. The National Gallery contains three fine examples, several are in the Vernon collection, and two are in the Metropolitan Museum of New York City.

WILSON, Sir Robert Thomas (1777-1849). An English general and military writer, born in London and educated at Westminster and at Winchester. When scarcely seventeen he served with distinction as a volunteer under the Duke of York in Belgium. He was appointed to command the small force of cavalry which served under Sir Ralph Abercromby in Egypt, and at the conquest of the Cape of Good Hope in 1806 he again commanded a small cavalry force. As a member of the staff of Lord Hutchinson, he was present at the battle of Eylau (q.v.), in 1807. Under Wellington he commanded a Spanish brigade at the battle of Talavera, in 1809. As British representative with the Russian army in the campaign of 1812, Wilson fought against the French in the battle of Smolensk, and participated in several engagements during the French retreat. At Lützen (1813) he took command of the Prussian reserve, and at a crisis of the battle succeeded in checking the enemy. At Bautzen he also distinguished himself, and a day or two after, the Emperor of Russia presented to him publicly the cross of the Order of Saint George.

In 1841 he attained the rank of general; and from 1842 to 1849 he held the post of Governor of Gibraltar. In 1818-31 he sat in Parliament as a Liberal for Southwark. His publications include: *An Inquiry into the Military Force of the British Empire* (1804); *Campaigns in Poland, with Remarks on the Russian Army* (1811); and a *Sketch of the Military Power of Russia* (1817). His nephew, the Rev. Herbert Randolph, edited his private diaries (1861), and a *Life* (1863), based on autobiographical materials.

WILSON, Sir Roland Knyvet (1840—). An English lawyer, born at Swaffham, Norfolk, and educated at Eton College and at King's College, Cambridge. He became well known for his valuable treatises on legal subjects, especially Anglo-Indian practice. Among his publications are: *A Short History of Modern English Law* (1874); *An Introduction to the Study of Anglo-Muhammadan Law* (1894); and *A Digest of Anglo-Muhammadan Law* (1895).

WILSON, Thomas (c.1525-81). An English statesman and philologist. He was educated at Eton and at King's College, Cambridge, became tutor to the sons of the Duke of Suffolk, left England in 1553, and, ignoring Queen Mary's summons to return, was, probably at her instigation, confined in the prison of the Inquisition on a charge of heresy till 1555, when he escaped through the action of an avenging mob breaking open the prison and releasing the suspects. He returned to England when Elizabeth came to the throne, and became her private secretary in 1558. He was made ambassador to the Netherlands in 1576; became a Secretary of State the next year, and Dean of Durham in 1579. He wrote: *The Rule of Reason, conteinynge the Arte of Logique* (1551); *The Arte of Rhetorique* (probably 1551), one of the earliest English treatises on rhetoric; *Discourse uppon Usurye* (1572); and other works. He translated a part of Demosthenes (1570).

WILSON, Thomas (1663-1755). An English bishop, born at Burton, in Cheshire, and educated at Trinity College, Dublin. He was appointed chaplain to William, ninth Earl of Derby, and tutor to his only son. In such esteem did Lord Derby hold him that the next year he offered him the rich living of Badsworth, which Wilson would not accept because of his disapproval of non-resident rectors. Toward the end of 1697 Lord Derby insisted upon his taking the Bishopric of Sodor and Man, and he was consecrated early in 1698. He was strict in discipline and is perhaps best known for the unusual exercise of his rights as head of the ecclesiastical courts. Between 1713 and 1736 this led him into frequent collisions with the Governor, and in 1722 he was imprisoned in Castle Rushen for two months. To repay for this the King offered him the Bishopric of Exeter, which he refused. Among his writings were: *The Principles and Duties of Christianity* (1699); *A Short and Plain Instruction for the Better Understanding of the Lord's Supper* (1736); *Essay Toward an Instruction for the Indians* (1740); and *Sacra Privata* (1781). Consult the *Life* by Keble (Oxford, 1847-63); and Stubbs, *History of the University of Dublin* (London, 1889).

WILSON, William (1801-60). An English poet and publisher, born in Perthshire. At the age of twenty-two he became editor of the *Literary Olio* at Dundee, and in 1826 removed to Edinburgh, where he established himself in business and was a member of the literary circle of Christopher North. In 1832 he came to America and became a bookseller and publisher at Poughkeepsie, N. Y. He was the father of Gen. James Grant Wilson. He was a lifelong contributor of verse to the reviews of England and America, but never published his poetry in book form. A selection, edited by B. J. Lossing, appeared, however, in 1869.

WILSON, William Dexter (1816-1900). An American clergyman and philosopher, born in Stoddard, N. H. He entered the theological department of Harvard University in 1835; was ordained in the Protestant Episcopal Church in 1842; was made professor of history and of philosophy in Geneva College (1850), and of philosophy in Cornell University (1868-86), and emeritus professor at Cornell from 1886 to his death. His leading works are: *Elementary Treatise on Logic* (1856); *Lectures on the Psychology of Thought and Action* (1871); *Text-book of Logic* (1872); *First Principles of Political Economy* (1875); *The Foundations of Religious Belief* (1883); *Theories of Knowledge, Historically Considered* (1889).

WILSON, William Lyne (1843-1900). An American political leader and educator, born in Jefferson County, Va. He graduated at Columbian College at Washington, D. C., in 1860; then studied for a year at the University of Virginia;

served in the Confederate Army; was professor of Latin in Columbian College in 1865-71; and then practiced law until 1882. In the following year he became president of the University of West Virginia, and from 1883 to 1895 was a Democratic member of Congress from West Virginia. In 1893-95 he was chairman of the Committee of Ways and Means, and he carried through the House the repeal of the Sherman Silver Purchase Law, and also framed the well-known Wilson Tariff Bill, which with some modifications became a law in August, 1894. (See TARIFF.) During his Congressional career he won a high reputation as an eloquent and forceful speaker and as an authority on the tariff and other financial subjects. In 1892 he was chairman of the Democratic National Convention. In 1895 he became Postmaster-General in the Cabinet of President Cleveland, and held that office until 1897, when he became president of Washington and Lee University.

WILSON, WOODROW (1856—). An American educator and historian, born at Staunton, Va. He graduated at Princeton in 1879, then studied law at the University of Virginia, and for two years, in 1882-83, practiced in Atlanta, Ga. In 1883-85 he studied jurisprudence, history, and political science at the newly opened Johns Hopkins University, from which in 1885 he received the degree of Ph.D., presenting as his thesis a study of *Congressional Government* (1885), which won for him a reputation as a scholar and a clear and original thinker—a reputation that was enhanced by his subsequent works. He was an associate professor of history at Bryn Mawr in 1885-86, and associate professor of history and political science there in 1886-88; filled a similar chair at Wesleyan University in 1888-90, and in 1890 became professor of jurisprudence and politics at Princeton, where he became exceedingly popular among the students and was remarkably successful as a teacher. Upon the resignation of President Patton in June, 1902, Wilson was elected president of Princeton University by the unanimous vote of the trustees, and on October 25th he was formally inaugurated. His election was regarded as particularly significant from the fact of his being the first layman to be chosen president of the university. In addition to *Congressional Government* and magazine articles and published addresses, his writings include: *The State: Elements of Historical and Practical Politics* (1889), a standard work on the subject; *An Old Master, and Other Political Essays* (1893); *Division and Reunion, 1829-1889* (1893), in the "Epochs of American History" series; *Mere Literature, and Other Essays* (1893); *George Washington* (1896); and *A History of the American People* (5 vols., 1902), his most important work, and in some respects the best compendious account yet published of American political history.

WILSON'S CREEK, BATTLE OF. A battle fought near Wilson's Creek, about ten miles south of Springfield, Mo., on August 10, 1861, between a Federal force of about 5400 men under General Lyon and a Confederate force of about 10,000 under General McCulloch. McCulloch had advanced to Wilson's Creek, ten miles from Springfield. Having resolved to attack him, Lyon on the evening of the 9th sent a column of 1200 men and six pieces of artillery under Colonel Franz Sigel with orders to strike the Confederate right flank next morning; while he himself, with about 4200 men, including eight companies of regulars and ten pieces of artillery, prepared to fall upon the Confederate left wing. The two attacks were delivered as planned, but Sigel's column was completely routed, and the Confederates were then able to concentrate superior numbers against Lyon. While leading a charge that General was killed; but his troops under Major Sturgis continued to fight with great determination, repulsed all the assaults made against their position, and succeeded in effecting a retreat to Springfield and from there to Rolla. The Federal losses in the battle were about 1235; those of the Confederates about 1095. As a result of the battle the Confederates were able to capture Lexington, Mo. Consult Johnson and Buel (eds.), *Battles and Leaders of the Civil War*, vol. i. (New York, 1887).

WILT, vilt, MARIE (1833-91). An Austrian singer, born in Vienna. Soon after her marriage to the architect Wilt she took up singing with Gänsbacher and Wolf, and in 1865 made her début at Gratz, as Donna Anna. The two following years she sang in Vienna, Berlin, and London, where she appeared as Norma. For ten years she sang in both opera and concert in Vienna and again in London, from 1874 to 1875. She went to Leipzig in 1877, and later to Brünn, Budapest, and other cities, finally returning to Vienna. Her voice, a soprano, was rich and of wonderful compass. She was unrivaled in her bravura singing. She committed suicide in Vienna by jumping out of a window.

WIL'TON, JOSEPH (1722-1803). An English sculptor, born in London. He studied under Delvaux in Brabant, then in Paris, and afterwards in Rome, where in 1750 he received the jubilee gold medal of Pope Benedict XIV. He returned to England in 1755, and was appointed director of the Duke of Richmond's art gallery in Spring Gardens. He was one of the founders of the Royal Academy, and befriended and assisted the painter Richard Wilson. Among his works are busts of Bacon, Cromwell, Swift, Wolfe, Newton, Chatham, and Chesterfield, and monuments of Stephen Hales and Admiral Holmes.

WILTON, MARIE EFFIE. An English actress. See BANCROFT, MARIE EFFIE WILTON, LADY.

WILT'SHIRE, or **WILTS.** A southern inland county of England, bounded by Gloucester, Berkshire, Hampshire, Dorsetshire, and Somerset (Map: England, E 5). Area, 1375 square miles. The surface features are chiefly those of a rolling open country with some stretches of woodland, and the county is watered by the lower and southern Avon. The greater portion is in pasture land, though wheat, oats, turnips, and cabbage are raised. The mechanical industries are chiefly centred around the great railroad shops at Swindon, and there are iron mines and blast furnaces in several places. Wiltshire is very rich in archæological remains, among which is the famous Stonehenge (q.v.). Population, in 1891, 264,997; in 1901, 273,845. County town, Salisbury.

WIMBLE, WILL. A character in Addison's *Spectator*. He is a younger son, an idler and a jack of all trades, who can do nothing to better his own condition in life, and hence good-naturedly drifts into bettering that of others in trifling ways. He mends whip lashes, makes gifts of fresh fish to housewives, and is a great favorite with small children.

WIM′BLEDON. A town in Surrey, England, 8 miles southwest of Saint Paul's, London (Map: London, F 6). It is a favorite suburban residence of Londoners, and was formerly the meeting-place of the British Rifle Association. It has remains of an early British earthwork, and is regarded as the scene of the defeat of King Ethelbert of Kent by King Ceawlin of Wessex in 586. Population, in 1891, 25,777; in 1901, 41,604.

WIMMER, vĭm′mẽr, Ludwig Frands Adalbert (1839—). A Danish philologist, born at Ringkjöbing, in Jutland. He was educated at the University of Copenhagen, where he took his degree in 1868. In 1876 he became professor of Norse philology in the same institution. His contributions to the study of Scandinavian languages, and particularly to the study of runic writing, place him among the foremost scholars in Norse philology. His writings include *Old nordisk Formlaere* (1870), *The Origin and Development of Runic Writing in the North* (1874), *The Baptismal Font in Aakirkeby Church* (1887), and his great collection of Danish runes, *De historiske runemindesmaerker* (1895).

WIMPFFEN, vĭm′fĕn′, Emmanuel Félix de, Baron (1811-84). A French general. He was born at Laon, Department of Aisne. His first military service was in Algeria. In the Crimean War he displayed great bravery. He became brigadier-general of the Imperial Guard in 1855, and a general of division four years later. Later he held the posts of commandant at Lyons, and of governor of the provinces of Algiers and of Oran. In the Franco-German War he was at the head of the Twelfth and Fifth army corps, took the chief command at Sedan after MacMahon was wounded, and signed the capitulation September 2d. After the war he resided in Algiers. He published two papers relating to the disaster in which he had so prominent a part: *Sedan* (1871) and *Réponse au Général Ducrot* (1871). He was engaged in a bitter controversy with Cassagnac's journal, *Le Pays*, and lost a libel suit against its editor. He also published *La situation de la France et les réformes nécessaires* (1873) and *La nation armée* (1876).

WINCH (AS. *wince*, winch). A kind of hoisting machine in which an axle carrying a spool or drum is rotated by means of a crank handle so as to wind and unwind a rope or cable to the free end of which is attached the article to be hoisted. Generally it is smaller than a windlass (q.v.), and frequently it is operated by steam or electricity.

WIN′CHELL, Alexander (1824-91). An American geologist. He was born at Northeast, Dutchess County, N. Y., and was graduated at Wesleyan University in 1847. After teaching natural science in several schools and acting as principal of schools in Alabama, he was elected professor of physics and civil engineering in the University of Michigan in 1853. Two years later he was transferred to the chair of geology, zoology, and botany. He was State Geologist and Naturalist of Michigan, 1859-62, and again, 1869-71. In 1873 he was chosen chancellor of Syracuse University, but resigned the following year and was made professor of geology, zoölogy, and botany. In 1875 he received a like appointment in Vanderbilt University and filled both positions till 1878, dividing his time between the two institutions. In 1879 he was recalled to the University of Michigan as professor of geology and paleontology. He was one of the founders of the Geological Society of America and aided in the establishment of the *American Geologist.* He was best known as an entertaining lecturer and author of numerous books aiming to popularize science, especially geology. His advocacy of evolution met with the disapproval of the authorities of the Methodist Church and led to his dismissal from Vanderbilt University. Among his works were: The *First Biennial Report of the Geological Survey of Michigan* (1861); *Geological Map of Michigan* (1865); *The Grand Traverse Region* (1866); *Genealogy of the Family of Winchell in America* (1869); *Geological Chart* (1870); *Sketches of Creation* (1870); *Geology of the Stars* (1872); *The Doctrine of Evolution* (1874); *Reconciliation of Science and Religion* (1877); *Preadamites* (1880); *Sparks from a Geologist's Hammar* (1881); *World-Life, or Comparative Geology* (1883); *Geological Excursions* (1884); and *Geological Studies* (1886).

WINCHELL, Newton Horace (1839—). An American geologist, born in North East, Dutchess County, N. Y. He graduated at the University of Michigan in 1866, was superintendent of public schools at Adrian, Mich., from 1866 to 1869, and was Assistant State Geologist of Michigan in 1869-70. In 1870-72 he was an assistant on the Ohio Geological Survey; from 1872 until 1900 was State Geologist of Minnesota; and in 1887 was a member of the United States Assay Commission. In 1903 he was president of the American Geological Society. He published a *Catalogue of the Plants of the State of Michigan; Geology of Ohio and Minnesota;* and, with Horace V. Winchell, *The Iron Ores of Minnesota* (1891). He was also editor of the *American Geologist.*

WINCHELSEA, wĭn′chel-sē. A small English town, one of the Cinque Ports, seven miles from Hastings, in Sussex. It was formerly an important walled town. In the Roman and Saxon periods Old Winchelsea stood at the mouth of the Rother, two miles from the present town. It was frequently inundated by the sea and was submerged in 1250 and finally destroyed in 1287. New Winchelsea, built on a regular quadrangular plan, was founded by Edward I. This town was practically ruined by the gradual recession of the sea, amounting to a mile and a half since the sixteenth century. The salt marshes thus formed are now drained.

WIN′CHENDON. A town, including several villages, in Worcester County, Mass., 68 miles northwest of Boston, on the Boston and Maine and the Boston and Albany railroads (Map: Massachusetts, C 2). It has a public library with about 7000 volumes, a fine high school building, the gift of Captain Ephraim Murdock, and Monument Park. Winchendon is chiefly an industrial town, the most important manufactures being cotton goods, woodenware, saws, toys, and machinery. The water-works are owned and operated by the town. Population, in 1890, 4390; in 1900, 5001. Winchendon was first settled in 1752 and was known as Ipswich Canada until 1764, when it was incorporated as a township under its present name (from Winchendon, England). Consult Marvin, *History of the Town of Winchendon* (Winchendon, 1868).

WIN'CHESTER. The capital of Hampshire, England, on the Itchen, 66 miles by rail southwest of London (Map: England, E 5). In the fourteenth century it was the principal seat of England's woolen manufactures and had an extensive Continental trade, but since the fifteenth century its prosperity has gradually declined. The city consists of one main street, crossed by a number of streets running at right angles to it, and was in early times surrounded by a wall, of which remains exist. The Castle-hill is the site of the medieval castle or royal palace, part of which survives in a magnificent hall, which is used for the county court; King Arthur's 'Round Table,' a sixth-century relic, hangs on one of its walls. Charles II. commenced a palace here, the completed part of which, used as a barracks, accommodated 2000 men until its destruction by fire in 1894; new barracks have since been built. The city cross in the High Street, dating from the fifteenth century, is very beautiful in design. A colossal bronze statue, erected in 1901 in connection with the King Alfred millennial celebration, typifies the great monarch, and stands in the Broadway. "Seinte Marie College of Wynchestre," now Saint Mary's or Winchester College (q.v.), was founded by William of Wykeham, Bishop of Winchester, and completed in 1393. Winchester's chief glory is the cathedral. A church is said to have been built in the year 169, to have been destroyed in 266, restored in 293, and converted into a temple of Dagon or Wodin. In 635 the desecrated church was pulled down, and a new one commenced. From the year 674 the succession of bishops of Winchester, which includes the celebrated Saint Swithin (q.v.), has continued unbroken. Of the ancient cathedral, in which most of the Saxon kings of Wessex (see HEPTARCHY) were interred, no portion remains. The present cathedral was built by Bishop Walkelin (1870-97). William of Wykeham greatly enlarged and beautified the building and began the remarkable transformation of the nave from the Norman to the Perpendicular. The cathedral is 560 feet long; its breadth at the transepts is 208 feet, length of nave 351 feet, and height 86 feet. There is a low central Norman tower 186 feet high. The interior is magnificent, and contains many objects of the highest interest—as the tomb of William Rufus; the golden shrine of Saint Swithin, with some excellent specimens of sculpture, both ancient and modern; the tomb of Edmund, the son of King Alfred; and the tomb of Izaak Walton. There are other churches of interest and buildings of a religious and educational character, including the remains of Hyde Abbey, where King Alfred was buried. About a mile from the town is the famous Hospital of Saint Cross, founded in 1136 by Henry de Blois, Bishop of Winchester. The city possesses a public library and a museum. Population, in 1901, 20,919.

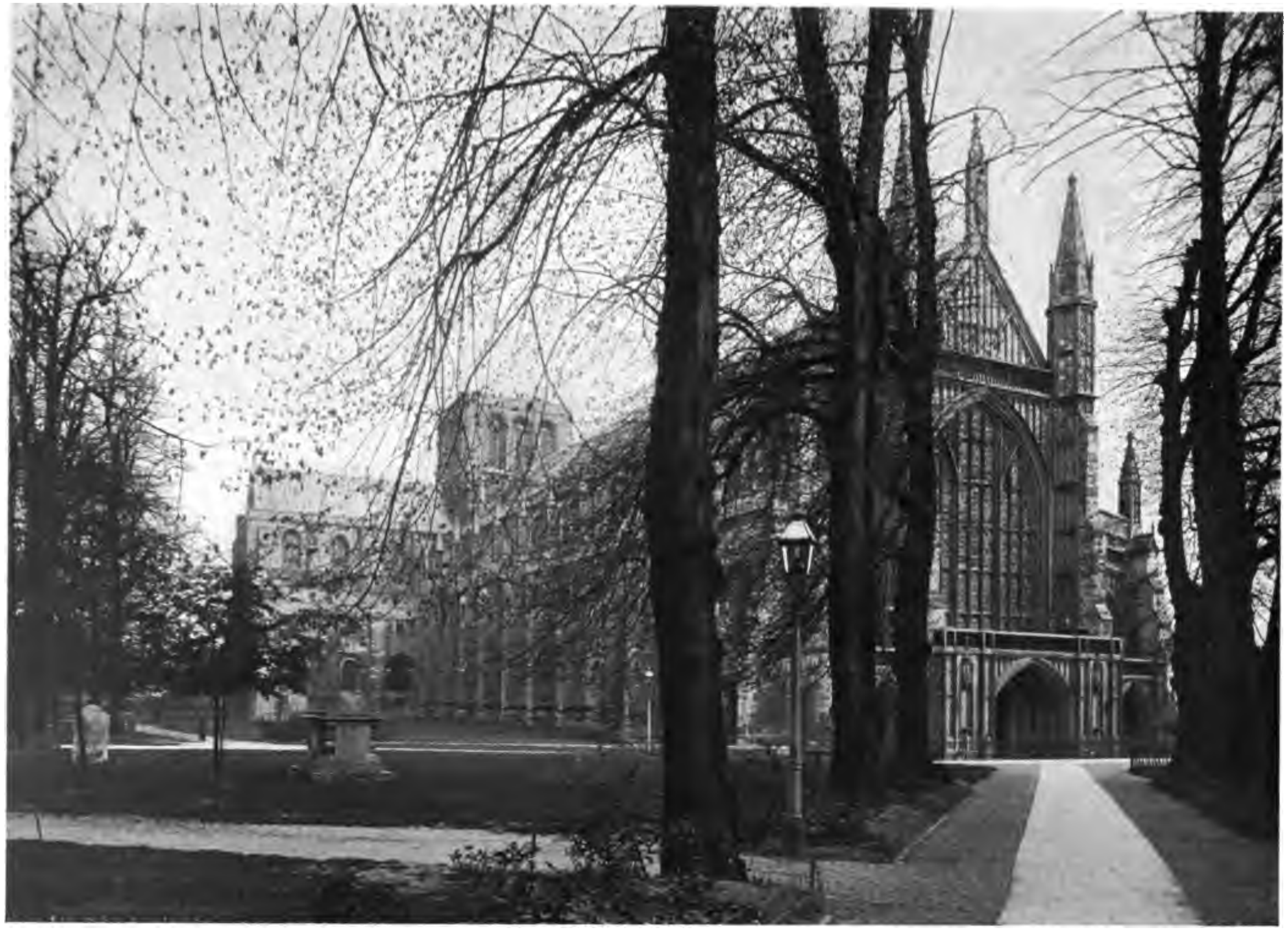
Winchester, the Roman *Venta Belgarum*, was the site of a British city before it became a Roman station, and a place of considerable importance. Taken by the Saxons in 495, the town was called Wintanceaster. As the capital of Wessex, Winchester became the capital of England, and even after the Norman Conquest was long a chief royal residence. In 1265, during the Barons' War, Winchester was sacked. It was taken by Cromwell in 1645; the castle was dismantled and the cathedral pillaged and vandalized. Consult: Kitchin, *Winchester* (London, 1890); Leach, *History of Winchester College* (New York, 1899).

WINCHESTER. The county-seat of Randolph County, Ind., 24 miles north by west of Richmond, on the White River, and at the junction of the Cleveland, Cincinnati, Chicago and Saint Louis and the Grand Rapids and Indiana railroads (Map: Indiana, E 2). It has the Randolph County Law Library, and attractive public buildings. The vicinity is engaged in farming. The principal manufactures include bricks and tiles, flour, and lumber products. Population, in 1890, 3014; in 1900, 3705.

WINCHESTER. The county-seat of Clark County, Ky., 100 miles east by south of Louisville, on the Chesapeake and Ohio and the Louisville and Nashville railroads (Map: Kentucky, G 3). It is the seat of the Kentucky Wesleyan College (Methodist Episcopal, South), opened in 1866. Farming is the leading industry of the surrounding country, and there are planing mills, a spoke and rim factory, and flouring mills. Under the charter of 1884, the government is vested in a mayor, chosen every four years, and a unicameral council. Winchester was incorporated in 1792. Population, in 1890, 4519; in 1900, 5964.

WINCHESTER. A town in Middlesex County, Mass., eight miles north by west of Boston, on the Boston and Maine Railroad (Map: Massachusetts, E 3). It is largely a residential place, and is the home of many business men of Boston. "Middlesex Fells," a park of more than 3000 acres, maintained by the State, lies partly in the town. There are also here a State Aviary, a public library with more than 13,600 volumes, and the Home for Aged People. The industrial interests of the town are confined chiefly to the manufacture of leather, machinery, felt goods, and watch hands. The government is administered by town meetings. Population, in 1890, 4861; in 1900, 7248. The successive names of Winchester since the settlement of the country have been: 1638, Waterfield; 1640, Charlestown Village; 1642, Woburn; 1850, Winchester. Consult Hurd, *History of Middlesex County* (2 vols., Philadelphia, 1890).

WINCHESTER. The county-seat of Frederick County, Va., 80 miles west by north of Washington, D. C., on the Baltimore and Ohio and the Cumberland Valley railroads (Map: Virginia, F 2). It is the seat of the Valley Female College (Methodist Episcopal, South), opened in 1874, and has Fairfax Hall and the Shenandoah Valley Academy, a public library, and a fine city hall. Also of interest are the National and Confederate cemeteries. Winchester is the commercial centre of a farming, stock-raising, and lumbering section, and is es-



WINCHESTER CATHEDRAL

pecially noted for its extensive glove and leather interests. Flour, woolen goods, paper, and lumber products are also manufactured. Under the charter of 1874, the government is vested in a mayor, chosen biennially, and a unicameral council. The water-works are owned and operated by the municipality. Population, in 1890, 5196; in 1900, 5161.

After Braddock's defeat (1755) Washington took command at Winchester of the British and colonial troops. Fort Loudoun, built by him, still remains, and his headquarters can also be seen in one section of the town. During the Civil War several engagements were fought at and in the vicinity of Winchester, which by reason of its location was an important strategic point. On March 23, 1862, the Federal General Shields defeated General Jackson, with an inferior Confederate force, at Kernstown, four miles south of Winchester. On August 17, 1864, General Early, with a Confederate force, drove a Federal force under General Torbert from Winchester. On September 19, 1864, in the battle of Winchester or Opequan Creek General Sheridan, with a Federal force of about 38,000, defeated General Early, with a Confederate force of about 15,000, the Federals losing in killed, wounded, and missing about 5000, and the Confederates about 4000. This was followed by another engagement at Fisher's Hill, near this place, on September 22d, in which Sheridan was again victorious. On October 19, 1864, Sheridan started from Winchester on his famous ride to Cedar Creek (q.v.).

WINCHESTER, Elhanan (1751-97). A Universalist minister, born at Brookline, Mass. He joined the open communion Baptists, at Canterbury, Conn., 1770, and was ordained pastor of a church, Rehoboth, Mass., 1771; a year later he became a close communionist and was excommunicated by his Church. He resided in Charleston, S. C., 1774-80. He became pastor of the First Baptist Church, Philadelphia, 1780; became a preacher of universal restoration, and with a majority of his people formed a new church, 1781. He went to England in 1787, remaining till 1794, and preaching with great success. Among his numerous publications may be named: *New Book of Poems on Several Occasions* (1773); *Hymns* (1776); *The Face of Moses Unveiled* (1787); *The Universal Restoration, Exhibited in Four Dialogues* (1788); *The Restitution of All Things Defended* (1790); *Course of Lectures on the Prophecies that Remain to be Fulfilled* (1789-90); and *Five Letters on the Divinity of Christ* (1810). He was a forerunner of the present Universalist denomination. Consult his *Life* by Stone (Boston, 1836).

WINCHESTER, James (1752-1826). An American soldier, born at White Level, Md. He became a second lieutenant in the Second Maryland in 1777, and a first lieutenant in 1778; was captured at Charleston in 1780, but was exchanged in the following December; and became a captain in the Third Maryland in 1781. In March, 1812, he was appointed a brigadier-general, and in September superseded William Henry Harrison at Fort Wayne. In command of the left wing of the army, Winchester moved from Fort Defiance to Maumee Rapids, but on January 22, 1813, was defeated at the River Raisin by a greatly superior force of British and Indians under Colonel Proctor. Winchester was himself taken prisoner, and was induced to send an order to those of his men who were still resisting to surrender. The sick and wounded Americans were massacred on the 23d by the savages. (See Frenchtown.) Winchester himself was taken as a prisoner to Quebec, and was not exchanged until the spring of 1814. In March, 1815, he resigned his commission in the army.

WINCHESTER, Oliver Fisher (1810-80). An American manufacturer, born in Boston. He resided for a time in Baltimore, and in 1848 he removed to New Haven, where he opened one of the first shirt factories in the United States. When the Volcanic Arms Company was organized to manufacture the Henry magazine rifle, Winchester became a stockholder, and in 1860 bought it out and reorganized it as the New Haven Arms Company. Five years later he again reorganized it as the Winchester Repeating Arms Company, and gave the rifle his own name. In 1872 he began the manufacture of metallic cartridges. He was elected Lieutenant-Governor of Connecticut in 1866. He gave large sums of money to Yale University and founded there an observatory which for some time bore his name. See Rifle.

WINCHESTER, William Paulet (Pawlet, or Poulet), first Marquis of (c.1485-1572). An English nobleman, eldest son of Sir John Paulet of Basing, Hampshire. He held several positions in the royal household, was created Baron Saint John in 1539, and was nominated by the will of Henry VIII. one of the council of regency for the period of young Edward's minority. In 1550 he assisted Northumberland in overthrowing Somerset; was created Earl of Wiltshire five days later; and in the following year became Marquis of Winchester. He pretended to acquiesce in Northumberland's plan for setting aside the claims of Mary and giving the throne to Lady Jane Grey, but after Northumberland left London to put down the revolt, Paulet joined other noblemen in proclaiming Mary. She confirmed him in all his offices, and also made him Lord Privy Seal. Under Elizabeth he also continued to hold his offices, and was Speaker of the House of Lords in 1559 and in 1566.

WINCHESTER COLLEGE. One of the oldest public schools in England, situated at Winchester. It was founded by William of Wykeham in 1387, and opened in 1393, as a feeder for New College, Oxford. Originally the foundation consisted of a warden, ten fellows, three chaplains, an usher, and seventy scholars; but in 1857 the number of fellowships was reduced to six. A certain number of outside pupils were admitted from the very beginning, and their number increased gradually. About twelve vacancies for foundationers occur every year, which are filled by competitive examination. Four exhibitions of the annual value of £50 each, tenable for four years at the universities of Oxford and Cambridge, are awarded every year. There are also six scholarships tenable at New College, Oxford. The original building with several additions is still extant. The attendance in 1902 was about 450.

WINCHILSEA, wĭn'chĭl-sē, Countess of (Anne Finch) (c.1660-1720). An English poet. She was a daughter of Sir William Kingsmill, of Sidmonton, Hampshire. She married Heneage Finch, who became, in 1712, fourth Earl of Winchilsea. Rowe composed in her honor an 'epistle,' and Pope an 'impromptu.' When she had been forgotten for a long while, she was praised by Wordsworth, who cited her "Nocturnal Reverie" for its original images of external nature at a time when descriptive poetry was mostly artificial (essay appended to vol. i. of *Poems*, 1815). Her verse consists of *The Spleen, a Pindaric Ode* (in Gildon's *Miscellany*, 1701; republished in 1709); *Miscellany Poems*, including the tragedy *Aristomenes* (1713); and scattered pieces. Consult Reynolds, *The Poems of Anne, Countess of Winchilsea* (edited with introduction and notes, Chicago, 1902).

WINCHILSEA, Daniel Finch, Earl of. See Finch, Daniel.

WINCKELMANN, vĭŋ'kel-män, Johann Joachim (1717-68). An eminent German classical archæologist and art historian. Born at Stendal, Brandenburg, on December 9, 1717, the son of a poor cobbler, he succeeded only through his invincible determination in picking up the elements of education as a charity scholar in the school of his native place, whence, in 1735, he proceeded to the Köllnisches Gymnasium in Berlin. From 1738 to 1740 he studied theology and the classics at Halle, then mathematics and medicine at Jena, obtained a place as tutor at Hadmersleben, near Halberstadt, in 1742, and as associate rector in the grammar school at Seehausen in 1743. In 1748 chance brought him employment in the library of the Saxon ex-minister and historian, Count Bünau, at Nöthnitz, near Dresden, where he remained six years. His association with the eminent artists and scholars at Dresden and the valuable instruction and advice which he received there, especially from Oeser, determined him to follow that career which eventually revolutionized the entire field of criticism on the subject of classical antiquities.

Through the Papal nuncio at Dresden, Count Archinto, Winckelmann was converted to the Roman Catholic faith, in 1754. He now spent a year in Dresden solely devoted to his studies, and published his first work, *Gedanken über die Nachahmung der griechischen Werke in der Malerei und Bildhauerkunst* (1755), well illustrated by Oeser, which brought him a royal stipend for two years in Rome. In September, 1755, he set out for Rome, where he derived much benefit from the companionship of Raphael Mengs, and then became librarian to Count Archinto, who in the meanwhile had been made a cardinal and Secretary of State. In 1758 he visited Naples, Herculaneum, and Pompeii, then spent nine months in Florence, cataloguing the unique collection of antique gems and intaglios of Baron Stosch, and assiduously studying the works of Raphael and Michelangelo.

After the death of Cardinal Archinto he became librarian to Cardinal Albani, the passionate art-lover and most famous collector of his time, under whose roof he henceforth lived as a friend and confidant. Repeated visits to Naples resulted in several publications which greatly contributed to the elevation of taste in the decorative arts, but his greatest work is the *Geschichte der Kunst des Altertums* (1764, new ed., by Julius Lessing, with biography, 1882). Through it, and in the field of archæology, through the *Monumenti antichi inediti* (1767-68, new ed. 1821), Winckelmann became the true expounder of classic art and the founder of scientific archæology. His views of the theory of the beautiful called forth Lessing's *Laokoon* and profoundly impressed Goethe. In April, 1768, he left Rome in company with the sculptor Cavaceppi to revisit Germany, but in passing the Alps he evinced a strange reluctance to leave Italy, and was with difficulty persuaded to proceed to Munich. At Vienna he was received with honor by the Empress Maria Theresa. Hurrying on to Triest, he there chanced to make the acquaintance of one Arcangeli, a convict recently released, whose cupidity he aroused by showing him some gold coins, the gift of Maria Theresa, and who stabbed him fatally in his room on June 8, 1768, causing his death within a few hours. Consult his *Life* by Justi (Leipzig, 1898); also Vogel, in *Allgemeine deutsche Biographie*, xliii. (ib., 1898); John, *Biographische Aufsätze* (ib., 1866); and Karl Hillebrand, in *Fortnightly Review* (London, 1874).

WIND (AS. *wind*, Goth. *winds*, OHG. *wint*, Ger. *Wind*, wind; connected with Lat. *ventus*, Skt. *vâta*, wind, from *vâ*, to blow). Moving air. The direction of movement, if horizontal, is expressed by stating the point of the compass from which the wind comes. The force was formerly expressed on some arbitrary scale, such as zero for calm, and four for destructive to large trees. In 1806 Admiral Beaufort introduced into the British Navy a scale of zero to twelve, arranged according to the amount and kind of sail to be carried by the standard ship of the Royal Navy. (See Beaufort Scale.) Recently the United States Weather Bureau has adopted the rule that in official forecasts the fine subdivisions once used shall be replaced by the following simpler scale of terms:

DESIGNATION OF WIND	Miles per hour
Light	1 to 9
Fresh	10 " 19
Brisk	20 " 29
High	30 " 39
Gale	40 " 59
Hurricane	60 and above

The above figures are usually understood to refer to velocities as recorded by the Robinson anemometer during a brief interval such as one minute or five minutes, but without correction for the errors that are known to be peculiar to that instrument and by reason of which its records are from five to twenty-five per cent. too large. Instead of using the wind velocity, which is the datum specially appropriate to meteorology, many have attempted to measure the pressure against a normal unit of surface and thus obtain a scale of wind force. But as the pressure varies with the shape of the obstacle and the density of the air, it is generally conceded that velocities should be observed and pressures must be calculated therefrom as best we can.

From a general meteorological point of view, winds are classified as steady, periodical, and variable. The steady winds are best illustrated by the trade winds at the earth's surface, and the anti-trades above them, by the easterly wind that apparently prevails high above the equatorial region, and by the westerly wind that prevails above the north temperate zone. The periodical winds are represented by the diurnal land and sea breezes and the summer and winter monsoons, which are in fact sea breezes and land breezes on a large scale. The variable winds usually occur in connection with the areas of high and low pressure, or the storms that move over the earth. They represent ascending and descending movements due to the interaction of upper and lower strata or of cold arctic and warm tropical air, when seeking to obtain more stable equilibrium. The variable winds generally endure only a few days, or at the most a week, by which time the disturbance has passed by or perhaps altogether subsided, and a change of wind takes place. Sometimes the winds appear to blow with some regularity for a few days from the north and then for a few days from the south alternately, but this alternation is not often maintained for any length of time, as it is evidently due to the regularity with which areas of high and low pressure pass over the station. These irregular or variable winds give to ordinary local weather its characteristic variability, and they have therefore always been a prominent subject of observation and discussion. In the north temperate zone the westerly wind may be considered as the normal and most frequent; all other winds soon shift to the west.

The local names that have been given to various winds must not be considered as implying that the peculiarities of the winds are local. Thus the simoon, sirocco, and solano, which are the warm southerly winds of the northern Mediterranean coast, have their parallels in very similar southerly winds in Siam, India, and the Atlantic coast of the United States. The bora of the Adriatic and the gregale of Malta have their counterparts in the blizzards of the United States and the purga of Siberia. The dry puna winds of Peru have a very close parallel in the so-called hot winds of the region from Missouri to Nebraska and Iowa. The east winds of the British Islands prevail in New England as well as from Scotland eastward into Russia, where, however, they become drier than they are in Great Britain. The mistral, or northwest wind of Southern France, is essentially the same as the northwest wind that follows a storm centre passing over the lake region eastward into New York and New England.

Several laws bearing on the winds have been enunciated. Dove maintained the existence of alternate currents, polar and equatorial, existing side by side and moving as a whole eastward. He also showed empirically that there was a certain law of sequence according to which the winds followed each other day after day, and which we now know is simply due to the fact that the majority of the storms pass on one side or the other of the station. Redfield, Reid, and other meteorologists showed that the winds circulate around a storm centre, a fact which, however, was also known to Dampier and other early voyagers. Hence all large storms have the character of whirlwinds. Redfield knew, but did not lay stress upon the fact, which Meldrum brought out most forcibly, that the winds are inclined at a considerable angle to the radius vector from the storm centre, or to the isobars surrounding the storm centre. J. Allan Broun and, many years later, Clement Ley and Cleveland Abbe independently announced that the upper winds are inclined to the lower winds in a regular sequence, so that as we ascend in the atmosphere the winds are deflected more and more to the right. Ferrel showed that the inclination of the wind to the isobar depends upon the distance from the storm centre, on the latitude of the place, and on the coefficient of resistance of the earth to wind, and he gave the formula connecting these together. Espy and, many years later, Koeppen, independently, showed that the interchange of air between the upper strata and those near the ground causes the decided diurnal increase in the velocity of the wind in the early morning hours up to a maximum at the hour when the interchange is most rapid; also that there must be a corresponding diminution of the wind in the upper strata, which diminution has been established by actual observations on mountain tops and other elevated points. The general circulation of the atmosphere is not a simple system of steady upper and lower winds. It has been shown that the dynamics of the air do not allow of the existence of any steady currents maintaining the dynamic equilibrium. Therefore the system of upper and lower winds devised by Ferrel as the simplest imaginable must be replaced by systems of whirls or eddies, so that the great whirlwinds or cyclones and anticyclones that observation shows on every daily weather map must be considered as an integral and essential part of the general circulation, and would be so even if the globe were a uniform frictionless sphere.

BIBLIOGRAPHY. On the general subject of the winds, consult: Ferrel, *Popular Treatise on the Winds* (New York, 1889). On wind pressure, consult Marvin, *Anemometry* (United States Weather Bureau, Washington, 1900). On the general circulation, consult Oberbeck, translated in Abbe, *Mechanics of the Earth's Atmosphere* (Washington, 1891). On recent results of observations on the movements of the upper strata, consult Bigelow, *Report on International Cloud Observations* (Washington, 1901). For charts of the winds, see Bartholomew's *Atlas of Meteorology* (London, 1900). For a most comprehensive review of all recent results, see Hann, *Lehrbuch der Meteorologie* (Leipzig, 1901). See ANEMOMETER; CLIMATE; METEOROLOGY.

WINDAGE. See BALLISTICS; GUNNERY.

WINDBREAK, or SHELTER BELT. Any planting on the windward side of buildings, orchards, gardens, etc., with the object of overcoming the force of the wind. Windbreaks are of great advantage in prairie regions in protecting from the cold, lessening evaporation from soils and plants, retaining snow and leaves as protection, lessening liability to mechanical injury from winds, protecting trees at time of blossoming, and so on. Some disadvantages are that they cause snow to drift to the leeward; prevent the circulation of warm winds in spring, thus retarding the melting of snow and the drying of the soil and roads; and furnish harbors for plant pests, etc. The trees are usually planted upon the north and west sides of the object it is desired to protect. The drifting of snow may be prevented about buildings by planting a second line of trees at a distance from the main shelter belt. The snow will then be caught in the space between the two. The number of rows of trees required for a good shelter belt will depend upon the kind of trees planted and the nature of the country. Among the best species for planting are the Norway spruce, Austrian and Scottish pines, maples, and box-elder. In Minnesota and similar regions it is recommended first to plant white willows, followed by green ash and white elm, and after these become established to plant hardy evergreens, mountain ash, and birches or other ornamental trees and shrubs. A mixed plantation with hardy deciduous trees to the windward is by many considered the ideal windbreak. In planting windbreaks, as well as in all other tree-planting on the prairies, the trees should be far enough apart for cultivation, but sufficiently thick to furnish forest conditions at the earliest time possible. A distance of 8 feet for the rows and 2 feet apart in the rows is believed to have given the most satisfactory results.

WINDELBAND, vĭn′del-bänt, Wilhelm (1848—). A German philosopher, born at Potsdam. He studied in the universities of Jena, Berlin, and Göttingen; in 1876 became a professor of philosophy at the University of Zurich, in 1877 at Freiburg, in 1882 at Strassburg, and in 1903 at Heidelberg. Among his published works are: *Geschichte der neuern Philosophie in ihrem Zusammenhange mit der allgemeinen Kultur und den besondern Wissenschaften* (2d ed. 1899); *Präludien, Aufsätze und Reden zur Einleitung in die Philosophie* (2d ed. 1903); *Geschichte der alten Philosophie* (in *Handbuch der Altertumswissenschaft*, vol. v., 2d ed., 1894); *Geschichte der Philosophie* (1892); and *Platon* (3d ed. 1901).

WINDER, wĭn′dẽr, William Henry (1775-1824). An American soldier, born in Somerset County, Md. He graduated at the University of Pennsylvania, and from 1798 till 1812 practiced law in Baltimore. In 1812 he was appointed lieutenant-colonel of the Fourteenth United States Infantry; was promoted to the rank of colonel, and in November of that year led a successful raid into Canada from Black Rock, N. Y. In the following March he was commissioned a brigadier-general. He was captured at the battle of Stony Creek early in June; was held a prisoner until the spring of 1814, and in May of that year was put in command of the Tenth Military District, comprising Maryland, the District of Columbia, and a part of eastern Virginia. In the following August General Ross and several thousand British troops landed and advanced upon Washington. To oppose them Winder had only a few hundred regulars, and a mob of some thousands of militia. In consequence he was totally defeated at Bladensburg (q.v.), and the capital fell into the hands of the invaders. Winder was afterwards court-martialed, but was acquitted of all blame.

WINDERMERE, wĭn′dẽr-mẽr, or **WINANDERMERE**. The largest lake in England, situated on the boundary of Westmoreland and Lancashire, a few miles north of Morecambe Bay, into which it discharges (Map: England, D 2). It is 11 miles long, one mile broad, and over 200 feet deep. It contains several islets, and the shores are high and wooded, becoming somewhat bold toward the north. The lake is celebrated for its quiet beauty. Near its northern extremity is Rydal, the home of Wordsworth.

WINDFLOWER. See Anemone.

WINDGALL (*wind* + *gall*, AS. *gealla*, probably from Lat. *galla*, gall-nut). Puffy swellings about the joints of animals, particularly of horses. They correspond to the ganglions of human surgery, and seem to result from irritation and inflammation in the delicate synovial cavities. With moderate work they should not appear, and should soon disappear with rest.

WINDHAM, wĭn′dam, William (1750-1810). An English statesman, born in London. He was educated at Eton, Glasgow University, and University College, Oxford. In the Portland Ministry, formed by the coalition of Fox and Lord North (1783), Windham became the principal secretary to Lord Northington, Lord Lieutenant of Ireland, but, dissatisfied with the policy pursued, he pleaded ill health, resigned, and returned to England. In 1784 he entered Parliament and held his seat till 1802. On the outbreak of the French Revolution he went with Burke into reaction, and favored the bills against seditious meetings and aliens. He entered the Ministry of Pitt (1794) as Secretary of War, and began a series of reforms in the army which mark his best work. Going out of office with Pitt in 1801, he opposed the Peace of Amiens, a policy which cost him his seat at Norwich. In 1803 he became the head of the Grenville party, and, gradually drifting away from Pitt, united once more with Fox, and in 1806 accepted the Colonial Office in the Grenville Administration. Renewing his efforts for military reforms, he advocated and carried measures for pensions, higher pay, and shorter terms of service. Two years later life service was reintroduced against his protest, but in 1847 Windham's principle of short enlistment was reinaugurated. In the war against Napoleon Windham favored concentration and opposed the attack on Copenhagen and the disastrous Walcheren expedition. In general, he believed in protecting England by developing its navy, and not by fortifying its coasts. Consult: Amyot, *Speeches with Memoir* (London, 1812); Baring, *Windham's Diary* (London, 1866), of great value; and Lecky, *History of England in the Eighteenth Century* (London and New York, 1890-92).

WINDHOVER. See Kestrel.

WINDHOEK, vĭnt′ho͞ok. Capital, since 1889, of the protectorate of German Southwest Africa, situated in the southern part of Damaraland on the northern slope of the Awas Mountains, at an altitude of 5331 feet (Map: Africa, F 7). It is often termed Great Windhoek, and officially, since 1903, Windhuk. In 1901 it was connected with Swakopmund, on the coast, by telegraph, and in June, 1902, by rail. The railway, taking a rather indirect course, is 237 miles in length. The white population, in 1902, was 557. Just to the southwest is Little Windhoek, having, in 1902, 43 white inhabitants. Here are five hot springs, with temperatures from 104° F. to 122°

F. The district of Windhoek had, in 1902, a population of 1117 whites, of whom 918 were Germans, and about 23,000 natives, of whom 15,000 were Hereros, 5000 Hill-Damaras, and 2000 Bastards. At the beginning of 1904 Windhoek was menaced by an uprising of the Hereros.

WINDING UP OF COMPANY. Under the English law, a company which is incorporated under the Companies Act cannot go out of existence except through the process of winding up under the provisions of the Companies Winding Up Act (1890). This may be done by the court upon petition of the stockholders or the creditors, in which case the court appoints a receiver or liquidator, and the proceedings are quite similar to those in bankruptcy; or the shareholders themselves may wind up the company voluntarily. It is estimated that 90 per cent. of the companies organized under the above act are thus wound up by voluntary resolution of their shareholders, appointing liquidators and turning over the affairs of the company to them for settlement. Proceedings under this method resemble somewhat those under the insolvency acts in the United States. Consult: Lindley, *On Companies*, fifth edition; Buckley, *The Companies Act*, seventh edition.

WIND INSTRUMENTS. A generic name for all those instruments in which the tone is produced by means of a vibrating column of air. With respect to the material employed in their construction wind instruments are divided into brass and woodwind. The brass instruments are further subdivided into: (1) Natural instruments, yielding only natural or harmonic tones. (See HARMONICS.) Such are the old horns and trumpets without valves. Instruments with a narrow gauge do not yield the fundamental tone, which can be produced only upon instruments with a wider gauge. But in these the upper range is limited. (2) Slide instruments, like the trombones, in which the tone is produced by lengthening or shortening the tube by means of a sliding tube. (3) Valve instruments, in which the same effect is produced by regulating the length of the vibrating column by means of valves. Such are the modern horns and trumpets and tubas. The wood-wind instruments are again subdivided into (1) flue pipes, in which the column of air is directed against a sharp edge, as in the flutes; (2) reed pipes, in which the column of air causes a reed (either single or double) to vibrate. Of the latter kind are the clarinets (single reed) and oboes and bassoons (double reed). The organ is a combination of all the various kinds of wind instruments. See the separate articles on various instruments; also MUSICAL INSTRUMENTS; ORCHESTRA; ORGAN.

WINDISCH, vĭn'dĭsh, ERNST (1844—). A German philologist, born at Dresden, and educated at the University of Leipzig. In 1870-71 he catalogued the Sanskrit manuscripts in the India Office library, London, and in the latter year was appointed professor extraordinary at Leipzig, but in 1872 was called as full professor to Heidelberg. He remained there till 1875, when he removed to the University of Strassburg, and in 1877 he was made professor of Sanskrit and Celtic at Leipzig. Aside from his numerous articles in the *Zeitschrift der deutschen morgenländischen Gesellschaft*, of which he became an editor in 1880, and other journals, his publications include: *Der Heliand und seine Quellen* (1868); *Kurzgefasste irische Grammatik* (1879, Eng. trans. 1882); *Ueber das Nyāyabhāshya* (1888); *Māra und Buddha* (1895); and the great series of *Irische Texte* (3 ser., 1880-97). He also edited *Zwölf Hymnen des Rigveda mit Sāyaṇas Commentar* (1883), and the *Itivuttaka* for the Pali Text Society (1890).

WINDISCHGRÄTZ, vĭn'dĭsh-grĕts. The name of a princely Austrian family, dating from the thirteenth century. Its most prominent member is ALFRED CANDIDUS FERDINAND, PRINCE WINDISCHGRÄTZ, who was born May 11, 1787, at Brussels, entered the Austrian army in 1804 and saw active service throughout the Napoleonic wars. In 1833 he became a lieutenant field marshal and commander of division. From 1840 to 1848 he commanded the forces in Bohemia. In June, 1848, he suppressed the insurrection in Prague with bloody severity, but his wife and son were killed during the rioting. He was then placed in command of all the Austrian forces except those in Italy. After the insurrection of October 6th at Vienna Windischgrätz declared the city in a state of siege, and on October 23d began the attack on the capital. On October 31st he took the city by storm. With his brother-in-law, Prince Felix Schwarzenberg, he arranged the abdication of Ferdinand, and then led an army against the Hungarians. In January, 1849, he took Buda and Pest, but dissensions with the Vienna Government led to his recall. In 1859 he was made Governor of Mainz, then under the control of the Diet of the Germanic Confederation. He died March 21, 1862. Under his auspices was published *Der Winterfeldzug 1848-49 in Ungarn* (Vienna, 1851).

WINDLASS (corruption of *windas*, *windass*, from MDutch *windaes*, Dutch *windas*, Icel. *vindāss*, windlass, winding-beam, from MDutch *windan*, Icel. *vinda*, to wind, + MDutch *aes*, Dutch *as*, Icel. *āss*, Goth. *ans*, beam, pole; influenced by popular etymology with obsolete Eng. *windlass*, circuitous route, subtlety). A modification of the wheel and axle used for raising weights. It consists of a rope wound on a horizontal axle of cylindrical form whose ends are firmly supported in bearing blocks, with either spokes or a larger wheel or a crank at one or both ends where the force is applied. It differs from the capstan (q.v.) chiefly from having a horizontal instead of a vertical axis. Some forms of windlass closely resemble the winch (q.v.) in construction. The advantage in power is secured by having the force applied on the wheel at considerable distance from the centre, according to the law of the wheel and axle (q.v.). See CAPSTAN; ANCHOR.

WINDLESTRAE. See HAIR GRASS.

WINDMILL. A motor which utilizes the energy of the wind for pumping water, driving mills, or doing other work. The wind acts on a set of sails or slats attached to an axis so as to form a revolving wheel. A crank or gearing transmits the power from the axis to the pump or other mechanism to be driven. Most windmills are mounted on towers at a considerable elevation above the ground, or else placed on the tops of buildings, in order to take advantage of the unobstructed action of the wind. A comparatively few wind wheels are set on a vertical axis, but as a rule the axis is either horizontal or slightly inclined therefrom. A deviation from the horizontal is sometimes essential to permit the sails to clear the tower.

The typical Dutch windmill is composed of four long sails at right angles to each other, fixed on an axis inclining about 10° to the horizontal and mounted on an inclosed tower of masonry or wood. Modifications of this type include six or more sails. The web of the sails is generally of canvas, but wood may be substituted. In the best forms of European windmills each sail is composed of arms or whips 30 feet or more in length, attached at right angles to the sail axle. Transverse bars or rods are secured to the whip at intervals throughout its length, and on these the sails are stretched. By setting the bars at varying angles with the plane of revolution of the whips, a warped surface is produced. This is essential, since the sails revolve in a plane at right angles to the direction of the wind, so if the surface was not curved the only effect of the wind would be to press against a fixed surface. The width of the sails is generally greater at the outer than at the inner extremity, and the total sail area is smaller in proportion to the area of the wind zone than is the case in American mills.

American windmills may be divided into two broad classes: (1) those that revolve in the same direction as the wind and resemble paddle-wheels or certain types of water wheels, and (2) those revolving at right angles to the wind. The members of the second class in this one respect are similar to the Dutch and European mills already described, and may for convenience be called sail wheels. Most of the windmills in use fall in the second class. The paddle-wheel mills must have one-half of their fans guarded from the action of the wind, for otherwise they will not revolve, since the pressure on the two halves will balance. This protection may be afforded, in the case of wheels revolving on a horizontal axis, by casing in the lower half of the wheel; and for wheels on a vertical axis, by either casing in one-half or by using folding vanes that close on themselves when they come into the counter-pressure. In either of these sub-classes, it is evident that only a portion of the total wind area of the wheel is effective. The horizontally set paddle-wheel mills are generally placed near the ground and facing the prevailing wind. They are of no use except when the wind blows their way. Sometimes the vanes are made in the form of a warped or screw surface to obviate this defect, whereupon the mill assumes somewhat of the sail-wheel type. In the vertical paddle-wheel mills the wind guard may be made in the form of a semi-cylindrical revolving hood, self-adjusting by means of the changing direction of the wind itself, through the action of the wind on a rudder.

The American sail-wheel windmills vary in design from four or more arms attached to a horizontal axis, with a single plain board nailed to the arm at such an angle as to catch the wind, to an elaborate series of fans in one or more annular rings, the fans being composed of narrow slats of wood, also set at an angle with the wind. From this complex type there is a strong tendency for the wheels to revert to a simple form, somewhat like the old European mills, except that in the place of a few curved sails of canvas and wood there are a number of metal sails with curved surfaces, all connected to make a compact, strong wheel.

Whatever the type of mill employed, its highest efficiency can be attained only by keeping it constantly in the wind; that is, so that its plane of revolution will be at right angles to the wind in the sail-wheel mill, and parallel with it in the paddle-wheel type. In the early European mills the wheel and tower were mounted on a pivoted post and turned by hand. Later on the mills were so arranged that only the wheel, its accessories, and the dome or cap of the tower were turned. This was done either by hand or by wind power, an auxiliary windmill, with gearing, being employed in the latter case. In the American mill, also, only the upper part of the mill revolves. The turntable to effect this movement is actuated by the direct pressure of the wind on either the wheel itself or a rudder attached to it; or else by means of a secondary wheel, which is used to turn the main wheel into the wind.

Besides devices to keep the wheel in the wind others must be employed to regulate the wheel under varying conditions of wind velocity. Such regulation is necessary to secure the maximum amount of power when the wind is low, a fairly constant speed, so far as is possible, under all conditions, a reduction of speed in high winds, and the complete stoppage of the windmill during gales. Regulation may be effected by applying a brake to check the speed, or, as is commonly the case, by diminishing the area of sail exposed to the wind. The latter may be effected by changing the angle of the groups of vanes of a sectional wheel, by means of centrifugal action applied through lever rods and resisted by means of weights or springs. The greater the velocity of the wheel the more the vanes will be turned until, if the wind be high enough, they offer it no purchase whatever. A second method involves turning the wheel partially or wholly out of the wind, by revolving it about the axis of the tower. Counterweights may also be used here, as in the case of both the centrifugal governor and some of the devices used for holding the wheel in the wind. The object of the counterweights is to prevent too sudden action of the regulating devices, which might result in damage to some portion of the mechanism involved.

The chief use to which windmills are put in America is the pumping of water from wells, but they are also employed, often conjointly, for grinding grain and cutting fodder for stock, turning grindstones and other machinery for repairing and making farm tools, and numerous other purposes where a relatively small amount of irregular power is needed and where low first cost and a minimum of expense for maintenance and operation are essential.

The power of windmills increases a little faster than the square of the wind velocity and about 1.25 times the square of the diameter of the wind wheel. According to Murphy (see bibliography below) "a good 12-foot steel mill should furnish one horsepower in a 20-mile wind (indicated) and 1.4 horsepower in a 25-mile wind. This is the smallest amount of power that will do any considerable amount of useful work. A 16-foot mill will furnish 1.5 horsepower in a 20-mile wind (indicated) and 2.3 horsepower in a 25-mile wind.

"A 12-foot steel mill and a 50-foot steel tower as commonly made weigh about 2000 pounds. A 16-foot steel mill and a 50-foot steel tower weigh about 4250 pounds. The 16-foot outfit weighs more than twice that of the 12-foot, and its power is only 1.5 that of the latter. In addition, the 12-foot mill will govern more easily and is less likely to be injured in a storm than the 16-foot mill. In most cases, therefore, it is better to use two 12-foot mills than one 16-foot mill."

"Steel mills," he says, "with few large sails, have much more power than the wooden mills with their many small sails." Mills should be placed on towers 50 to 70 feet high, in order to get them at least 30 feet above the tallest trees and buildings. Mills should start in as light a wind as corresponds to a velocity of four or five miles per hour. For information as to velocity and other phases of the wind, see WIND.

BIBLIOGRAPHY. Consult: Wolff, *The Windmill as a Prime Mover* (New York, 1885), a technical treatise; Perry, *Experiments with Windmills;* Barbour, *Wells and Windmills in Nebraska,* which contains a very interesting descriptive review of home-made windmills; and Murphy, *The Windmill: Its Efficiency and Economic Use,* also mentioned above (Washington, D. C., 1899, 1899, and 1901, being Nos. 20, 29, and 41-42, respectively, of *Water Supply and Irrigation Papers* of the United States Geological Survey).

WIN'DOM, WILLIAM (1827-91). An American legislator and Cabinet officer, born in Waterford, Belmont County, Ohio. He was educated at Mount Vernon (Ohio) Academy, was admitted to the bar in 1850, and in 1852 was elected prosecuting attorney of Knox County on the Whig ticket. In 1855 he removed to Winona, Minn., where he allied himself with the Republican Party. He was a Republican member of Congress from 1859 to 1869, and was chairman of the important Committee on Indian Affairs. In July, 1870, he was appointed to the seat in the United States Senate made vacant by the death of Daniel S. Norton, and was regularly elected in 1871 and again in 1877, holding the position of chairman of the Committee on Appropriations. On March 4, 1881, he resigned his seat to enter the Cabinet of President Garfield as Secretary of the Treasury. He resigned his portfolio after Garfield's death, and was at once reëlected to the Senate to fill his own unexpired term. During the years 1883-89 he spent most of his time in New York City, where he was interested in various financial enterprises, and from 1889 until his death was Secretary of the Treasury in President Harrison's Cabinet. He was one of the early advocates of reciprocity and of the gold standard, and was a candidate for the Presidential nomination in the Republican National Conventions of 1880, 1884, and 1888.

WINDOW (Icel. *vindauga*, window, wind-eye, from *vindr*, AS. *wind*, wind + *auga*, Goth. *augō*, OHG. *ouga*, Ger. *Auge*, AS. *ēage*, Eng. *eye*). An opening in the wall of a building for the admission of light and air. Windows are generally closed with glass, set in a frame called the *sash.* This may be of wood or of metal, and may be fixed or arranged to be opened at will. Commonly the sash is in two halves, either hinged at the sides and meeting in the middle, as in 'French' and 'casement' windows, or sliding up and down in grooves, with cords and counterbalancing weights, as in 'double-hung' windows. The former are the more common on the Continent of Europe; the latter in England and the United States. The sash is, however, sometimes pivoted so as to turn horizontally or vertically. When stained glass is used, it is set in small pieces held together by grooved strips of lead, and stiffened by iron bars. Large windows are often subdivided by fixed vertical bars or *mullions* of wood, metal, or stone, and one or more horizontal bars called *transoms.* A *bay window* or *bow window* is one or a group of windows set in a frame or structure projecting outward from the face of the wall. A *dormer* is a vertical window lighting the interior of a steep roof. When the sash is made to lie in the slope of a roof it is called a *skylight;* it may be fixed or hinged, or partly fixed and partly hinged.

EGYPTIAN. It is sometimes asserted that windows were practically unknown until the Christian Era. This is a monumental error. In Egypt windows were in common use; in ordinary houses they pierced the wall on the second story front and on the inner court. In temple architecture they were rare, but occur at Karnak as clearstory openings in the hypostyle hall. In military architecture they were common, and in the palaces and villas of the New Empire were elaborately treated with heavy stone jambs and sills, and lintels crowned with the characteristic cavetto cornice. The openings were protected by wooden slats and shutters. In Babylonia and Assyria there was little use made of windows, though some reliefs show clearstories lighting the larger and loftier palace halls.

GREEK. In Greece windows were in use from prehistoric times, but remained quite simple rectangular openings, sometimes slightly smaller at the top: the window frame was of stone or of wood, as occasion required. In some cases the windows are oblong and double, the lintel being supported in the centre by a pier. The decorative framework of the opening was often not real, but carved in the wall masonry, as in the beautiful Erechtheion window. The windows, when not left as mere openings, were fitted with gratings of wood or metal, or with shutters (usually of wood), or with both.

ROMAN. The Romans made even more use of windows, with greater variety of form and increased richness of decoration. In private houses those on the streets were ordinarily small and simple (e.g. house of John and Paul on the Cœlian, Rome), but windows of temples were often highly elaborate, e.g. in the temple of Vesta at Tivoli; at Palestrina, surmounted by a cornice resting on consoles; and in the little temple of the Deus Rediculus near Rome, framed with rich ornamental carving. Under the late Empire round-headed windows became common, as at Telmessos in Asia Minor. Of extraordinary beauty are the windows of the Porta dei Borsari at Verona, which with their pilasters and gables undoubtedly served as models for the masters of the Renaissance. The great halls of the thermæ were lighted by huge semicircular clearstory windows, fitted with elaborate bronze gratings. The use of glass was far commoner than is imagined, beginning even in Republican times and probably derived from Alexandria and Antioch. Even commoner was the use of transparent stones called *specularia*, the choicest of which came from Spain.

Early Christian, Byzantine, and Mohammedan. The development of the basilical church involved the general use of windows, and many more actual examples have remained of this period, though they are far from being as beautiful as those of the Roman Empire. The normal brick window of Early Christian and Early Byzantine buildings was a single, plain and rather wide round-arched opening, without moldings or sculpture. Only in the East, where stone was commonly used, was the old Greco-Roman richness partly perpetuated, especially in the ruined cities of Central Syria, where hundreds, not to say thousands of windows remain in religious and secular structures built during the third, fourth, fifth, and sixth centuries A.D.

As the Middle Ages approached the Byzantine windows took on new forms, and were slenderer, often with two lights, separated by marble colonnettes and framed with moldings. The Roman custom of filling the aperture with glass or transparent marble was continued and many examples remain of the perforated marble slabs; usually the perforations were small and circular, quite often square, sometimes in elaborate patterns. The perforations were at times filled with colored glass, thus combining the two varieties. The churches of Grado, Parenzo, Ravenna, Rome, etc., retain examples dating from the sixth to the eleventh century. In the Mohammedan East windows were early provided with *musharabiyeh*, lattice-work and stucco window sashes cut out in free and exquisite floral designs, filled with stained glass; this was practiced especially in Egypt (Cairo), but perhaps also in Syria, and many beautiful examples are to be seen in the mosques of Constantinople.

Mediæval. Romanesque windows are ordinarily single, round-headed apertures, splayed where the wall is thick; very seldom does a two-light window with central colonnette occur. Occasionally the arched opening was framed with carving or treated, like the superb doorways, with receding arches and carved moldings, especially in Southern France and Southern Italy. But the highest development of the window came with the Gothic style. Its perfect system of balanced construction permitted the opening of windows as vast as the entire space between the supporting piers of a vaulted interior. Thus arose the magnificent pointed and circular windows with tracery (q.v.), dividing them into several narrow lights. They were filled with stained glass, which developed into an important branch of painting. For the first time—except for a few late Romanesque examples in France and Germany—the pieces of stained glass framed in lead were so assembled as to form immense figured compositions rivaling wall-paintings. France led the way, closely followed in this art by England and Germany. Italy was least important.

Renaissance. The discontinuance of the Gothic system of construction after the fifteenth century put an end to the use of tracery and removed the chief distinction between the windows of churches and secular buildings. The art of stained glass declined, although a few fine examples were produced in Florence and in Northern France during the early Renaissance. In general attention was now bestowed upon the architectural adornment and framing of the square or arched openings, which at first were single or coupled arches with little decoration, but later were enriched with most elaborate carved ornament, as in the superb windows of the Certosa at Pavia. In the later periods they were flanked by colonnettes and crowned with entablatures and often with curved or triangular pediments. Clear glass was almost exclusively used.

Modern. In modern work windows are either treated simply as openings for light and air, and therefore filled with clear glass in movable sashes, usually of wood, or made internally decorative, as in the Middle Ages, by the use of stained glass. This art has been revived and extended by wholly new developments as to color and treatment, especially in the United States, and applied in both secular and religious architecture. In general the form and treatment of modern windows are made to conform to the historic style which predominates in the design, but the style is often handled with great freedom of detail. Nearly all types of Gothic and Renaissance windows may be seen in modern buildings, the Gothic being chiefly confined to ecclesiastical buildings. The use of plate glass has made possible the glazing of windows without intermediate sash-bars, with gain in light, but loss of architectural effect. Shop windows measuring ten or fifteen feet square are not uncommon, each of a single sheet of glass, but they detract greatly from the solid aspect of a building and are wholly destitute of architectural character.

WINDOWPANE. A small, thin, almost translucent, variously mottled flounder (*Lophosetta maculata*) common along the Northeastern coast of the United States. It is a near ally of the English turbot, but is little used as food.

WINDOW-SHELL. A Ceylonese 'oyster' (*Placuna placenta*) of the family Anomiidæ, whose valves are round, nearly flat, almost transparent, and formerly were extensively used in China and elsewhere as a substitute for window glass. In the middle of the nineteenth century their export in ship-loads was an important item of commerce in Ceylon. They abound in tiny pearls, which are saved for burning into a lime to be chewed with betel-nut by those who can afford the luxury. Compare Jingle-Shell.

WINDPIPE. See Trachea.

WINDSOR, wĭn'zẽr. A municipal and Parliamentary borough in Berkshire, England, on the Thames, 21 miles by rail west by south of London (Map: England, F 5). Of great antiquity, its chief interest lies in its castle and parks. It has been a favorite residence of English monarchs. (See Windsor Castle.) Bridges connect the town with Eton and Datchet opposite on the left bank of the Thames. The town hall, built by Sir Christopher Wren in 1658, contains some royal portraits. Population, in 1901, 13,958.

WINDSOR. A port and the capital of Hants County, Nova Scotia, on the Dominion and Atlantic Railroad, 45 miles northwest of Halifax (Map: Nova Scotia, E 5). It is the seat of

WINDSOR CASTLE
FROM THE THAMES

Windsor University or King's College, chartered in 1788 by George III. The port's shipping ranks second on the Dominion register, and there is a large export trade in gypsum and limestone from neighboring quarries. Population, in 1901, 3,398.

WINDSOR. A town in Essex County, Ontario, Canada, opposite Detroit, Mich. (Map: Ontario, A 5). It has powerful railway ferryboats connecting with Detroit, electric lights and street railroads, important beds of rock salt, a large fruit industry, and thriving manufactures. Population, in 1901, 12,153.

WINDSOR. A town in Hartford County, Conn., 6 miles north of the city of Hartford, on the Connecticut and Farmington rivers, and on the New York, New Haven and Hartford Railroad (Map: Connecticut, E 2). Manufacturing is the leading line of industry, the most important products being paper, knit goods, and electric motors. Tobacco culture is extensively carried on in the vicinity. There is a public library. Population, in 1890, 2954; in 1900, 3614. In 1633 William Holmes and a few associates from Plymouth built here a fortified trading post, and two years later permanent settlers, headed by Roger Ludlow, came from Dorchester, Mass., the settlement being called Dorchester until 1637, when the present name was adopted. In 1639 Windsor united with Hartford and Wethersfield, under the "Fundamentall Orders," to form the colony of Connecticut. Consult Stiles, *History of Ancient Windsor* (New York, 1859).

WINDSOR CASTLE. The chief residence of the British sovereigns, at Windsor (q.v.), on the Thames, 21 miles by rail west by south of London. The buildings, which crown a plateau west of the town, cover 12 acres of ground in the midst of the Little or Home Park, which is about four miles in circumference. A tree-lined avenue connects with the Great Park, which has a circuit of 18 miles, and west of this is Windsor Forest, occupying an area 56 miles in circumference. The castle may be grouped in three portions: The Middle Ward, conspicuous by the dominating Round Tower or Keep, 80 feet high, built on an eminence 42 feet high; the Lower Ward on the west, containing Saint George's Chapel, the Albert Chapel, the houses of the military knights, cloisters, etc.; and the Upper Ward on the east, containing the royal private apartments. The Round Tower, which was built by Edward III. to receive the round table of the knights of the newly founded Order of the Garter, was used as a prison until 1660, James I. of Scotland being one of its most notable inmates. Saint George's Chapel, begun in 1474 by Edward IV. and completed by Henry VIII., is a fine specimen of flamboyant Gothic architecture. In the vault below the chapel, Henry VI., Edward IV. and his Queen, Henry VIII. and Jane Seymour, Charles I., George III. and his Queen, George IV., the Princess Charlotte, the Duke of Kent, the Duke of York, William IV. and his Queen, and other members of the royal family are buried. Adjoining Saint George's Chapel is the Albert Chapel, built by Henry VII., and lavishly restored by Queen Victoria as a memorial to the Prince Consort, Albert. The state apartments in the Upper Ward, including the celebrated Saint George's Hall, 200 feet long by 34 feet wide, the Waterloo Chamber or Grand Dining Room, 98 feet long by 47 feet wide, the Throne Room, and the old Ball Room, now the Vandyck Room, contain valuable collections of paintings, statuary, and other priceless objects of art. Frogmore (q.v.), the mausoleum of Queen Victoria and her husband, is in the park half a mile from the castle. Windsor was a residence of the Saxon kings before the Conquest, their palace being at Old Windsor, two miles distant. William the Conqueror chose the present site and built a castle which was extended by Henry I. and Henry II., but under the orders of Edward III. was taken down and a new one rebuilt by William of Wykeham, Bishop of Winchester. This castle was extended by successive monarchs, and under George IV. it was completely renovated at a cost of about $4,500,000. Consult: Dixon, *Royal Windsor* (London, 1879-80); Loftie, *Windsor: The Castle, Park, Town, and Neighborhood* (ib., 1886).

WINDTHORST, vĭnt'hôrst, LUDWIG (1812-91). A Prussian party leader. He was born at Kaldenhof, in Westphalia, studied jurisprudence at Göttingen and Heidelberg, became an advocate, and in 1849 was chosen a member of the Lower Chamber of Hanover. In this body he assumed the leadership of the party opposed to Prussian domination. He was made president of the Lower House, and from 1851 to 1853, and again from 1862 to 1865, was Minister of Justice. He was ultramontane in his views. When the collision between Austria and Prussia became imminent his influence was a considerable factor in bringing about the alliance of Hanover and Austria. After the North German Confederation had been formed and Hanover had been incorporated with Prussia Windthorst first led the Hanoverians in opposition, and when the Kulturkampf broke out he became the chief of the Catholic Centre party, whose policy he guided with great skill and persistence. While never completely reconciled to the Imperial Government, he succeeded, by supporting its economic policy, in gaining in return many a victory for his party and the Ultramontane cause generally. Consult Menzenbach, *Ludwig Windthorst in seinem Leben und Wirken, insbesondere in seiner politischen Thätigkeit* (Treves, 1892).

WIND VANE. An instrument for showing the direction of the wind, frequently also called anemoscope (q.v.).

WINDWARD ISLANDS. The southern part of the main chain of the Lesser Antilles, in the West Indies, the northern members of the chain being known as the Leeward Islands. The Windward Islands lie to the south of the parallel of 15° N. Saint Lucia, Saint Vincent, the Grenadines, and Grenada constitute the British colony of the Windward Islands. The Governor resides at Saint George, Grenada. (See articles on the separate islands.) The name Windward Islands was formerly applied to the whole of the main chain of the Lesser Antilles, the chain of islands extending east and west along the coast of South America having been known as the Leeward Islands.

WINE. Specifically, fermented grape juice; by extension, fermented juice of other fruits or plants, the name of the fruit always preceding the term, e.g. currant wine, rhubarb wine, elder-flower wine, etc.; loosely, unfermented fruit juice used as a beverage. Wine manufacture antedates history. Sketches on Egyptian monuments indicate that it was practiced several years before our era; biblical records abound in references to wines and vineyards; history credits the dissemination of the vine throughout the Mediterranean region to the Phœnicians, and, to judge by the writings of Herodotus, Aristophanes, Democritus, Cato, Varro, Vergil, Columella, and Pliny, wine-making in their days had reached a high degree of perfection among the Mediterranean nations. Many of the ancient wines, particularly of Western Asia, Greece, and Italy, owed their popularity to spices, the addition of which, except in the Mediterranean region and in the East, has been commercially abandoned. This practice and the present commercial demand for natural wines is partly accountable for the lower rating of formerly famous wines of the countries mentioned.

Commercial Importance. Wine is one of the most important agricultural products of the world, being made in every continent, and in almost every country except those of the extreme North. The world's supply, in 1901, was estimated at 4,146,753,600 gallons, which is equivalent to about 2.9 gallons per capita. During the fiscal year ending June 30, 1900, the United States exported 1,438,421 gallons of domestic wine and imported 4,222,483 gallons of foreign wine. According to the *Vinicultural Moniteur* the amount manufactured in the various countries for the year 1901 is as follows:

	Gallons.
France	1,530,223,200
Italy	1,013,760,000
Spain	520,080,000
Portugal	155,760,000
Algeria	146,440,800
Austria	116,160,000
Rumania	87,120,000
Chile	87,120,000
Russia	76,560,000
Bulgaria	73,920,000
Germany	60,720,000
Argentine Republic	55,440,000
Turkey and Cyprus	50,160,000
United States	39,600,000
Peru	36,960,000
Switzerland	31,680,000
Servia	23,760,000
Brazil	12,672,000
Australia	8,316,000
Madeira	7,920,000
Tunis	4,488,000
Cape Country	3,168,000
Uruguay	2,376,000
Mexico	924,000
Persia	765,600
Bolivia	660,000

Classification. Wines are red or white according to the method of their manufacture. The former are prepared by fermenting or partially fermenting on the husks (skins), the latter after the expression of the juice. Often both kinds are prepared from the same grape, but of course a red wine cannot be made from a white grape, nor a white wine from a dark-colored must. Red wines are fuller (have more body), more astringent, and more acid than white ones. Wines are classified as: *Dry* when completely fermented—only about 0.1 per cent. of sugar remaining; *sweet* or *fortified* when the fermentation is checked at an early stage by the addition of grape brandy or alcohol, evaporated must or sugar also being frequently added: *still* when the carbon dioxide produced by fermentation is allowed to escape before bottling or barreling; *sparkling* or *effervescent* when charged with carbon dioxide formed by the fermentation of a small amount of sugar solution added to the completely fermented wine; *carbonated* when charged artificially with carbon dioxide under pressure; *rough* and *astringent* or *smooth*, according to the amount of tannin derived from skins and stems during fermentation; *heavy* or *light* according as the alcoholic content is high or low; *full* when rich in body (solids). According to flavor and aroma the self-explanatory terms mild and delicate are frequently employed. The variations in these characteristics are due to differences in climate, soil, culture, methods of manufacture, and varieties of grapes.

Wines are commonly classified also according to the country where manufactured, and within each country into special types. Among these types may be mentioned the following (see also the various manufacturing countries mentioned below): *Bordeaux* or *claret*—an astringent, dry red wine manufactured in the valley of the Gironde in France; *Burgundy*—a smooth, dry red wine made in Côte d'Or in France; *Champagne*—the most famous sparkling wine, made in the Province of Champagne, France; *Madeira*—a sweet Portugese wine from the island of Madeira; *Malmsey*—a light sweet Madeira; *Moselle*—an acid, dry, white wine made in the valley of the Moselle in Germany; *Port*—a famous sweet red wine made near Oporto, Portugal; *Rhine wine*—a white, dry wine of fine aroma from the Rhine Valley, Germany; *Sauterne*—a superior dry, or slightly sweet white wine made in the upper valley of the Gironde, in France; *Sherry*—a dry, fortified Spanish wine; *Tokay*—a rich, soft, sweet Hungarian wine.

American Wines. About the middle of the sixteenth century wine was made in Florida from wild grapes, and unsuccessful attempts were made by the early settlers of Virginia to establish wine-making as a permanent industry. In 1664 a man named Richards received permission from the first English Governor of New York to sell native wines without tax, and began the extensive cultivation of grapes in that colony. During the latter part of the seventeenth century the manufacture of wine was begun in New Jersey and Delaware, and it was attempted, but without success, by William Penn in Pennsylvania. From the beginning of the industry in the United States the best grapes have been imported from wine-producing countries, but attempts to acclimate them have been largely unsuccessful except in the States lying west of the Rocky Mountains. (See Grape.)

There are five distinct wine-producing regions in the United States: (1) The Pacific district, including the territory lying west of the Rocky Mountains, New Mexico, Arizona, and a portion of the Rio Grande Valley in Texas; (2) New York; (3) Ohio and Virginia; (4) Missouri; and (5) the Southern States from North Carolina to Texas. These divisions are of the most general nature, and each would be subdivided into many districts if its wines were carefully and comprehensively studied. For instance, the soil and climatic conditions of California yield wines of widely varying characteristics. They are made almost exclusively from the European

RED WINES.

NAME	Type	Country where made	Characteristics
Adelantadillo	Bordeaux	Spain	Still.
Affenthaler	Rhine	Germany	Dry and still.
Aleatico	Muscatel	Italy	Still, sweet and delicate.
Alicante (Alicant)	South'n French	Spain	Still and sweet.
Assmannshäuser	Rhine	Germany	Still and sparkling; sweet and dry.
Asti	Burgundy	Italy	Still or sparkling and strong.
Auldana	Bordeaux	Australia	Full, still and slightly astringent.
Auvergnat	Bordeaux	France	Full, still and slightly astringent.
Auxerre	Burgundy	France	Still, smooth and slightly astringent.
Avallon	Burgundy	France	Still, smooth and slightly astringent.
Barbera	North Italian	Italy	Full, sparkling and rough.
Beaujolais	Burgundy	France	Smooth, slightly astringent and still or sparkling.
Beaune	Burgundy	France	Full, smooth, still or sparkling and astringent.
Beclan	Jura	France	Still, full and astringent.
Beni Carlo	Burgundy	Spain	Deep red, still, smooth and spirituous.
Bergerac	Bordeaux	France	Still and astringent.
Beziers	Burgundy	France	Still and sweet.
Blanquefort	Bordeaux	France	Still and pungent.
Blue Portuguese	Austrian	Austria	Still, deep colored, full and neutral.
Bonarda	North Italian	Italy	Still, deep colored, acid and astringent.
Bordeaux	Bordeaux	France	Still and astringent.
Bourg	Bordeaux	France	Still and slightly astringent.
Bual	Madeira	Madeira	Still, sweet and soft, ruddy brown.
Burgundy	Burgundy	France	Still or sparkling, full, smooth and dry.
Cabernet	Bordeaux	France	Still and soft.
Carignan	South'n French	France and United States	Still, full and neutral.
César	Jura	France	Still, full, deep colored, and rough.
Chambertin	Burgundy	France	Dry, still or sparkling and soft.
Champagne	Champagne	France	Dry or sweet and sparkling.
Charbono	Bordeaux	France	Still, full and astringent.
Château Laffitte	Bordeaux	France	Still, full and slightly astringent.
Château La Rose Perganson (Château La Rose)	Bordeaux	France	Still, fruity and soft.
Château La Tour	Bordeaux	France	Still, full and mellow.
Château Margaux	Bordeaux	France	Still and generous.
Chauché Noir	South'n French	France	Still, light and neutral.
Chianti	North Italian	Italy	Still, full and spirituous.
Cinsaut	South'n French	France	Still, full and delicate.
Claret	Bordeaux	France	Still and slightly astringent.
Clos Vougeot	Burgundy	France	Still, full and soft.
Commanderia	Sherry	Cyprus	Still, heavy and rich.
Constantia	Sherry	Cape of Good Hope	Still, heavy and sweet.
Cosne	Bordeaux	France	Still, dry and slightly astringent.
Côte Rôtie	South'n French	France	Purple color, still or sparkling and slightly astringent.
Dolcetto	North Italian	Italy	Still, deep colored, light and soft.
Epineuil (Epinail)	Burgundy	France	Full, dry and sparkling.
Etraire de l'Adhui	Jura	France	Still, full and astringent.
Falerno	Sherry	Italy	Still and sweet.
Favorita	North Italian	Italy	Light, deep colored and mild.
Floirac	Bordeaux	France	Still and slightly astringent.
Florence	Bordeaux	Italy	Still, full and slightly astringent.
Gamai Teinturier	Bordeaux	France	Deep colored, still and full.
Glenpara	Bordeaux	Australia	Still and spirituous.
Gomera	Madeira	Canary Islands	Still and spirituous.
Graves	Bordeaux	France	Still, full and slightly astringent.
Gros Mansenc	North Italian	Italy	Still, full, acid and astringent.
Grossblauer (Kölner)	Austrian	Austria	Still, light and mild.
Hermitage	South'n French	France	Still, full, soft and aromatic.
Highercombe	Australian	Australia	Still and dry.
Hockheimer (Hock)	Rhine	Germany	Still or sparkling, dry or sweet, light and acid.
Kadarkas	Hungarian	Hungary	Dry, full and rough.
Karlowitzer	Port	Hungary	Still, spirituous and astringent.
Lacrimæ Christi	South'rn Italian	Italy	Full, still or sparkling and sweet.
Lagrain	North Italian	Italy	Full, still, deep colored and astringent.
Lipari	Muscatel	Lipari Islands	Still, sweet, and raisiny.
Mâcon	Burgundy	France	Still, light and soft.
Madeira	Madeira	Madeira	Still, dry, soft, delicate and nutty.
Malbec	Bordeaux	United States	Still, and slightly astringent.
Malmsey	Madeira	Madeira, Canaries, Greece, Spain, and Italy	Still, sweet, full and soft.
Malvasia (Malvaise, Malvoisie)	Madeira	All wine producing countries	Still, sweet, full and soft.
Marsala	Madeira	Sicily	Still, dry and astringent.
Marzemino	North Italian	Italy	Still, light, low acid and rough.
Mataro	South'n French	France	Still and slightly astringent.
Médoc	Bordeaux	France	Dry, still and delicate.
Merlot	Bordeaux	France	Dry, still and delicate.
Meunier	Burgundy	France	Dry, still, full and soft.
Mission		United States	Light, neutral, low acid.
Mondeuse	Bordeaux	United States	Soft and slightly astringent.
Montefiascone	Muscatel	Italy	Still and spirituous.

RED WINES.—Continued.

NAME	Type	Country where made	Characteristics
Montepulciano	Muscatel	Italy	Still, spirituous and sharp.
Mourastel	South'n French	France	Dry, still, light and neutral.
Muscatel (Muscadel, Muscadine, Muscat)	Muscatel	All wine producing countries	Still, sometimes sparkling, sweet, raisiny an aromatic.
Musigny	Burgundy	France	Dry, still, soft and full.
Nebbiolo	North Italian	Italy	Full, heavy and acid.
Patras	Port	Greece	Still or sparkling, spirituous and sharp.
Pinots	Burgundy	France	Dry, full and soft.
Ploussard	Jura	France	Dry, full and astringent.
Pomard (Pommard)	Burgundy	France	Dry, still, full and soft.
Pomino	North Italian	Italy	Still, dry, spirituous and acid.
Pontac	Bordeaux	France	Dry, still, rich and delicate.
Port	Port	Portugal	Still, sweet, astringent and heady.
Preignac	Sauterne	France	Dry, still and fruity.
Rausan	Bordeaux	France	Dry, still, slightly astringent, strong and aromatic.
Refosco	North Italian	Italy and Austria.	Dry, full, deep color, and astringent.
Rivesaltes	Muscatel	France	Dry, still and fruity.
Romanée-Conti	Burgundy	France	Dry, still or sparkling, full and aromatic.
Roussillon	Burgundy	France	Dry, still, fruity and aromatic.
St.-Emilion.	Bordeaux	France	Still and generous, dry and slightly astringent.
St.-Estèphe.	Bordeaux	France	Dry, still and delicate.
St.-Julien.	Bordeaux	France	Still, fruity and aromatic.
St.-Macaire.	South'n French	France	Dry, still and slightly astringent.
Santenay	Burgundy	France	Still, full and soft.
Savigny	Burgundy	France	Dry, still, rich, aromatic and smooth.
Shiraz	Sherry	Persia	Still, sweet, rich and aromatic.
Sirah	Jura	France	Dry, full and astringent.
Syracuse	Muscatel	Sicily	Still, or sparkling, raisiny and aromatic.
Tannat	South'n French	France	Dry, still and slightly astringent.
Tent	Sherry	Spain	Rich, sweet, fruity and aromatic.
Tinta Amarella	Port	Portugal	Full, heavy and astringent.
Tinta Cão (Tinta Cam)	Port	Portugal	Dark colored, full and heady.
Tinta Valdepeñas		Spain	Full, strong and slightly bitter.
Torres Vedras	Bordeaux	Portugal	Still, sweet and thin.
Trousseau	Jura	France	Dry, full and slightly astringent.
Val de Penas	Sherry	Spain	Dry, still, full and slightly astringent.
Volnay	Burgundy	France	Dry, full, still or sparkling, firm and delicate.
Zinfandel	Hungarian	United States	Still, dry, spirituous and astringent.

WHITE WINES.

NAME	Type	Country where made	Characteristics
Aliso	Sherry	United States	Still and sweet.
Amontillado	Sherry	Spain	Dry, still, delicate and nutty.
Angelica	Tokay	United States	Still and sweet.
Avize	Champagne	France	Dry, light and sparkling.
Ay	Champagne	France	Dry, light and sparkling.
Bacharach.	Rhine	Germany	Light, still, sweet and acid.
Bakator	Hungarian	Hungary	Dry, still, full, heavy and smooth.
Bari	Muscatel	Italy	Still, sweet and raisiny.
Barsac	Bordeaux	France	Still and dry, and slightly astringent.
Beaujolais	Burgundy	France	Dry, still or sparkling and rather soft.
Beaune	Burgundy	France	Dry, full, still or sparkling and slightly astringent.
Bergerac	Bordeaux	France	Still, dry and slightly astringent.
Bernkasteler Doctor	Moselle	Germany	Dry, still, acid and musky.
Blanquette	Champagne	France	Still or sparkling, and also dry or sweet.
Bodenheimer	Rhine	Germany	Light, dry, still, acid and delicate.
Bordeaux	Bordeaux	France	Dry, still and astringent.
Bouzy	Champagne	France	Dry, sparkling, delicate and soft.
Brauneberger	Moselle	Germany	Light, still, dry and acid.
Burger	Rhine	Germany	Light, dry, still and slightly astringent.
Burgundy	Burgundy	France	Dry, still or sparkling and soft.
Canary	Madeira	Canary Islands	Full, heavy, still and sweet.
Cape	Sherry	Cape of Good Hope	Still and spirituous.
Carcavelhos	Port	Portugal	Still, sweet and heady.
Catawba	American	United States	Still or sparkling and dry or sweet.
Chablis	Burgundy	France	Dry, still or sparkling, full and soft.
Chambertin	Burgundy	France	Dry, still or sparkling and soft.
Champagne	Champagne	France	Sparkling and dry or sweet, light and acid.
Chateau La Tour Blanche	Sauterne	France	Still, sweet and spirituous.
Chateau Yquem	Sauterne	France	Still, sweet and delicate.
Chianti	North Italian	Italy	Still, full and heavy.
Clos Vougeot	Burgundy	France	Dry, still, firm and smooth.
Constantia	Sherry	Cape of Good Hope	Still, heavy and sweet.
Côte Rôtie	South'n French	France	Still or sparkling, and slightly astringent.
Cotnar		Rumania	Still, sweet and heavy; greenish color.
Deidesheimer	Rhine	Germany	Light, dry, still and acid, and gold color.

WHITE WINES.—Continued.

NAME	Type	Country where made	Characteristics
Delaware	American	United States	Still, dry and delicate.
Epernay.	Champagne	France	Dry, sweet and sparkling, or creamy.
Falerno	Sherry	Italy	Still, and sweet and nutty.
Farnese	Muscatel	Greece	Still, sweet and oily.
Folle Blanche	Sauterne	France	Still, dry and mild.
Forst	Rhine	Germany	Light, still, dry and acid.
Frontignan	Muscatel	France	Still, sweet, high in alcohol.
Geisenheimer	Rhine	Germany	Still and slightly astringent.
Genevrières	Burgundy	France	Still, dry and smooth.
Glenpara	Bordeaux	Australia	Still and heavy and slightly astringent.
Graves	Bordeaux	France	Still and slightly astringent.
Grüner Veltliner.	Austrian	Austria	Still, dry and neutral.
Haut Villers	Champagne	France	Dry and sparkling, straw color.
Herbemont	American	United States	Still, dry, fresh and aromatic.
Hermitage	South'n French	France	Still, full and soft.
Highercombe		Australia	Still.
Hochheimer (Hock)	Rhine	Germany	Light, sparkling and dry or sweet.
Johannisberger	Rhine	Germany	Dry, still or sparkling, delicate and soft.
Jurançon		United States	Dry, still and aromatic.
Lacrimæ Christi.	North Italian	Italy	Full, still or sparkling and sweet.
Liebfrauenmilch.	Rhine	Germany	Dry, still and delicate.
Lipari	Muscatel	Lipari Island	Still, sweet and raisiny.
Lunel	Muscatel	France	Still, sweet and spirituous.
Mâcon.	Burgundy	France	Still, light and soft.
Madeira	Madeira	Madeira	Still, dry, soft, delicate and nutty.
Malaga	Sherry	Spain	Still, and dry or sweet, with burnt flavor.
Malmsey	Madeira.	Madeira, Canaries, Greece, Spain and Italy.	Still, full and sweet.
Malvasia (Malvaise, Malvoisie)	Madeira.	All wine producing countries	Still, soft, full and sweet.
Manzanilla	Sherry	Spain	Dry, still and aromatic and nutty.
Markobrunner	Rhine	Germany	Still, dry, slightly astringent.
Marsala	Madeira.	Italy	Still, soft and sweet.
Médoc.	Bordeaux	France	Dry, still and delicate.
Montilla	Sherry	Spain	Still, dry, light and aromatic.
Moselle	Moselle	Germany	Light, still or sparkling, dry or sweet, soft, delicate and aromatic.
Montrachet	Burgundy	France	Dry, still and soft.
Muscatel (Muscadel, Muscadine, Muscat)	Muscatel	All southern countries	Still or sparkling, sweet, raisiny and aromatic.
Niersteiner	Rhine	Germany	Still, light and acid, delicate.
Oloroso	Sherry	Spain	Dry, still, nutty and aromatic.
Orvieto.	Muscat	Italy	Still and sweet.
Patras	Port	Greece	Still or sparkling, heavy and sharp.
Pedro Jimenez (PedroXimenes, Peter-see-me)	Sherry	Spain	Still, dry and nutty.
Pinot Blanc	Burgundy	France	Still, dry, full and soft.
Pinot Chardonay.	Burgundy	France	Still, dry, full and soft.
Pinot Gris	Rhine	Germany	Still, dry and delicate.
Pontac	Bordeaux	France	Still, rich and slightly aromatic.
Port	Port	Portugal	Heavy, still, sweet and astringent.
Preignac	Sauterne	France	Dry, still, fruity and aromatic.
Rauenthaler	Rhine	Germany	Light, still and dry.
Rhine	Rhine	Germany	Light, still or sparkling, dry and aromatic; yellow color.
Riesling	Rhine	Germany and Austria	Light, still, soft and subacid.
Romanée-Conti	Burgundy	France	Still or sparkling, full and soft.
Rüdesheimer	Rhine	Germany	Light, dry, still or sparkling, delicate and sharp.
Ruländer	Rhine	Germany	Still, dry and delicate.
Santenot	Burgundy	France	Dry, full, still and soft.
Saumur	Champagne	France	Still or sparkling, dry and delicate, gold color.
Sauterne	Bordeaux	France	Still, also sparkling, sweet or dry, spirituous and aromatic.
Sauvignon	Bordeaux	France	Still, dry, delicate, heavy and slightly astringent.
Sack	Malaga	Canary Islands	Still, dry or sweet and heavy.
Scharlachberger	Rhine	Germany	Light, still, delicate, aromatic and acid.
Scharzhofberger (Scharzberger).	Moselle	Germany	Light, still, dry and aromatic.
Scuppernong	American	United States	Still, sweet, aromatic, and delicate gold color.
Semillon	Sauterne	France	Full, still and soft with low acidity.
Sherry	Sherry	Spain	Still, strong, dry, nutty and spirituous.
Shiraz	Sherry	Persia	Still, sweet and rich.
Slankamenka	Hungarian	Hungary	Still, light, dry and full.
Stein (Holy Ghost Wine)	Rhine	Germany	Sparkling, full, soft and aromatic; gold color.
Steinberger	Rhine	Germany	Dry, still, subacid. light, rich and delicate.
Steinschiller	Hungarian	Hungary	Dry, still, light and subacid.
Syracuse	South'rn Italian	Sicily	Still or sparkling, raisiny and aromatic.
Teneriffe	Madeira	Canary Islands	Still, dry or sweet, soft, rich and aromatic.
Tokay	Tokay	Hungary	Still, sweet, soft, full and rich tonaz color.
Tonnerre	Burgundy	France	Sparkling, spirituous and aromatic, full and soft.
Val de Peñas	Sherry	Spain	Full, still and slightly astringent.
Verdal	South'n French	France	Light, dry, still and neutral.
Vernaccia	Austrian	Austria and Italy	Still, dry, full and acid.

WHITE WINES.—Continued.

NAME	Type	Country where made	Characteristics
Verzenay	Champagne	France	Light, sparkling and dry.
Volnay	Burgundy	France	Still or sparkling, full, delicate and soft.
Wälschriesling	Austrian	Austria, Germany and Switzerland	Dry, still and neutral.
Zeltinger	Moselle	Germany	Sparkling, sweet, soft, delicate and aromatic.
Zierfahndler	Austrian	Austria	Still, fiery, alcoholic and somewhat sweet.

varieties of Vinifera. The wines of California have been carefully studied by Hilgard and his associates at the State Agricultural Experiment Station, and have been described in the station's publications. In general, California wines are higher in alcohol, solids, tannin, and coloring matter than European wines made from the same grapes. Thus California Bordeaux may be made more like the product of the Gironde by dilution. The successful wines of the Pacific district may be distributed among the following types: Bordeaux, Champagne, Jura, Sauterne, Southern French, Rhine, Port, Sherry, and the cultivated varieties of the North Italian. Burgundy, which resembles French Bordeaux more closely than it does French Burgundy, has been largely made, but is being discontinued. The Hungarian type, with the exception of the Zinfandel, is also rapidly losing favor.

East of the Rocky Mountains American varieties of grapes are used almost exclusively and the relative amount of grapes used for wine-making and for the table depends largely upon the price of the latter; vines are most cultivated to supply table demands. But the number of vineyards for wine production is increasing, and there are some localities, especially in New York, Virginia, and Ohio, where wine-making is an important industry. Large amounts of sparkling wine of fair quality are produced in this district, chiefly from Concord, Catawba, and Delaware varieties. In Virginia and Ohio a red wine of good color and body is made from Norton's Virginia and Ives's seedling grapes; the Cynthiana, Elvira, and Goethe grapes are employed for wine in Missouri; the Southern States from North Carolina to Texas employ the Herbemont, Lenoir, Goethe, and Elvira; in the Atlantic Coast States from North Carolina to Florida, the Scuppernong is largely raised, and is highly prized both as a table and wine grape. The American varieties are said to have a 'foxy' flavor, which is believed to be due to the short time that the American species have been cultivated. The wines of the Northern States are usually drier, milder, less alcoholic, and more acid than more southerly kinds.

Austrian Wines. Austrian wines are little known in commerce; they are usually full, strong, and astringent. No distinct type can be described, since the various parts of Austria produce widely different varieties. Many Austrian vineyards are fortunately located, and excellent wine is produced where the methods of manufacture are not too careless and inefficient. The grapes are usually those of the surrounding countries, especially Germany, Hungary, and Italy, and but few characteristic local varieties are known.

Australian Wines. The wines of Australia are very similar to those of California, and are popular in England. The industry is growing rapidly and is of considerable importance.

French Wines. The production of wine is one of the leading industries of France, 78 of the 86 departments producing it in large quantities. Until 1875 France easily led the world, but in the following years her vineyards were devastated by the phylloxera, which reduced the acreage between the years 1875 and 1887 from 5,550,000 acres to 3,722,000, and the output of wine from 1,840,000,000 gallons to 535,000,000. Since the latter date vineyards have been restored by grafting on resistant American varieties, and the industry is again flourishing. The best known types of wine made in France are the Bordeaux, Burgundy, Champagne, and Sauterne. The wines of Saumer, of Jura, and the light wines of Southern France are also worthy of mention. These in turn are divided and subdivided according to local geographical and climatic conditions and the varieties of grapes employed. The wines produced in the region of the Gironde, in and near the Province of Bordellais, are commonly called Bordeaux, a class including a large number of wines with somewhat widely varying characteristics. They are all full, astringent, acid, usually rich in coloring matter, and have a medium alcohol content; their average composition is: alcohol, 10.5 per cent.; total acids, 0.60 per cent; tannin, 0.175 per cent.; body, 2.3 per cent. Among the grapes employed in the preparation of Bordeaux are the Cabernet, Verdot, Merlot, Malbeck, Teinturier, Gamai, and Charbono. Many light wines are made in this region, however, and these are usually blended with those having a higher percentage of alcohol before being placed on the market.

The great demand for Bordeaux wines and the ravages of the phylloxera have led to extensive adulteration, which consists chiefly in coloring with cherry juice and blending with cheaper Spanish wines. The establishment of the 'entrepots speciaux' (special bonded warehouses), now abolished, in which Spanish wines were admitted free of duty, mixed with wines of the Gironde region, and exported as Bordeaux wines, led to the exportation of low-grade mixtures under the name of Bordeaux, a practice which resulted in a loss of reputation for true Bordeaux wines. The use of foreign wine for mixing has scarcely diminished, as the duty required is only about six cents a gallon. The sophisticated wines are sent mainly to South America, and, it has been charged repeatedly, imported into the United States. On the other hand, it is claimed that the high protective tariff adopted by this country has effectually prevented the importation of low-priced wines. Certain it is that a very large percentage of the wine imported into the United States from this immediate vicinity is fraudulently labeled, and low-grade Bordeaux wines are commonly sold here under the names of famous brands.

The wines of the Gironde naturally arrange themselves into the following classes: Medoc, Graves, Sauterne, Entre-deux-mers, Saint Emilionnais, Bourgeais, and Blayais: subdivisions which are, in a sense, geographical and vary in size from three cantons to the greater part of a department. They are also graded according to their supposed relative merits. The first classification of the Medoc wines was made in the eighteenth century, and has not been revised since 1855, when six groups were made, the first five called 'classified growths,' and originally valued in the order of their number. This classification is rigorously retained, and it is difficult for a wine to be promoted into a higher grade even though it may make such a reputation as will demand a higher price than many in the grades above it.

First Growth: Chateau Lafitte, *Pauillac;* Château Margaux, *Margaux;* Château Latour, *Pauillac;* Château Haut-Brion, *Pessac.* Second Growth: Château Mouton, *Pauillac;* Château Rauzan-Ségla, *Margaux;* Château Rauzan-Gassies, *Margaux;* Château Léoville-Lascases, *Saint-Julien;* Château Léoville-Poyférré, *Saint-Julien;* Château Léoville-Barton, *Saint-Julien;* Château Durfort-Vivens, *Margaux;* Château Lascombes, *Margaux;* Château Gruaud-Larose-Sarget, *Saint-Julien;* Château Gruaud-Larose, *Saint-Julien;* Château Branne-Cantenac, *Cantenac;* Château Pichon-Longueville, *Pauillac;* Château Pichon-Longueville-Lelande, *Pauillac;* Château Ducru-Beaucaillou, *Saint-Julien;* Château Cos-d'Estournal, *Saint-Estèphe;* Château Montrose, *Saint-Estèphe.* Third Growth: Château Kirwan, *Cantenac;* Château Yssan, *Cantenac;* Château Lagrange, *Saint-Julien;* Château Langoa, *Saint-Julien;* Château Giscours, *Labarde;* Château Malescot, *Margaux;* Château Brown-Cantenac, *Cantenac;* Château Palmer, *Cantenac;* Château La Lagane, *Ludon;* Château Desmirail, *Margaux;* Château Canon-Ségur, *Saint-Estèphe;* Château Ferrière, *Margaux;* Château Becker, *Margaux.* Fourth Growth: Château *Saint-*Pierre, *Saint-Julien;* Château Duluc-Branaire, *Saint-Julien;* Château Talbot, *Saint-Julien;* Château Duhart, *Pauillac,* Château Poujet, *Cantenac;* Château La-Tour, *Saint-Laurent;* Château Rochet, *Saint-Estèphe;* Château Beychevelle, *Saint-Julien;* Château Le Prieure, *Cantenac;* Château Marquise-de-Therme, *Margaux.* Fifth Growth: Château Pontet-Canet, *Pauillac;* Château Balailley, *Pauillac;* Château Grand-Puy-Lacoste, *Pauillac;* Château Ducasse-Grand-Puy, *Pauillac;* Château Lynch-Bages, *Pauillac;* Château Lynch-Moussas, *Pauillac;* Château Dauzac, *Labarde;* Château Mouton-d'Armailhacq, *Pauillac;* Château Le Tettre, *Arsac;* Château Haut-Bages-Liberat, *Pauillac;* Château Pedesclaux, *Pauillac;* Château Belgrave. *Saint-Laurent;* Château Camensac, *Saint-Laurent;* Château Cos-Labory, *Saint-Estèphe;* Château Clerc-Milon, *Pauillac;* Château Croizet-Bages, *Pauillac;* Château Cantemerle, *Macau.*

Each of the Gironde districts makes wines distinctly different from those of the other districts, but this distinction is not commonly understood, and the great majority of the wines of the Gironde region are sold simply as Bordeaux, although they might be described more exactly as Medoc, Graves, or Saint Emilionnais.

The wines of Burgundy, which once ranked highest, are still held in high estimation by connoisseurs. Burgundy is rich in flavor, smooth, velvety, and when aged has a peculiar delicate aroma not present in the new wine. It has a medium content of alcohol, acid, and body, is very low in tannin, and rather lacking in color. The vineyards, consisting of Pinots, Gamai Noir, and Meunier grapes, are located about half way up the hillsides (800-1000 feet high) in the Côte d'Or between Dijon and Challons. Red and white varieties, which are made from the same grapes, are equally esteemed. The growths of Burgundy are classified as follows: *Red Burgundy:* Class I.—Romanée-Conti, Chambertin, Clos Vougeot, Richebourg, and La Tâche; Class II.—Musigne, Romanée, Saint-Vivant, Le Clos, Saint-Georges, Le Corton, Les Bonnes Mares, Le Clos du Tart; Class III.—Arvelets, Rugiens, Beaumont, Cailles, Cras-Murge, Boudots, Porrets, Prouliers, Thaurey, Vaucrains, Cailleret, Champaigns, Clavoillon, Clos Margeot, Clos Tavannes, Noyer, Bart, Carton, Echezaus, Fèves, Grèves, Ferrière, Sautenot. *White Burgundy:* Class I.—Montrachet; Class II.—Chevalier Montrachet, Bâtard Montrachet, Charmes, Combettes, Generrières, Goutte d'Or, Charlemagne. Similar to the wines of Burgundy, but inferior to them, are those of Chablis and Mâcon.

Champagne. True Champagne, which is characterized by the low alcohol content and high acidity, is made in the Department of Rheims, or the ancient Province of Champagne, the region being divided into six districts, Ay, Bouzy, Verzenay, Cramant, Pierry, and Monthelon, and the products of each being classified in various growths. The vineyards, located upon southerly hillsides, consist mainly of Meunier, black and white Pinot, and Gami varieties, the fruit of which is often gathered before fully mature, and, when necessary, the must brought to the proper composition by the addition of sugar and acid before fermentation. In 1900 the products of the region were 58,000,000 liters, and after an addition of sugar and water to the lees, 9,000,000 liters more. No wine from other districts is permitted to be sold in France as Champagne, but vintners in this district purchase the products of neighboring sections for blending, the result being that wines labeled Champagne can be purchased in Paris for very small sums. Many sparkling wines which compare favorably with Champagne are improperly so called, among such being certain Rhine, Moselle, and American wines. To meet the demand for cheap articles, much wine is artificially carbonated, like soda water, but the effervescence subsides sooner than in wine fermented under pressure.

Jura Type. The wines of the Department of Jura, made from such grapes as César, Mondeuse, Etraire de l'Adhui, Sirah, and Tinta Valdepañas, are deep-colored and astringent, fuller, smoother, less aromatic than the Bordeaux, markedly different from the delicate, smooth Burgundies of the Côte d'Or, upon which the district borders, and also from the neutral wines of Southern France. Their average composition is: alcohol, 11.50 per cent.; body, 3.00; acid, 0.55 per cent; tannin, 0.25 per cent.

Sauterne. The white wines made in the Sauterne district, in the Upper Gironde, are commonly divided into Haut and Grave Sauternes; the former, which contain about 14 per cent. of alcohol, 3.5 per cent. of body, and 0.7 per cent. of acid, being full, high in alcohol, smooth, somewhat aromatic, vinous, and slightly sweet, the latter lighter, drier, and less aromatic. When fermentation has reached the desired stage, Haut Sauternes are racked into heavily sulphured casks, and consequently contain a relatively large amount of sulphurous acid, to the presence of which the persistent headaches that follow indulgence are attributed. The Grave Sauternes include many of the most highly prized of European white wines, their flavor being admittedly due to the care used in preparation rather than to soil and climate. A marked difference exists between the first growth and the second. In the preparation of the latter, only ordinary care is exercised; in that of the former, the berries are picked individually, and no possible precautions are omitted. Grand First Growth: Château Yquem, *Sauternes*. First Growth: Château La-Tour-Blanche, *Bommes;* Château Vigneau, *Bommes;* Château Peyraquey, *Bommes;* Château Suduiraut, *Preignac;* Château Coutet, *Barsac;* Château Climens, *Barsac;* Château Guiraud, *Sauternes;* Château Rieussec, *Fargues;* Château Rabaut, *Bommes*. Second Growth: Château de-Myrat, *Barsac;* Château Doisy, *Barsac;* Château Peyxotto, *Bommes;* Château d'Arche, *Sauternes;* Château Filhot, *Sauternes;* Château Bronstet-Nérac, *Barsac;* Château Caillou, *Barsac;* Château Suau, *Barsac;* Château Malle, *Preignac;* Château Romer, *Preignac;* Château Lamothe, *Sauternes*.

A number of the 'crus Burgeois' are of great merit, and often bring a higher price than some of the second growth: Château Lafon, *Sauternes;* Château Cantegril, *Barsac;* Château Vedrines, *Barsac;* Château Piada, *Barsac;* Château des Rochers, *Preignac;* Château Bastor, *Preignac;* Château Pleytegat, *Preignac*.

A large amount of red and white, sweet and dry wine, unclassifiable into distinct types, but generally deficient in aroma, is made in Southern France. The wines of the hill regions are somewhat full and smooth, and those of the plains low in alcohol, body, tannin, and acidity. The *vines de liqueur*, such as the sweet Muscats and Roussillon, are most prized. The average composition is: alcohol, 10 per cent.; body, 2.10 per cent.; acid, 0.55 per cent.; tannin, 0.15 per cent.

German Wines. The valleys of the Rhine and the Moselle in Southern Germany, long famous for their wines, mark the northern limit of successful viticulture, but probably they suffer from unfavorable climatic conditions, especially cold and wet, more frequently than any other region. In favorable seasons the wines are of exceptionally fine flavor and delicate aroma. The Rhine Valley is the most important wine district of Germany; north of Coblenz little wine is made; between Coblenz and Assmannshausen that produced is inferior. From the vicinity of Assmannshausen to that of Mainz on the north bank of the river are many of the most famous wine-producing localities, and in the neighborhood of Hochheim is produced the so-called 'Hock,' under which name English usage often includes all Rhine wine.

The valleys of the Moselle and the Saar, especially in Lorraine, produce large quantities of high-grade wine. In Württemberg much low-grade wine is made. Characteristically German wine is white, but red wines are produced in some localities. In general, German wines are low in alcohol (generally below 9 per cent.) and body, and very often as much as 1 per cent. of acid); those of the higher grade approach French wines in composition, the average being: alcohol, 11 per cent.; body, 2.5 per cent.; acids, 0.7 per cent.

The list of varieties of grapes employed, smaller than that of France, includes Riesling (most widely grown), Traminer, Burger, Sylvaner Ruländer, Blaver, Burgunder (a pinot), Affenthaler, Arbst, Kleinberber, Orleans, and Elbling.

Greek Wines. Since early historical times the hillsides and valleys of Greece have been famous for their wines, which, however, are commonly so crudely and imperfectly made, and so badly fermented, that they cannot be carried through the first summer. Rather than perfect their methods, the vintners use smoke and resin as preservatives. The wines of Santorin, which are shipped mainly to Russia, are acknowledged best. Other celebrated Greek wines are the Malvoisies or the Kephissia of Attica, a red wine of Zante, and the so-called Tokays, which are largely exported from Patras. Others in good repute are Thera, Caliste, and Saint-Elie. The annual vintage is about 35,000,000 gallons.

Hungarian Wines. Among the most prized Hungarian wines are the Furmint or Tokay and the Kadarkas, produced from Hungarian varieties of grapes. German and Italian varieties are also grown. Among the celebrated vineyards are those of Erlau, Tokay, Bakator, Erdöd, Somlyo, and Ménes; the Hegyalja Mountain and the valleys of Samos and Bodrog in the north; and Rust, Alsó-Fehér, the Banat, and the Wojwodina in the south.

Italian Wines. Most of the wine of Northern Italy, being carelessly made from neglected vineyards, is light, neutral, coarse, and of bad keeping quality, but, owing to the natural advantages of the country, well-colored wines of high alcohol and tannin content can be produced with reasonable care. Though rough and astringent when new, they are fully equal to the Bordeaux type when properly aged, and are highly prized for their pleasant flavor and for blending with the neutral wines of Southern France. The wines of Asti and Montferrat are among the most famous. The wines of Southern Italy are rich in alcohol, but have less tannin and acid than the northern type. Those of Tuscany are highly prized, and a red wine made at Chianti finds a ready market. Among the grapes used are Refosco, Margemino, Barbera Fresa, Lagrain, Nebbliolo, and Moscatello Fino. The first two are remarkable for their adaptability, being among the most valuable wine grapes of Austria and California. The wines of Sardinia and Sicily are famous, the Marsala of Sicily especially.

Portuguese Wines. The soil and climate of Portugal are especially favorable to the grape, and some of the wines, which include red and white, sweet and dry, are among the world's most famous. Port, made in the mountains near Oporto, is said to have been first exported in 1678, and by 1750 to have reached a volume of 2,000,-

000 gallons. From 1757 to 1833 and from 1843 to 1867 it was controlled by a monopoly which raised the price, but lowered the quality to such an extent that the demand decreased. New port is ordinarily fortified with alcohol to hasten the ripening and prolong fermentation, and is made to appear aged by the addition of *jeropiga*, a solution of elderberries, raisins, molasses, and alcohol. Grapes were introduced into the island of Madeira early in the fifteenth century, since when Madeira vintages have been in great demand. An outbreak of 'oidium' early in the nineteenth century reduced the output from 2,770,000 gallons in 1813 to 3780 gallons in 1855, and induced extensive immigration to the West Indies. Since the latter date production has increased, a successful remedy for oidium having been found. A light, sweet, aromatic Madeira wine called Malmsey from Napoli di Malvasia, an island in the Grecian Archipelago, the wines of which are widely known by this name, is made from fully ripe grapes partially dried on the vines and is produced in the Azores, the Canaries, Sardinia, Sicily, and Provençe, as well as Madeira.

SPANISH WINES. The favorable soil and climate have made viticulture the most important agricultural industry of Spain, an industry which has repeatedly received governmental encouragement. The wines are high in alcohol, color, and aroma, and have been extensively used for blending with French wines, especially of the Gironde district, the red wines of Tawagona Rioja being favorites for this purpose. Spain leads the world in the manufacture of fortified wines. The most famous, sherry, a dry wine, made in Southern Spain between Port Saint-Mary (Puerto de Santa Maria) and Jerez, from which it is named, is so little fortified that it contains only 14 or 15 per cent. of alcohol. The grapes, having been allowed to ripen fully and to become partially dry before picking, are sold to large wineries, and not, as in other regions, worked up in small establishments. After fortification the wine is matured (baked) in hot rooms. Two classes of sherry deserve special mention, amontillado and manganilla, the former, inland wines, subdivided into fino (the most delicate) and oloroso; the latter, lighter and drier wines, made on the coast. Mantilla, a wine resembling manganilla, is made in the Province of Cordova. Other important Spanish wines are 'tinto,' a sweet red wine from the Rota district; Valde Peñas (red), from Central Spain; and Tarragona or 'Spanish red,' from Catalonia.

WINE MANUFACTURE. In the successful manufacture of wine, great discretion, unremitting care, and large experience are essential. Climate, location, soil, vintage, and method of preparation profoundly influence the character and composition of wine, and it is exceedingly difficult to maintain the uniformity demanded by commerce. The manufacture of wine really begins with the growing of the grapes and ends only after the final racking of the finished product. The vine must be intensively cultivated to replace the often unpleasant natural odor of the fruit with an agreeable aroma. The grape obtained, the vintner must ascertain the variety of wine for which it is suited, and then study the method and details of fermentation which will give best results. Unless the fruit is ripe when harvested, it may need to be artificially ripened or fitted for pressing by exposure to sun or fire heat, by steaming, sweating, or freezing; unless ripe when pressed it will generally yield a small quantity of juice, which must be further manipulated to avoid the production of wine of excessive acidity; and unless free from dust it must be sprayed to prevent a taint of earth in the final product.

In many of the wine-producing sections of Europe, even in Médoc, Graves, and Saint-Emilion, the wine-makers hesitate to adopt improved methods, because they fear that the quality of the product may be impaired. Here the 'cuvier' or wine-house is often a one-roomed, one-storied building which serves for both pressing and fermenting.

STEMMING, CRUSHING, AND PRESSING. Grapes whose tannin content is low, and especially fully mature or over-ripe grapes, are often pressed without stemming. The kind and quality of wine to be made also helps to decide whether or not stemming shall be performed. For high-grade wines the berries are often picked by hand; for ordinary grades, and particularly in old-fashioned practice, they are removed by wicker-work or galvanized iron combs or screens against which the clusters are worked by hand; in modern practice, prevalent in California and somewhat used in the Gironde, steam power stemmers are used, and some of these can stem more than 300 pounds of grapes a minute. For white wines the fruit is pressed (usually without stemming) and the juice fermented; for increasing the body and astringency it is crushed and allowed to ferment more or less before the must is removed for further fermentation; for red wines this is the usual practice, since it secures the required color from the skins in the solvent action of the alcohol formed during fermentation. According as a red or a white wine is desired the grapes in modern establishments are transferred by an endless chain from the storage rooms to a steaming machine or to an endless press. Sometimes a centrifugal machine is used for obtaining the juice from the crushed fruit. In some localities, however, the ancient method of treading the grapes with clogs or sandals or kneading with wooden pestles is still in operation, the claims being that it secures an amount of saccharine matter equal to that obtained by the recent process without crushing the stems or the unripe berries. Usually the 'first run,' the juice that flows naturally from the crushed grapes, is treated separately from the 'second run,' which is pressed out. The exhausted pomace may be treated with water, sugar, etc., for making inferior wines, brandy, or vinegar. In white-wine making the more perfect presses obtain from 60 to 80 per cent. or even more of the juice of the fruit, depending largely upon the kind of grape, whether watery or pulpy; in red-wine making they often secure more than 85 per cent., the pulp and skins having been acted upon by fermentation prior to pressing.

FERMENTATION. Since wine fermentation is due to yeasts found in the air and upon the skins of the fruit, the addition of yeast to the must as in beer-making is unnecessary. Action starts in from 12 to 24 hours, depending upon the temperature, and continues briskly for about a week. Selected yeasts (pure cultures), which have been carefully investigated, have been found of little value in cold climates, but in warm regions they are of assistance in controlling fermentation and improving the flavor of the finished product. It is not true, however, that they can convert cider into high-grade wine as is popularly reported.

In making red wine the grapes may be fermented whole or after crushing according to the vintner's preference. The former practice insures a clearer, brighter wine than the latter, which yields a larger 'first run' (*vin de goutte*) and a wine richer in body and coloring matter. In white-wine making the must becomes turbid from the growth of yeasts in it and from the flocculation of proteids and tartar. During the fermentation of red-wine must the floating mass (cap) of skins, stems, etc., brought to the surface by the gas evolved must be thoroughly mixed daily with the liquid to prevent souring and to insure uniform fermentation. To avoid this labor, perforated or loosely fitting covers are used, and in making red wine diverse inventions for excluding the air are gaining in favor.

With the appearance of requisite color in the must, the mass is pressed, an operation which, depending upon the color of the grapes and their content of tannin, may occur the day after crushing, usually before the fifth day, but sometimes not until the conclusion of fermentation. Since rapid fermentation at temperatures above 25° C. produces less aromatic and less stable wines than slower action at lower temperatures—a fact which largely accounts for the superior aroma of northern wines—cool cellars have long been used and artificial methods of cooling are sometimes employed. As soon as the wine becomes clear, usually in December, it is racked into clean casks and kept at a lower temperature in the subcellar. Here a slow fermentation continues and a second racking (drawing off) is made in March or April, when cheap wines may be bottled for sale. Higher grades are kept in casks and racked annually (in some cases for eight years) until the sediment (tartar, proteids, gummy matter, etc.) ceases to form, the casks being kept full to the bung by additions of wine every week during the first few months and fortnightly thereafter.

The fine bouquet so much desired is produced by the gradual oxidation of the alcohols and the combination of the resultant products with acids; hence the necessity to keep the wine in wood, through the pores of which the air enters. No bouquet is formed in air-tight vessels. Racking every alternate month permits the absorption of oxygen, thus hastening the formation of bouquet. But it exposes the wine to possible infection of so-called diseases which may impart stale, sour, or bitter flavors and thus ruin the product. To obviate this, scrupulous cleanliness is imperative. As an additional precaution, however, antiseptics and other means are used as preventives. Of these practices, burning sulphur in the casks is most general; filtering through unglazed porcelain, fining with gelatin and tannin are used in specific occasional cases; and pasteurizing has gained in favor since being demonstrated useful.

Sparkling Wines. Effervescent wines are prepared by adding a small quantity of sugar syrup and occasionally yeast-forming material to bottled (sometimes barreled) white or red still wines, after which they are kept closely corked to retain the carbon dioxide evolved by the ensuing fermentation. Champagne, which is the most noted of these wines, demands the highest degree of skill and care. The grapes are gathered with scissors, the defective berries are cut off, the fruit removed to the press room with as little bruising as feasible and pressed quickly to avoid the extraction of an excess of tannin and coloring matter. After vigorous fermentation subsides the wine is racked into barrels, blended for the desired flavor, and removed to the cold cellar, where it is again racked in December. In March or April it is removed to the fermenting room and sugar added. As soon as fermentation starts more sugar, as a syrup, is added and the wine decanted usually into tightly corked strong bottles, which are placed neck downward in an inclined position. When 'ripe' the bottle is given a gentle rotary movement, the cork drawn, the sediment which collects in the neck dextrously removed, a small quantity of sweetened and flavored liquor added, and the bottle quickly corked. Barrels are sometimes used to cheapen the price. Champagne is never entirely dry, a trace of sugar being necessary to prevent a raw, unpleasant taste.

Sweet or Fortified Wines. To produce sweet wines, which may be red or white, still or sparkling, grapes of high sugar content are used, and before the sugar has all been acted upon fermentation is stopped by the addition of wine brandy or alcohol, evaporated must or a sugar solution being also often added to meet certain demands. The mixture is then ripened in warm rooms in partially filled casks. It must contain more than 18 per cent. alcohol to prevent fermentation of the sugar, of which ingredient as much as 8 per cent. may be found in the finished product.

Blending. Since the composition, flavor, etc., of wine obtained from any variety of grape varies with seasons and various other factors, and since commerce demands uniformity, the mixing of somewhat dissimilar wines is widely practiced. By this means excess or deficiency of acids, body, astringency, etc., are corrected. In the operation the known composition of the elementary wines is of assistance, but much more depends upon the manipulator. In no other branch of wine-making are skill, experience, and judgment more requisite.

Composition and Adulteration. The constituents of grape must vary considerably in percentage with season, variety, state of maturity, etc. The principal ones are water, sugar, and cream of tartar (bitartrate of potassium).

In cold climates, especially in unfavorable years, the sugars present (about equal parts grape and fruit sugar, with some cane sugar) may be less than twelve per cent.; in very warm localities, thirty per cent. or even more; the usual range is from fifteen to twenty-five per cent. Since they continue to form until the grapes are fully ripe, some is sacrificed when immature grapes are used; and since the mature fruit loses moisture rapidly, the relative proportion of sugars to water increases after maturity—a phenomenon utilized in making certain wines, notably Malmsey. In the preparation of dry wines, musts containing more than twenty-five per cent. of sugar are commonly diluted thus to prevent the formation of a sweet wine by the non-conversion of the sugar into alcohol. Fermentation does not yield more than about 14 per cent. of alcohol and is slow and uncertain above 12.5 per cent. It converts the sugars largely into alcohol and carbon dioxide, theoretically thus:

$$\begin{matrix}\text{Glucose or}\\\text{levulose}\end{matrix}=\text{Alcohol}+\begin{matrix}\text{Carbon}\\\text{dioxide}\end{matrix}$$

$$C_6H_{12}O_6=2C_2H_6O+2CO_2$$

the alcohol being 51.11 per cent. of the sugar fermented. In practice, however, only about 48.5 per cent. of alcohol is formed, the deficiency being represented mainly by glycerin (from 6 to 14 parts by weight to 100 of alcohol), higher alcohols, succinic and acetic acids and ethereal salts, upon the nature and quantity of which last the flavor of wine largely depends. Since the development of sugar is largely dependent upon temperature, the wines of northern climates are uniformly poorer in alcohol than those of the south. The alcohol content of unfortified wines known to be pure varies from 2½ to 18 per cent. by volume; that of glycerol, from 0.2 to 1.4 grams per 100 cubic centimeters. A relatively high ratio of glycerol to alcohol is thought to indicate a superior wine, and in Europe a content of 7 to 14 parts glycerol to alcohol is desired, but, since many wines contain less than 7, the tendency is to lower the minimum to 6. Judging from the few complete analyses, American wines seem to fall below European in this ingredient.

Cream of tartar, to which the acidity of must is largely due, may range from 0.5 to 1.5 per cent. As grapes mature their relative acidity diminishes with the increase of sugar; as the must matures its absolute acidity decreases because of the deposition of cream of tartar, which is insoluble in alcohol. The acid of wines, which rarely contains less than 0.4 gram nor more than 1.5 gram, calculated as tartaric acid, per 100 cubic centimeters, is often diminished during ageing by the action of microörganisms as well as by the separation of the cream of tartar. It may, however, be increased by concentration and by the formation of lactic and succinic acids. Its content is usually in inverse ratio to the content of alcohol; thus dry, northern wines are less alcoholic but more acid and aromatic than southern ones. Volatile acids are always formed during fermentation, but excess indicates carelessness in management. In northern wines they are limited to .12 and .16 grams per 100 cubic centimeters respectively, in white and red wines.

Coloring matter is found in the skins, which, like the stems and seed coats, contain tannin. Hence, the closer the crushing, and, in red-wine making, the longer the immersion of these parts in the must, the higher the percentage of tannin in the expressed juice. Tannin is not present in the 'first run,' and, like coloring matter, is deficient in the juice of stemmed grapes quickly pressed.

Albuminoids, of which from 0.25 to 0.9 per cent. is found in must, are somewhat decreased by fermentation. Their deficiency precludes complete fermentation; their excess is thought to interfere with the preservation of the wine; but their offices are not fully understood. Varying somewhat with the varieties, the solids of white wine (except sugar) vary from 1.6 to 2.5 grams per 100 cubic centimeters; those of red wine, 1.8 to 3.7; pure German reds reaching the minimum and Californian rarely less than 2.4 grams. Wines with an ash content of less than 0.14 grams per 100 cubic centimeters are suspected, as are also those containing a high sodium chloride or potassium sulphate percentage and a minimum ash. The ratio of ash to extract is usually about 1 to 10, and the percentage of ash depends largely upon the composition of the wine in other respects; for instance, a plastered wine will necessarily contain a high ash, and a new wine more than an old. The separation of cream of tartar diminishes the ash content and the neutralization of excessive acidity increases it.

The Municipal Laboratory of Paris considers red and white wines to be fortified when their alcohol content exceeds 4.5 and 6.5 times, respectively, the weight of their extracts. It also considers wine to be diluted with water when the percentage of alcohol by volume ('natural' alcohol in the case of fortified wines), plus the weight of total acids in grams (expressed as sulphuric acid—H_2SO_4), is less than 12.5 per liter.

The figure obtained by deducting the sum of the glycerol, ash, and fixed acids from the sugar-free solids is usually between 0.3 and 0.6 gram per 100 cubic centimeters, a figure of great importance in wines of low extract content, since it helps to determine whether addition has been made to increase the percentage of extract to the minimum limit. A high undetermined extract should accompany a high percentage of alcohol and a low acid content.

The composition outlined above is possible only with wines made from grapes adapted to their climate and soil and grown in a favorable year. When the must of a particular vintage is not normal, as often happens, additions of sugar (chaptalizing), of acid, or water (gallizing) are permitted in many countries to make it normal; but such treatment is liable to abuse. When added so as to increase the output the practice is fraudulent. The fermentation of the pomace with sugar water, or of the liquid obtained by extracting pomace with sugar water (peotizing), is popular in France, the cheap wine-like beverage (piquette) being a legitimate product when sold under its own name. Cheap wines are often made from raisins and other dried fruits, sugar and glucose. The addition of preservatives to wine is not permissible. The use of sulphur for bleaching a dark-colored white wine or to check improper fermentation is fraudulent, though sulphur is widely used for cleansing the casks prior to their use in fermenting. Foreign coloring matters in red wine should not be employed; the skins should supply sufficient color. Misrepresentation as to variety of wine and place of production is the most common fraud practiced with supposed medium and high-grade wines. Blending, which is allowable and essential in many cases, is subject to abuse in some celebrated wine regions, especially near Bordeaux, where foreign wines are largely used to increase the volume and cheapen the product.

DIETETIC AND MEDICINAL VALUE OF WINES. As a general rule, the use of wine even in moderate quantities is not necessary for young or adult persons in good health and living under normal conditions. In elderly individuals and those engaged in sedentary occupations, the taking of small quantities of carefully chosen wine with the meals is not only permissible, but oftentimes distinctly beneficial. Wines may be roughly divided according to their therapeutic and dietetic uses into the heavy sweet wines such as port, sherry, and Madeira; the lighter clarets, Burgundies, and acid white wines, Rhine and Moselle wines; and the sparkling wines or champagnes. Heavy wines are often used in disease instead of whisky or brandy when an alcoholic stimulant is needed. Port is a serviceable temporary tonic in cases of debility and exhaustion, especially in old people. It may be spiced, or mulled, and diluted. It is reputed to be unsuitable for dyspeptics, and those subject to gout, rheumatism, biliousness, or to the formation of gall stones or gravel.

The clarets or Bordeaux and the Burgundies and certain red Hungarian wines, which have a wider range of usefulness, if sound and well made, are among the most wholesome wines, and are serviceable tonics for invalids or convalescents. They contain little or no sugar and are of approved value in convalescence. The lighter varieties are best for daily consumption by brain-workers or those leading a sedentary life. Burgundy, being a much 'fuller' wine than claret, is considered useful as a tonic and blood-maker. All of these wines are best taken somewhat diluted with water. The red wines, being somewhat astringent, are thought to act beneficially by overcoming the excessive excitability of the visceral nerves, and by controlling intestinal fermentation. The white acid wines contain less tannin and more free acid than the red, and are reputed diuretic, especially when diluted with some alkaline mineral water, which counteracts the excess of acidity.

Champagnes or sparkling wines are good for invalids and others with extremely irritable stomachs. Champagne will often remain in the stomach when that organ will retain nothing else. It is absorbed with great rapidity and acts promptly by invigorating the nervous system. It may often be substituted with advantage for spirits when an alcoholic stimulant is indicated. Sparkling wines impede the digestion less than still ones, and when taken in moderation stimulate the secretion of the gastric juice and the muscular action of the stomach, and slightly accelerate the speed of the chemical forces concerned in gastric digestion. The heavy wines retard digestion perceptibly.

Bibliography. Consult Roos, *Wine-Making in Hot Countries*, Translated by Dubois and Wilkinson (Victoria, 1900); Hussmann, *American Grape-Growing and Wine-Making* (New York, 1896); Thudichum, *A Treatise on Wines; Their Origin, Nature, and Varieties, with Viticulture and Vinification* (New York, 1896). Also bulletins of the State Agricultural Experiment Station at Berkeley, California, and of the Bureau of Chemistry, United States Department of Agriculture.

WINE'BRENNER, John (1797-1860). An American clergyman, founder of the Winebrennerians or Church of God. He was born in Frederick County, Maryland, was ordained as a minister of the German Reformed Church in 1820, and took charge of four small congregations at and near Harrisburg, Pennsylvania. In 1827, being out of harmony with the belief and practice of this Church, he withdrew, but continued to preach. In 1830, with several other preachers, he founded a new organization. (See Church of God.) For several years he edited the *Church Advocate*, and published a *Pronouncing Testament and Gazetteer* (1836); *Brief View of the Church of God* (1840); *Regeneration* (1844); *Practical and Doctrinal Sermons* (1880).

WINEBRENNERIANS. See Church of God.

WINE PALM. See Jupati Palm.

WINER. vē'nĕr, Georg Benedikt (1789-1858). A German biblical scholar. He was born in Leipzig, studied at the university there, and was made professor in 1819. In 1823 he was appointed to a chair at Erlangen, but returned to Leipzig in 1832. He devoted himself particularly to the philological side of Bible study, and is best known for his *Darstellung des Lehrbegriffs der verschiedenen christlichen Kirchenparteien* (1824; Eng. trans., Edinburgh, 1873). Besides this he published a Chaldee grammar (1824; Eng. trans., Andover, 1845) and reading-book (1825); *Biblisches Realwörterbuch* (1820); *Handbuch der theologischen Litteratur* (3d ed. 1838-40; supplementary volume, 1842). He edited the *Neues kritisches Journal der theologischen Litteratur* (1824-30) and the *Zeitschrift für wissenschaftliche Theologie* (1826-32).

WINES, Enoch Cobb (1806-79). A Congregational minister, noted for his services to the cause of a scientific and humane system of penology. He was born at Hanover, New Jersey, and graduated at Middlebury College in 1827. After teaching in the United States Navy, at Princeton and Burlington, New Jersey, and in Philadelphia, he studied theology and began to preach in 1849. He was pastor at Cornwall, Vermont, and East Hampton, Long Island, became professor of languages in Washington College, Pennsylvania, in 1853, and president of Saint Louis University in 1859. In 1862 he became secretary of the New York Prison Association, and of the National Prison Association in 1870. He was member of a commission appointed by the State of New York to investigate the relation of free labor and prison labor. In 1871-72 he organized in London the first international congress on prison discipline, and was an active member of many later meetings for similar purposes both in the United States and Europe. Of his published works mention may be made of *Two Years and a Half in the Navy* (1832); *Hints on Popular Education* (1838); *Commentaries on the Laws of the Ancient Hebrews* (1852); *The Prisons and Reformatories of the United States and Canada* (1867); *State of Prisons and Child-Saving Institutions* (1880).

WINES, Frederick Howard (1838—). An American sociologist, born in Philadelphia, Pa. He graduated at Washington College (Pa.), in 1857; was chaplain in the United States Army from 1862 to 1864, and after graduating at the Princeton Theological Seminary in 1865, became pastor of the First Presbyterian Church of Springfield, Ill. From 1869 to 1893 he was secretary, and in 1883 president, of the Illinois State Board of Commissioners of Public Charities. Besides giving much time to the work of the National Conferences of Charities and Correction, the International Prison Congress, and the National Prison Association, he lectured on these subjects at Harvard, Princeton, the Johns

Hopkins University, and elsewhere. He had charge of the statistics of crime and pauperism for the Tenth and Eleventh Censuses, and was assistant director of the Twelfth Census. His publications include *Punishment and Reformation* (1895), a standard work, and *The Liquor Problem in Its Legislative Aspects* (1897).

WIN'FIELD. The county-seat of Cowley County, Kan., 225 miles southwest of Kansas City, on the Walnut River, and on the Atchison, Topeka and Santa Fe, the Saint Louis and San Francisco, and the Missouri Pacific railroads (Map: Kansas, F 4). It is the seat of the State Imbecile Asylum, of the Southwest Kansas College (Methodist Episcopal), opened in 1886, and Saint John's Lutheran College, opened in 1893. Winfield is the commercial centre of a section engaged in farming and stock-raising, and containing a supply of natural gas. There are flouring mills, grain elevators, machine shops, and a large produce-packing establishment. Limestone is extensively quarried in the vicinity. Under the charter of 1878, the government is vested in a mayor, chosen biennially, and a unicameral council. Winfield was settled in 1870, and was incorporated the following year. Population, in 1890, 5184; in 1900, 5554.

WINFRID. See BONIFACE, SAINT.

WINGED LION. See LION OF SAINT MARK.

WING'FIELD, EDWARD MARIA (c.1560-c.1613). An English merchant and colonist in America, born at Stoneley, Huntingdonshire. He served in the English Army both in Ireland and in the Low Countries. Becoming interested in schemes for American colonization, he was one of those to whom the patent of Virginia was granted April 6, 1606. He was the only one of the patentees who sailed to America with the first colonists, and was named in the sealed instructions a member of the council, of which he was elected the first president. He quarreled with the other members of the council, and with Captain John Smith in particular, his Catholicism threw suspicion upon his loyalty, and he was soon deposed both from the council and governorship in September, 1607. In 1608 he returned to England and was living on his family estates as late as 1613. He wrote *A Discourse of Virginia,* a journal of the colony from the first setting out to his departure from it, the manuscript of which is in Lambeth Library. It was edited and published by Charles Deane in 1860.

WINGLESS VICTORY. See NIKE APTEROS.

WING-SHELL. The name of various mollusk-shells having a shape or expansions regarded as wing-like, e. g. the great stromb (q.v.), or certain broad species of Unio; more especially, the name of the irregular bivalves of the tropical family Aviculidæ, which includes the pearl-oysters (q.v.) and other species of interest, existing and fossil. The family characteristic, typically displayed in the genus Avicula (see Plate of ABALONE, ETC.), is the straight hinge margin, produced on each side into wing-like 'ears.' This is carried to its extreme in the hammer-oyster (q.v.). The outer surface of the shell is foliaceous, and the inner always highly nacreous, yielding valuable mother-of-pearl.

WINIFRED, wĭn'ĭ-frĕd, SAINT. A British maiden of noble family, who lived in the seventh century. According to the legend which in later times grew up round her history, Prince Caradog Ap Alan cut off her head because she would not accept his addresses. Her head, so the legend says, rolled down the hill and into Saint Bueno's Church, where immediately a spring appeared. The head was replaced by Saint Bueno, after which she lived fifteen years. This spring, called Holywell, is one of the most famous in England. The flow of water has never ceased. The spring was leased in 1876 to the corporation of Holywell by the Duke of Westminster for a thousand years at a sovereign a year. See HOLYWELL.

WINKELMANN, vĭŋ'kel-män, EDUARD (1838-96). A German historian, born in Danzig and educated at Berlin and Göttingen. He became head master of the knight and chapter school at Reval in 1860, and in 1865 was appointed professor at the University of Dorpat. He was called to the chair of history at Bern in 1869, and in 1873 to Heidelberg. He published *Geschichte Kaiser Friedrichs II. und seiner Reiche 1212-1235* (1863); *Forschungen zur deutschen Geschichte* (1872); *Bibliotheca Livoniæ Historica* (1870 and 1878); *Philipp von Schwaben und Otto IV. von Braunschweig* (1873); *Geschichte der Angelsachsen* (1883); *Urkundenbuch der Universität Heidelberg* (1886); and *Kaiser Friedrich II.* (1889-97).

WINKELMANN, HERMANN (1845—). A German dramatic tenor, born in Brunswick. He adopted the profession of a singer after he had reached manhood. He made his début at Sondershausen, and then went to Darmstadt and Hamburg. He became identified with the Wagnerian drama in 1882, when he took the part of Parsifal at Bayreuth, with such success that he was engaged for the Imperial Opera at Vienna. Here he sang in Wagner's operas, with Madame Friedrich-Materna and Herr Scaria. The famous trio made a tour of the United States in 1884.

WINKELRIED, vĭŋ'kel-rēt, ARNOLD or ERNI. A Swiss peasant, who, according to tradition, is said to have brought about the victory of the Swiss over Duke Leopold of Austria at Sempach (q.v.) on July 9, 1386. The tradition relates that Winkelried broke the phalanx of the Austrians by gathering several spears of the enemy and pressing them into his breast, thus opening a way for his companions. A monument was erected in his honor on the battlefield in 1886. There has been considerable dispute as to whether Winkelried is a legendary character or not. There is no contemporary notice of him.

WINKLE. A name, shortened from 'periwinkle,' applied among oystermen of the Northeastern coast of the United States to certain large mollusks destructive to oysters. See CONCH; OYSTER.

WIN'LOCK, JOSEPH (1826-75). An American astronomer, born at Shelbyville, Ky. Upon graduating at Shelby College in 1845, he became professor of mathematics and astronomy in that institution, but in 1852 he removed to Cambridge to become a computer of the *Nautical Almanac.* He was professor of mathematics in the navy, 1856-66, and of astronomy at Harvard, 1866-75, and director of the observatory, where he made many important improvements in astronomical instruments. During his professorship in the navy Winlock was superintendent of the *American Ephemeris* and *Nautical Almanac*. He was much interested also in the observation of solar eclipses, and was the chief of several eclipse expeditions.

WIN'NEBA'GO. An important tribe of Siouan stock (q.v.) formerly residing in central Wisconsin, chiefly about the lake which bears their name, but now in part located on the Omaha reservation in northeastern Nebraska, while the majority continue scattered among the whites in their old country. They call themselves *Hochanka*, Winnebago being their Algonquian name, originally applied to the lake. They are first mentioned in 1640, and more than a century afterwards were prominent allies of the French against the English. Subsequently, in the Revolutionary War and down to the close of the War of 1812, they fought against the Americans, first under Little Turtle and afterwards under Tecumtha. By treaties between 1825 and 1837 they sold all their lands east of the Mississippi and removed to Iowa. After several other removals, each disastrous in its effect upon the Indians, they were finally located in 1866 on the present reservation in Nebraska, although in various ways the major portion contrived to find their way back to their old homes, where they long remained forgotten and free from Government supervision. In their original condition the Winnebago partook rather of the characteristics of the Algonquian tribes of the lakes than of the cognate tribes west of the Mississippi. Their alliances also were with the lake tribes as against those of the west. They lived in wigwams of wagon-top shape, covered with rush mats, which the women were very expert in weaving and dyeing. They practiced a limited agriculture, but, aside from hunting and fishing, depended chiefly upon wild rice. They also understood the art of making sugar from the juice of the maple. Those still in Wisconsin continue to follow their former habits of life to a great extent, very few of them engaging in civilized farming or other occupation. Those upon the reservation in Nebraska are reported to be retrograding, a condition ascribed largely to the evils of the lease system by which they are assured of a living without working. The Winnebago in 1822—before the great smallpox epidemic of 1836, which carried off almost one-fourth of them—were estimated at 5800. They number now about 2540, of whom 1140 are on the reservation, the rest in Wisconsin.

WINNEBAGO (Algonquian, dirty or cloudy water). A large lake in the eastern part of Wisconsin (Map: Wisconsin, E 5). It is 28 miles long, from 3 to 11 miles wide, and discharges northeastward into Green Bay through the Fox River. It is navigated by steamers, and there are a number of towns on its banks, the largest being Oshkosh and Fond du Lac.

WIN'NER, SEPTIMUS (1827-1902). An American musician, born in Philadelphia, Pa. In 1853 he opened a music store in Philadelphia. He became prominent in the city's musical enterprises, at various times acting as secretary of the Board of Music Trade, manager of the Philadelphia Musical Fund, and editor of the music department of *Peterson's Magazine*. His national reputation was first gained by his "How Sweet are the Roses" (1850), "What is Home Without a Mother" (1854), "Listen to the Mocking Bird" (1855), and other songs and ballads of a sentimental nature, written under various pseudonyms, such as "Alice Hawthorne," "Percy Guyer," and "Paul Stenton." During the Civil War his patriotic songs had a great influence upon public sentiment. His "Give Me Back Our Old Commander" caused his imprisonment for criticising the removal of General McClellan from command of the Army of the Potomac; and "God Save Our President," written during Garfield's illness in 1881, was also popular. He was equally well known for his "Gems of the Opera" and other similar series containing operatic airs arranged for various combinations of instruments, and for the many instruction manuals which he published under the general title "Sep. Winner's Methods."

WINNINISH (Canadian French *Ouananiche*, from the North American Indian name). A variety of the common salmon (*Salmo salar*, variety *ouananiche*), of the Saguenay River, Quebec, and neighboring waters. Though smaller than the ordinary salmon, averaging 3½ pounds, it is extremely vigorous and active, and very high in the favor of anglers. Jordan and some recent ichthyologists rank it as a species.

WIN'NIPEG. A lake in the provinces of Manitoba, Keewatin, and Saskatchewan, Canada, lying 90 miles north of the State of Minnesota, and about 350 miles northwest of Lake Superior (Map: Manitoba, K 4). It is 275 miles long and from 40 to 60 miles broad, has an area of 9000 square miles, and lies 710 feet above sea-level. Its greatest depth is 70 feet. It is connected by navigable channels with Lake Winnipegoosis and Manitoba, which lie to the west and extend almost parallel with it. Of its tributaries the largest is the Saskatchewan (q.v.). The Winnipeg River, 300 miles long, and flowing in a northwesterly direction, connects the Lake of the Woods and Rainy Lake with Lake Winnipeg. The Red River and its great branch, the Assiniboine, discharge their waters at the southern extremity of Lake Winnipeg. Nelson River, issuing at the north end of Lake Winnipeg, is its principal outlet, and connects it with Hudson Bay. A few Icelandic colonies to the southwest and some scattered posts of the Hudson's Bay Company are the only settlements on its banks. The whitefish of the lake are considered unexcelled.

WINNIPEG. The capital of the Province of Manitoba, Canada, situated at the confluence of the Red and Assiniboine rivers, the two principal streams of the province, 1424 miles west of Montreal, in latitude 49° 56′ N. and longitude 97° 7′ W. (Map: Manitoba, K 5). Through the Red River there is access to Lake Winnipeg. The city is regularly laid out, except the old part contiguous to Fort Garry. River Avenue is a favorite driving boulevard. The principal residential portion of the city is south of Portage Avenue, but there are many handsome residences in Fort Rouge, the part of Winnipeg south of the Assiniboine. The city is the headquarters of the provincial Government, and has the residence of the Lieutenant Governor, the Parliament house, and the public departments of the province. The city hall is noteworthy. The University of Manitoba, situated here, includes Manitoba College (Presbyterian), Saint John's College (Anglican), Saint Boniface College (Roman Catholic), and a medical college. Saint Boniface, a town (population, in 1901, 2019), chiefly French, lies on the east bank of the Red River, opposite Winnipeg, and contains Saint Boniface College, hospitals, and schools. It is connected with the city by an iron toll bridge. The trade of Winnipeg is large, the exports being grains, vegetables, flour, fish, cheese, butter, and furs. It has large machine and engine shops and car works belonging to the Canadian Pacific Railroad, lumber mills, flour mills, and other factories.

The city is governed by a mayor and a board of twelve councilmen, and shows a progressive civic spirit. As Fort Garry, Winnipeg was originally an old post of the Hudson's Bay Company, and was associated with the earliest days of trapping and fur-trading. The fort was situated about 400 yards from the mouth of the Assiniboine, and in 1835 was replaced by a larger structure, now dismantled and almost obliterated, which was the centre of the colony of Assiniboia. The fort figures prominently in the history of that colony and of Manitoba, and is noted as the seat of Louis Riel's short-lived Government, 1869-70. Population, in 1901, 42,336.

WIN′NIPEGOOS, or **WIN′NIPEGOO′SIS.** A lake in Manitoba extending northward into Saskatchewan, and lying 20 to 60 miles west of Lake Winnipeg (Map: Canada, L 6). It is about 130 miles long and 20 miles broad, but shallow and navigable only for vessels drawing 10 feet or under. It discharges through the Waterhen River southeastward into Lake Manitoba.

WINNIPISEOGEE, wĭn′nĭ-pĭ-sạ′gē, or **WINNEPESAUKEE.** A lake in the east central part of New Hampshire (Map: New Hampshire, J 7). It has an extreme length of 20 miles and a width of 10 miles, but is very irregular in outline, and studded with numerous islands. The water is clear and deep, and the picturesque scenery attracts large numbers of visitors. The lake discharges through a small stream into the Merrimac River.

WINO′NA. The county-seat of Winona County, Minn., 103 miles southeast of Saint Paul, on the Mississippi River, here spanned by several bridges, and on the Chicago, Milwaukee and Saint Paul, the Chicago and Northwestern, the Chicago, Burlington and Quincy, the Chicago Great Western, and the Green Bay and Western railroads (Map: Minnesota, G 6). It has a State normal school, Winona Seminary, and a public library. Other features include the Winona General Hospital, the Margaret Simpson Home, and the United States Government building. Winona is favored with excellent transportation facilities and is especially known as the centre of extensive grain and lumber interests. It is prominent industrially, its various manufacturing establishments in the census year 1900 having $6,192,386 invested capital and a production valued at $6,576,382. There are several large saw mills, railway shops, breweries, and manufactories of flour, flax fibre, carriages and wagons, boots and shoes, farm implements, patent medicines, machine shop products, etc. The water-works are owned by the municipality. Winona was settled in 1851, was laid out as a town in 1852, and was chartered in 1857. Population, in 1890, 18,208; in 1900, 19,714.

WINOOSKI, wĭ-nōōs′kė. A village in the town of Colchester, Vt. See COLCHESTER.

WINOOSKI, or ONION. A river of northern Vermont. It rises in the eastern part of the State, flows westward past Montpelier and through the Green Mountains, and empties into Lake Champlain near Burlington (Map: Vermont, C 4). It is about 100 miles long, and is a picturesque stream flowing in several places through deep gorges, and broken by numerous falls and rapids.

WINS′FORD. A salt-mining town in Cheshire, England, 5½ miles south of Norwich (Map: England, D 3). Population, in 1901, 10,382.

WIN′SHIP, GEORGE PARKER (1871—). An American librarian and writer, born in Bridgewater, Mass. He graduated in 1893 at Harvard, where he was an assistant in history in 1893-95; and subsequently was placed in charge of the John Carter Brown Library at Providence, R. I. He published: *The Coronado Expedition* (1896); *John Cabot* (1898); *Geoffrey Chaucer* (1900); and *Cabot Bibliography* (1900).

WINS′LOW, EDWARD (1595-1655). An Anglo-American colonial governor, born at Droitwich, Worcestershire, England. While making a tour on the Continent, he became acquainted with John Robinson, minister of the Independent church in Leyden, which had separated from the Church of England, and became a member of the Leyden congregation. In 1620, with his wife and brother, he joined the *Mayflower* at Southampton and was one of the party that landed at Plymouth, Mass. His wife died in March, 1621, and his marriage two months later, with Mrs. Susannah White, was the first in New England. Susannah was the mother of Peregrine White, the first English child born in New England. The same year Winslow won the friendship of Massasoit, the Indian chief, with whom he negotiated a treaty, and whom two years later he cured of an illness. In 1623 and 1624 he visited England as agent of the Plymouth Colony. On his return he became a magistrate. He went to England again in 1625. He was elected governor in 1633. While on a visit to England in 1635, he went before the council and prevented any attempt to destroy the self-government of the Plymouth Colony. The same year, as the instigation of an envious colonist, he was imprisoned for seventeen weeks by Laud on the charge of giving instruction in the church and of celebrating marriages, while only a layman. He was Governor again in 1636 and 1644; again visited England in 1646, and in 1649 went to England and stayed there. He was one of the founders of the Society for Propagating the Gospel in New England. In 1655 he was appointed by Cromwell one of three commissioners to take charge of an expedition against the Spaniards in the West Indies, but he died on the voyage between Hispaniola and Jamaica. He wrote several works, the chief of which, *Good Newes from New England* (1624), *Hypocrisie Unmasked* (1646), and *The Glorious Progress of the Gospell Amongst the Indians* (1649), have been republished by the Massachusetts Historical Society.

WINSLOW, FORBES (BENIGNUS) (1810-74). An English alienist, of New England stock, born in London. He studied medicine in New York, then at the Royal College of Surgeons, and at Aberdeen, at both of which he took his degree in 1835-36. He made a specialty of the treatment of insanity, and was for some time superintendent of a private asylum at Hammersmith and of one in London. He then devoted himself entirely to consultation practice in London. He founded in 1848 the *Quarterly Journal of Psychological Medicine and Mental Pathology*, and conducted it till 1865. He also founded *The Medical Critic* (1861-63). He served as an officer in many medical societies, and in 1853 was president of the Medical Society of London. Among his works are: *Physic and Physicians* (1839); *The Anatomy of Suicide* (1840); *On the Preservation of Health of Body and Mind* (1842); *The Plea of Insanity in Criminal Cases* (1843); *Lettsomian Lectures on Insanity* (1854); *On Obscure Diseases of the Brain and Disorders of the Mind* (1861); *Insanity and Crime* (1864); *On Uncontrollable Drunkenness* (1866); *Light, Its Influence on Life and Health* (1867).

WINSLOW, HUBBARD (1799-1864). A Presbyterian clergyman. He was born at Williston, Vt. He graduated at Yale College, 1825, and at the Yale Theological Seminary 1828. He was pastor at Dover, N. H., 1828-32; of Bowdoin Street Church, Boston, 1832-44; principal of Mount Vernon Young Ladies' Institute, Boston, 1844-54; edited the *Religious Magazine*, 1837-40; was Presbyterian pastor at Geneva, N. Y., 1857-59; and was in charge of Fiftieth Street Presbyterian Church, New York, 1861-62. Among his numerous publications may be mentioned: *Doctrine of the Trinity* (1831); *History of the First Church, Dover, N. H.* (1831); *Young Man's Aid* (1836); *Are You a Christian?* (1837); *Intellectual Philosophy* (1852); *Moral Philosophy* (1856); *Hidden Life* (1863).

WINSLOW, vĭns′lō, JACQUES BÉNIGNE (1669-1760). A Danish naturalist, born at Odense. He studied in Holland and Paris, and in 1743 was made a professor of anatomy in the Jardin du Roi in Paris. He wrote a large number of works, of which the most important is *Exposition anatomique de la structure du corps humain* (5 vols., 1732; afterwards translated into several languages). An opening in the gastrosplenic omentum is called after him the 'foramen of Winslow.'

WINS′LOW, JOHN (1702-74). An American soldier of the colonial period. He was born at Marshfield, Mass., and was descended from the early Plymouth Colony Governor of his name. He led a company of his own raising in the luckless attack on Cartagena, and commanded the force which in 1754 was sent out to occupy the country about the Kennebec. In the following year he had charge of the seizure of the Acadians, but disliked the work exceedingly, and wrote of it, "The affair is more grievous to me than any service I was ever employed in." In 1756 he was given command of the New England troops; in the same year was placed in command of Fort William Henry on Lake George; and led a second expedition to the Kennebec in 1758-59. Afterwards he was made presiding judge of Common Pleas for Plymouth County, and was a member of the Legislature and of the Council. The *Letter and Order Books of Winslow* are in the library of the Massachusetts Historical Society and form a valuable historical source upon the period of the French and Indian War.

WINSLOW, JOHN ANCRUM (1811-73). An American naval officer, born at Wilmington, N. C. He was descended on his father's side from Gov. Edward Winslow, of Plymouth Colony. He entered the United States Navy as a midshipman in 1827; served on the *Cumberland* and in command of the prize *Morris* in the Mexican War; and in September, 1855, was commissioned commander. During the first year of the Civil War he was attached to the Mississippi flotilla under Foote, and in July, 1862, he was commissioned captain and received command of the *Kearsarge*. In that vessel he proceeded to the coast of Europe in search of Confederate cruisers. After blockading the *Florida* at Brest, and then the *Rappahannock* at Calais, he received word while at Flushing that the famous *Alabama*, under Captain Semmes (q.v.), was in the port of Cherbourg, France. He at once proceeded to that place, and upon his arrival Semmes, who was confident of a victory that would benefit the Confederate cause in Europe, challenged him to a combat. The meeting took place on June 19, 1864; and after a comparatively short engagement, in which Winslow managed his vessel with consummate ability, the *Alabama* was forced to surrender and soon afterwards sank. For this brilliant service Winslow received the thanks of Congress and was promoted to the rank of commodore. He commanded the Gulf Squadron in 1866-67; was made a rear-admiral in March, 1870; and commanded the Pacific Squadron in 1870-72. Consult Ellicott, *The Life of John Ancrum Winslow* (New York, 1902).

WINSLOW, JOSIAH (1629-80). A Governor of Plymouth Colony, the son of Edward Winslow. He was born in Marshfield, Mass., was a member of the General Court in 1643, was Assistant Governor of Plymouth from 1657 until 1673, and was Governor from 1673 until his death, being the first Governor in any of the New England colonies who was born in America. From 1658 until 1672 he was one of the commissioners of the United Colonies of New England, and in 1675, soon after the outbreak of King Philip's War, was chosen commander-in-chief of the intercolonial forces. A poem written by him in commemoration of Governor Bradford was published in Morton's *New England Memoriall*.

WINSLOW, MIRON (1789-1864). An American missionary, brother of Hubbard Winslow (q.v.). He was born at Williston, Vt., graduated at Middlebury College, 1815, and at Andover Theological Seminary, 1818. In 1819 he went to India as a missionary of the American Board, and served for forty-four years in that country. He established the American mission at Madras in 1836. He prepared a Tamil and English dictionary, completed in 1862. It was based in part on manuscript material of the Rev. Joseph Knight, of the London Missionary Society, and the Rev. Samuel Hutchings, of the American mission, and was considered one of the most complete dictionaries of an Indian language ever published.

WINSLOW, William Copley (1840—). An American archæologist, born in Boston. He graduated at Hamilton College in 1862. After doing newspaper work in New York City, he graduated from the General Theological Seminary in New York in 1865; was ordained a minister in the Episcopal Church; and held various charges about Boston. He founded the American branch of the Egypt Exploration Fund in 1867 and served as vice-president, honorary secretary, and official representative for America until 1903. His publications include: *Israel in Egypt* (1883); *A Greek City in Egypt* (1887); *The Store City of Pithon* (1885); *Tombs at Beni Hassan; Egypt at Home; Pilgrim Fathers in Holland* (1891); and *Governor Edward Winslow*.

WINSOR, wĭn'zẽr, Justin (1831-97). An American historian and librarian, born in Boston, Mass. He was educated at Harvard College and continued his studies in Paris and Heidelberg. From 1868 to 1877 he was superintendent of the Boston Public Library, and from 1877 till his death librarian of Harvard University. His historical work was chiefly of a bibliographical and cartographical kind. The first book was a *History of the Town of Duxbury* (1849). This was followed by several valuable bibliographies, as that of the literature of the battle of Bunker Hill (1876), of the original quartos and folios of Shakespeare (1875), of the earlier editions of Shakespeare's poems (1879), etc. His more original work comprised *The Readers' Handbook of the American Revolution* (1880); *Christopher Columbus* (1891), a very iconoclastic book; *From Cartier to Frontenac; a Study of Geographical History in the Interior of North America in Its Historical Relations, 1534-1700* (1894); and the *Exploration of the Mississippi Basin* (1895). He was also editor of a *Memorial History of Boston* (1880-81), and a *Narrative and Critical History of America* (1884-89)—a most scholarly performance and his most useful work, no small part of its value being due to his own bibliographical and cartographical contributions.

WIN'STED. One of the county-seats of Litchfield County, Conn., 28 miles northwest of Hartford, on the Mad and Still rivers, and on the New York, New Haven and Hartford and the Central New England railroads (Map: Connecticut, C 5). It has the William L. Gilbert Home for Poor Children, the Litchfield County Hospital of Winchester, and the Memorial and Gilbert School libraries. Highland Lake and the Mad River furnish excellent water power, which is utilized by several manufacturing establishments. The most important products are clocks; pins, hosiery, coffin trimmings, brass goods, spool silk, edge tools, leather, and pocket cutlery. The water-works are owned and operated by the municipality. Winsted was settled in 1770, and was incorporated as a borough in 1858. Population, in 1890, 4846; in 1900, 6804.

WIN'STON. The county-seat of Forsyth County, N. C., 30 miles west of Greensboro; on the Southern and the Norfolk and Western railroads (Map: North Carolina, B 1). It is adjacent to Salem (q.v.), the two municipalities forming practically one community, known as Winston-Salem. Winston is in a section known for the production of tobacco, and has several establishments connected with this industry. Other important products include cotton goods, flour, fertilizers, furniture, carriages and wagons, knit goods, tobacco boxes, etc. Under the revised charter of 1899, the government is vested in a mayor, chosen biennially, and a unicameral council. The water-works are owned and operated by the municipality. Population, in 1890, 8018; in 1900, 10,008.

WINSTON, John Anthony (1812-71). Governor of Alabama. He was born in Madison County, and was educated at La Grange College and the University of Nashville. In 1840, and again in 1842, he was elected to the Lower House of the Legislature; from 1843 till 1852 was a member of the State Senate, and was several years its presiding officer. In 1853 he was elected Governor by the Democrats, and in 1855 was reëlected. During his administrations he strongly opposed efforts made by the Legislature to extend State aid to railroads, and by vetoing thirty-three measures of this kind gained for himself the name of the 'veto Governor.' On the question of public schools, however, he and the Legislature were in better accord, and the session of 1853-54 marked the beginning of the public school system of the State. When the Civil War came, he was made colonel of an Alabama regiment, and fought at Yorktown and at Seven Pines, but was shortly afterwards forced to resign because of bad health. By the Legislature chosen under the authorization of President Johnson he was elected United States Senator, but was not permitted to take his seat.

WINT, Peter De (1784-1849). An English landscape painter, born at Stone, Staffordshire, of a Dutch family which had emigrated long before to America and afterwards to England. From 1802 to 1806 he was apprenticed to learn engraving and portrait painting and later studied with Dr. Monro of the Adelphi. In 1809-10 he studied at the Royal Academy and in the latter year was made an associate of the Society of Painters in Water Colors. Two years afterwards he was made a full member and exhibited there as well as at the Royal Academy. He was one of the best of the English school of painters in water-colors; his work was characterized by fidelity and simplicity in painting from nature and by rich though subdued color. Consult Wedmore, *Studies in English Art* (London, 1876).

WIN'TER, Sir James Spearman (1845—). A Canadian statesman. He was born in Lamaline, Placentia Bay, was admitted to the bar in 1867, and in 1880 became Queen's counsel. He served in the Newfoundland House of Assembly in 1874-89, in 1893, and in 1897-1900, and during that period was Speaker (1877-78), Solicitor-General (1882-85), and Attorney-General (1885-89). He was the Newfoundland agent at the Washington Fisheries Conference (1887-88); was a delegate to the French Fisheries Commission in London in 1890 and 1898; and in 1898 was a member of the Anglo-American International Conference in Quebec. From 1893 to 1896 he was judge of the Supreme Court, and from 1897 to 1900 was Premier.

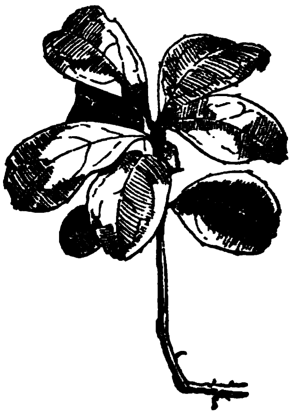
WINTER, John Strange. An English novelist. See Stannard, Henrietta Eliza Vaughan.

WINTER, vĭn'tẽr, Peter von (1754-1825). A German dramatic composer, born at Mannheim. He studied with Abbé Vogler, was appointed musical director at the Court theatre of Mannheim in 1776, and two years later went with the Court to Munich. He became Court kapellmeister in 1788 and held the position until his death. He wrote a number of operas, oratorios, sacred cantatas, masses, several secular cantatas, and quantities of church music. His most celebrated opera, *Das unterbrochene Opferfest*, was produced at Vienna in 1796, and given in Italy as *Il sacrifizio interrotto.*

WIN'TER, William (1836—). An American poet and critic, born in Gloucester, Mass. He graduated from the Harvard Law School in 1857, and for some time practiced law in the office of Rufus Choate. In 1859 he removed to New York City, where he became literary critic of the *Saturday Press*, then (1861-65) of the New York *Albion*, and finally (1865) dramatic critic of the New York *Tribune*. He became widely known both for his criticism and for his sketches of English scenery and historic localities. He was also favorably known for his poetry, his biographies of actors, and his memorial and other addresses. In 1891 he became president of the Staten Island (N. Y.) Academy. His works include: *Poems* (1855); *The Queen's Domain, and Other Poems* (1858); *My Witness* (1871), poems; *Thistle-Down* (1878), poems; *Henry Irving* (1885); *The Stage Life of Mary Anderson* (1886); *Shakespeare's England* (1886); *Wanderers* (1888), poems; *Gray Days and Gold* (1891); *Old Shrines and Ivy* (1892); *Shadows of the Stage* (1892, 1893, and 1895); *The Life and Art of Edwin Booth* (1893); *The Life and Art of Joseph Jefferson* (1894); *Brown Heath and Blue Bells* (1895). He also edited the works of George Arnold (1871), John Brougham (1881), FitzJames O'Brien (1881), and *The Shakespearean and Miscellaneous Plays of Edwin Booth* (1899).

WINTERBERRY. A popular name for two species of Ilex, of the natural order Ilicineæ. The common winterberry (*Ilex verticillata*), or black alder, grows from 6 to 12 feet high, on moist, preferably rich ground, bearing in November great quantities of brilliant crimson or scarlet-crimson berries, which are often gathered and used as vase ornaments or wreaths. If carefully dried they retain much of their brightness for several months. The smooth winterberry (*Ilex lævigata*) grows in wet grounds from Maine to the mountains of Virginia. See Inkberry; Holly.

WINTERGREEN (so called because the plant remains green throughout the winter). The popular name of plants of the genera Pyrola and Chimaphila, of the natural order Pyrolaceæ, which, according to some botanists, is a suborder of Ericaceæ, distinguished chiefly by difference of habit. Only about 30 species of Pyrola are known. They are native herbs or half-shrubby plants in woods throughout the Northern Hemisphere. Several species of Pyrola, natives of America, are perennial herbs with flowers of some beauty. Two species of Chimaphila, half-shrubby plants, with beautiful evergreen leaves, natives of North America, *Chimaphila umbellata*, known also as Prince's pine and pipsisewa, and *Chimaphila maculata*, spotted wintergreen, have been used to some extent medicinally. *Gaultheria procumbens*, a perennial half-shrubby plant with bright red berries and spicy aromatic evergreen leaves, is known as wintergreen in parts of the United States. See Gaultheria.



WINTERGREEN (*Gaultheria procumbens*).

WINTERGREEN, Oil of. An essential oil yielded by the flowers of the Gaultheria procumbens, abundant in New Jersey, and consisting chiefly of methyl salicylate, $CH_3C_7H_5O_3$, mixed with a small quantity of a hydrocarbon, termed *gaultherilene*, which is isomeric with oil of turpentine, and which, being more volatile than the salicylate of methyl, is easily separated from it. The salicylate of methyl is much the more abundant constituent of the oil. (See Salicylic Acid.) This oil is not only yielded by the distillation of other plants, but may be artificially formed by distilling a mixture of salicylic acid, wood alcohol, and strong sulphuric acid. In whatever mode it is obtained, it presents the appearance of a colorless or yellow oil, of a powerful, agreeable, and persistent odor; and hence it is largely used in perfumery. Both the natural and the artificial oil are used in medicine for the same purposes as salicylic acid. The artificial oil, however, is likely to contain harmful impurities.

WINTERHALTER. vĭn'tẽr-hăl'tẽr, Franz Xaver (1805-73). A German portrait painter, born near Sankt Blasien, in the Black Forest. He was a pupil of Stieler in Munich, and first attracted attention by a portrait of Grand Duke Leopold of Baden and his wife. His best known portraits are those of King Louis Philippe of France and of his Queen, of the royal family of England, the Empress Eugenie among her Court ladies, William I. of Prussia and his Queen, Emperor Maximilian of Mexico, and others. His works are elegant and idealized representations, but lack character and truth to nature.

WINTER KING, The. The popular title of Frederick V., Elector Palatine, who was King of Bohemia for a little more than a year, 1619-1620.

WINTER PALACE. A great building on the Neva in Saint Petersburg, now used only for ceremonial purposes. It was the residence of the Empress Anne, and was built by her on the site of a house presented to Peter II. The palace was partially destroyed by fire in 1837, but was at once restored. Its dimensions are: length 455 feet, breadth 350 feet, and height 80 feet. The interior contains a great number of suites and richly ornamented halls with important paintings. The brilliant Court balls are held in the Nicholas Hall and are the most imposing royal functions of Europe. In the Romanoff Portrait Gallery are preserved the likenesses of sovereigns since Michael Feodorovitch. The treasury contains the costly collection from the Russian crown jewels.

WINTER'S BARK. An aromatic bark, resembling cinnamon and similarly used. It derives its name from Captain Winter, who first brought it from the straits of Magellan in 1579. It is the product of Drimys Winteri of the natural order Magnoliaceæ, a native of some of the mountainous parts of South America and abundant in the lower grounds of Cape Horn. The bark of other species has similar properties. In Australia the fruit of Drimys aromatica is used as a substitute for allspice.

WIN'TERSET. The county-seat of Madison County, Iowa, 42 miles southwest of Des Moines, on the Chicago, Rock Island and Pacific Railroad (Map: Iowa, C 3). It is the shipping point of a productive farming region, and is especially noted for its large stock-raising interests. There are valuable limestone deposits in the vicinity. The court house, costing $150,000, and the Public Library are among the chief features of the city. The electric light plant is owned by the municipality. Population, in 1890, 2281; in 1900, 3039.

WINTER'S TALE, A. A comedy by Shakespeare, produced, according to Forman's diary, in 1611, printed in the 1623 Folio, and probably one of Shakespeare's latest plays. It was founded on Greene's romance *Pandosto* (1588), later known as the *Historie of Dorastus and Fawnia.* Greene's geographical errors are repeated, but the story is marvelously enriched and transformed.

WINTERTHUR, vĭn'tĕr-to͞or. A town of the Canton of Zurich, Switzerland, in the Töss Valley, on the Eulach, 16 miles by rail northeast of Zurich (Map: Switzerland, C 1). It is a modern, well-built town. There are several handsome churches, a fine town-hall in the Greek style from plans by Semper, a gallery of Swiss paintings, and a museum of antiquities and natural history. Winterthur is a rich manufacturing and commercial town. There are vine-growing and cambric-weaving industries, and the manufacture of machinery. Population, in 1900, 22,335, mostly German-speaking Protestants.

WINTER WHEAT. See FLOUR.

WINTHER, vĭn'tĕr, CHRISTIAN (1796-1876). A Danish poet, born in Fensmark, and educated at the University of Copenhagen. His poems show art in their construction, and are significant as expressions of national characteristics. His first collection of poems, *Nagle Digte* (1835), was followed by *Sangog sagn* (1841); *Lyriske Digte* (1849); *Nye Digte* (1850); and *Hjortens Flugt* (1856), a romantic lyric which was his masterpiece.

WIN'THROP. A town, including several villages, in Suffolk County, Mass., 5 miles northeast of Boston, on Massachusetts Bay, and on the Boston, Revere Beach and Lynn Railroad (Map: Massachusetts, F 3). Attractively situated, it is the place of residence of many business men of Boston, as well as a popular summer resort. The chief features include the Dean Winthrop house, dating from 1649, the Frost Public Library with a collection of pictures and interesting historical relics, Forts Banks and Heath, Ingall's Park, and the Winthrop Shore Reservation. Winthrop formed successively a part of Boston, Chelsea, and North Chelsea until 1852, when it was separately incorporated. Population, in 1890, 2726; in 1900, 6058.

WINTHROP, FITZ JOHN (1638-1707). A colonial Governor of Connecticut, the son of John Winthrop (1606-76). He was born in Ipswich, Mass., studied for a time at Harvard, went to England and served in the Parliamentary Army until the Restoration, and returned to New England in 1663. He served as a major in King Philip's War (1675-76), was a member of Governor Andros's council in 1686, and in 1690 commanded, as major-general, the Connecticut and New York troops, together with the Iroquois, who were to attack Montreal, but actually, owing to disease and faint-heartedness, never reached Canada. He was an agent for Connecticut at London from 1693 to 1697, and was Governor of the colony from 1698 until his death.

WINTHROP, JOHN (1588-1649). An English colonist in America, first Governor of the colony of Massachusetts Bay. He was born at Edwardston, Suffolk, England, and his early life was spent at Groton Manor, in Suffolk. He studied for two years (1602-04) at Trinity College, Cambridge. At the age of eighteen he appears to have been a justice of the peace. In 1626 he was appointed attorney in the Court of Wards and Liveries, presided over by Sir Robert Naunton. The drift of affairs in Parliament, the impending crisis in the political world, and his own sympathy with the Congregationalist movement, led him to take an interest in American emigration. The London proprietors of the Massachusetts Company, who had determined to transfer the seat of government to the New World, on October 30, 1629, elected John Winthrop Governor. On June 22, 1630, with a fleet of eleven ships, Winthrop arrived at Salem. Soon afterwards he removed to Charlestown, whence in the September following he and his fellow colonists again removed—this time to the site of Boston, which place they founded. During twelve of the nineteen years which Governor Winthrop lived in Massachusetts he was Governor of the colony. After 1630 he was annually elected until 1634, when he was chosen Deputy Governor under Thomas Dudley (q.v.). Dudley was followed by John Haynes (1635) and Haynes by Sir Harry Vane (1636). During the latter's Governorship Winthrop as Deputy Governor led the opposition to the liberal policy adopted by Vane toward Anne Hutchinson (q.v.) and her followers. He had separated from the Church of England on leaving England, and was at this time thoroughly identified with the Puritan movement. He opposed strenuously the new Antinomianism and on the issue thus raised was chosen Governor over Vane in 1637. He retained the Governorship until 1640, was again Governor in 1642-44 and again from 1646 until his death. In 1643 the New England Confederation was formed under his auspices, and he became its first president. Winthrop's *Journal* was first published in a single volume (Hartford, 1790). This was republished with newly discovered manuscripts under the title *History of New England, 1630-49* (Boston, 1825-26), with notes by James Savage. Many of his papers have been published by the Massachusetts Historical Society. Consult also R. C. Winthrop's valuable *Life and Letters of John Winthrop* (2 vols., 1864, 1867); and J. H. Twichell, *John Winthrop* (1891), in "Makers of America" series. For his wife, Margaret Tyndal Winthrop (1591-1647), consult: Alice Morse Earle, *Margaret Winthrop* (1895); and Anderson, *Memorable Women of Puritan Times* (1862), and *Some Old Puritan Love Letters* (1893).

WINTHROP, John (1606-76). A colonial Governor of Connecticut. He was the son of John Winthrop, the first Governor of Massachusetts Bay, and was born at Groton Manor, Suffolk, England. He was educated at Bury Saint Edmunds Grammar School, at Trinity College, Dublin, and at the Inner Temple (1624). In 1627 he took part in the Duke of Buckingham's unsuccessful expedition to the Isle of Ré, near La Rochelle, and subsequently traveled in Southern and Southeastern Europe as far as Constantinople. He joined his father in New England in 1631, and two years later participated in the founding of the town of Ipswich. He was for some time titular Governor of a small settlement at Saybrook on the Connecticut River. In 1646 he laid out a plantation on the Thames River at what is now New London, where, after 1650, he made his home. He was elected a magistrate in 1651, and Governor in 1657. Then, after serving as Deputy Governor in 1658, he was again chosen Governor in 1660, holding office from that time continuously until his death. In 1662 he carried to England a loyal address from the Connecticut colonial Government to Charles II., and was successful in securing from the King a very favorable charter. He was also influential in bringing about the union of the Connecticut and New Haven colonies. In 1675 he was one of the commissioners of the United Colonies of New England.

WINTHROP, John (1714-79). An American physicist, born in Boston, Mass. He graduated in 1732 at Harvard, where, from 1738 until his death, he was professor of mathematics and natural philosophy. He was one of the foremost men of science in America in the eighteenth century, and his influence on the early advancement of science in New England in particular was very great. Both Benjamin Franklin and Benjamin Thompson (Count Rumford) probably owed to him much of their early interest in scientific research. In 1740 and 1761 he observed the transits of Mercury, in the latter year proceeding to Newfoundland in a ship provided by the Province of Massachusetts—probably the first scientific expedition sent out by an American State. His application of computations to earthquake phenomena after the famous earthquake of November, 1755, has formed the basis of the claim made for him as the actual founder of the science of seismology. In addition to his scientific work he was actively interested in public affairs, was a judge of probate in Middlesex County for several years, was a member of the Governor's council in 1773-74, and subsequently gave the weight of his influence to the patriotic cause in the Revolution. He published: *Lecture on Earthquakes* (1755); *Answer to Mr. Prince's Letter on Earthquakes* (1756); *Account of Some Fiery Meteors* (1755); and *Two Lectures on the Parallax* (1709).

WINTHROP, Robert Charles (1809-94). An American political leader and legislator, Speaker of the House of Representatives. He was born in Boston, graduated at Harvard in 1828, studied law in the office of Daniel Webster, and in 1831 was admitted to the bar. He was a Whig member of the Lower House of the Massachusetts Legislature from 1834 until 1840, serving during the last three years as Speaker. From 1840 almost continuously until 1850 he was a Representative in Congress. In the Thirtieth Congress (1847-49) he was Speaker of the House. He was appointed to the seat in the United States Senate left vacant by Daniel Webster's resignation in 1850, but was defeated in the regular election, held in the following year, by Charles Sumner. His legislative career was marked by strong conservatism throughout. He was an opponent of slavery, of the Mexican War, and of the Fugitive Slave Law, but followed Webster in his desire for compromise and in his support of the Fillmore Administration. On the break-up of the Whig Party, he refused to ally himself with the Republican Party, and supported Fillmore in 1856, Bell in 1860, and McClellan in 1864. During the latter part of his life he devoted himself to the organization and development of the Peabody Education Fund—the gift made just after the Civil War by his friend, George Peabody. His services are also memorable as president of the Massachusetts Historical Society for thirty years. He published *Addresses and Speeches* (vol. i. 1852, vol. ii. 1886) and *Life and Letters of John Winthrop* (2 vols., 1864, 1867).

WINTHROP, Theodore (1828-61). An American novelist and soldier, a descendant of the second John Winthrop, born at New Haven, Conn. He graduated at Yale in 1848 and then spent some time in Europe. Returning, he was in steamship service at Panama and then visited California and Oregon. In 1853 he accompanied Lieutenant Strain's canal surveying expedition to the Isthmus of Panama. He afterwards practiced law and took part in the Frémont campaign, and then devoted himself mainly to writing novels. Just as *Cecil Dreeme* was to be published, the Civil War came on, and Winthrop at once went to Washington with the Seventh New York Regiment. He was soon made military secretary to General Butler, with the rank of major. He was killed at the battle of Big Bethel, while rallying his men. Shortly before his death he wrote for the *Atlantic Monthly* two articles descriptive of his marches. These were widely read and his novels and other books were rapidly published and sold. His books include: *Cecil Dreeme*, with memoir by G. W. Curtis (1861); *John Brent* (1862); *Ed-*

win Brothertoft (1862); *The Canoe and the Saddle* (1862); *Life in the Open Air, etc.* (1863); and *Life and Poems* (edited by his sister, 1884). Winthrop's novels are full of narrative talent and indicate that their author might ultimately have taken an important position in American letters. They helped to introduce the Far West to American literature.

WINTÚN, wĭn-tōōn′ (People). A group of tribes of Copehan linguistic stock formerly occupying the country of the upper Sacramento and Trinity rivers, northern California. Although of inferior type, their disposition enabled them to maintain themselves in the face of civilization to better advantage than the more warlike tribes. Timid, gentle, and extremely sensual, they were also industrious, and were expert in diving for clams and spearing salmon. Their houses were conical lodges of bark over a frame of poles. Their weapons were the bow and the sling. Each harvest season of fish, nuts, or blossoms was the occasion of a tribal gathering and dance, many of the songs being sweet and melodious until repeated to monotony. They had also the scalp dance, the war dance, the gift dance, and the puberty dance for young girls. Polygamy was common. The dead were wrapped into bundles and buried with all their ornaments and smaller property, and the name never thereafter mentioned. In the case of a woman a quantity of acorns was sometimes poured upon the corpse in the grave. Like the other California tribes, they excelled in basketry. A few of them are now gathered upon Round Valley Reservation, but the majority of those surviving still wander along the Sacramento.

WIRE (AS. *wīr*, wire; connected with OHG. *wiara*, fine-drawn gold, Lat. *viriæ*, armlets, Lith. *vĕlà*, wire, and ultimately with Skt. *vā*, weave). An extremely elongated, slender bar of metal produced by drawing a short thick bar through a succession of holes of regularly decreasing sizes until its diameter has been materially reduced and its length greatly increased. Wire is generally round, but flat wire, oval wire, and wire of other shapes is also made. The manufacture of wire has been traced by good authorities as far back as the period of early Egypt, and until the fourteenth century wire was manufactured by hammering out strips of metal. In the early history of the article, gold, silver, and bronze were practically the only metals used. It seems to be fairly well substantiated that the present method of producing wire by drawing was practiced in Germany during the fourteenth century. In 1865 machine-drawn wire was first produced in England.

Process of Manufacture. Wire is almost universally manufactured by drawing, and the facility with which any metal can be drawn into wire depends upon its ductility. Most metals have this property; but some, like antimony and bismuth, are so brittle that they can be drawn out only with difficulty, and wire made from such metals is useless from want of tenacity. All metals largely used for making wire, such as steel, brass, and copper, are drawn by essentially the same process. Steel billets first are rolled into round rods. The rods are cleaned of scale either by mechanical rubbing or more commonly by being immersed in an acid bath, and then deacidized by a bath of lime water. Each bar is then drawn into wire by pulling it through the holes of a draw plate. This is an oblong plate of hard steel pierced with conical holes, gradually diminishing in diameter and having the smaller ends of these tapering holes carefully prepared to the required size. Sometimes cubical shaped dies, each with a single trumpet-shaped hole, are used. The workman begins by making a point on the rod, so as to permit it to pass through the hole and be grasped by a pair of pincers attached to a chain. This chain is pulled along by suitable mechanism until the length of wire which has been drawn through the hole is sufficient to pass around a revolving drum, which is then set in motion and draws the rod slowly through the draw plate, winding it upon itself as it revolves. From this drum the wire is passed through a smaller hole and wound on another drum, and so the process is repeated until the wire has been reduced to the proper size. Fine wire may require from 20 to 30 drawings. The drum revolves slowly with a thick wire and the speed is increased as the size diminishes. After being passed a few times through the draw plate the metal becomes brittle and has to have its ductility restored by annealing. (See Annealing.) From the annealing furnace the wire passes to the acid bath to remove the scale and then to the lime water to remove the acid. It is then ready to be further reduced by the draw plate until annealing is again required. Generally a lubricant, wax, grease, soap, or other similar material, is employed during the drawing, especially for fine wires. For some very accurate purposes, such as chronometer springs and for gold and silver lace, the wire is drawn through holes perforated in rubies and other hard gems.

Uses of Wire. The uses of various kinds of wire are practically innumerable, and involve numerous kinds of wire manufactured from various materials. The metals used are silver, platinum, copper, bronze, brass, iron, and steel, and from them are drawn wires varying in size from ¼ inch to $\frac{1}{7000}$ inch, and possessing a tensile strength of from 20 tons to 150 tons per square inch of sectional area. The manufacture of wire netting, gauze, and cloth is among the many ingenious and serviceable applications of wire. Many thousand tons of plain fencing wire, strands, and barbed wire are annually manufactured. Carding wire is a product of no less magnitude and importance. Beautiful types of wire are to be found in the eyepieces of telescopes in the form of hair or spider lines for assisting in the observation of moving stars, planets, or bodies and their relative bearings and for measuring angles or determining evolutions and gradients. A platinum wire as fine as 0.00003 inch in diameter has been obtained, of which 1060 yards weighed 0.75 grain, or 1¼ grains per mile. This result was, however, obtained by covering the wire with silver, which, after being drawn down with the platinum to as fine a degree as possible, was dissolved off by a solution of nitric acid. Platinum and other wires are also used in galvanic cauteries, écraseurs, magnetic machines, probes, and other surgical instruments and appliances. Somewhat recently steel wire of high breaking strains has been employed for deep-sea soundings. (See Sound; Sounding.) One of the most important uses of wire in engineering is for making wire rope. Such rope is made in much the same form as hemp rope. (See WIRE ROPE.) Wire netting is also made by machines which take the wire from bobbins and deliver the netting complete in rolls ready for shipping. Consult Smith, *Wire: Its Manufacture and Uses* (New York, 1891).

WIRE GAUGES. Wire is made in a num- of sizes or diameters. To designate these sizes use is made of a series of numerals each of which indicates a certain diameter in fractions of an inch where English measure is used and in millimeters where metric measure is employed. Such a series of numerically designated sizes is called a wire gauge. There are a number of such gauges in use. In England the legal gauge is the Imperial wire gauge, which was established by law in 1884. Previous to this time a number of wire gauges had been employed in England, the best known of which are the Stubbs wire gauge and the Birmingham wire gauge. France and Germany have standard wire gauges based upon the millimeter. In the United States there are a number of different wire gauges, but they are nearly all precisely similar to the Roebling and Washburn-Moen standard. The following table shows the two American wire gauges most used and the equivalents in the English legal standard:

Number of wire gauge U. S. A.	Roebling's and Washburn-Moen's gauge	Brown and Sharpe's gauge U. S. A.	Equivalents in the English legal standard, S. W. G.
	in.	in.	in.
000000	.46	......	.464
00000	.43	......	.432
0000	.393	.46	.4
000	.362	.40964	.372
00	.331	.3648	.348
0	.307	.32495	.324
1	.283	.2893	.3
2	.263	.25763	.276
3	.244	.22942	.252
4	.225	.20431	.232
5	.207	.18194	.212
6	.192	.16202	.192
7	.177	.14428	.176
8	.162	.12849	.16
9	.148	.11443	.144
10	.135	.10189	.128
11	.12	.09074	.116
12	.105	.08081	.104
13	.092	.07196	.092
14	.08	.06408	.08
15	.072	.05706	.072
16	.063	.05082	.064
17	.054	.04525	.056
18	.047	.0403	.048
19	.041	.03583	.04
20	.035	.03196	.036
21	.032	.02846	.032
22	.028	.02534	.028
23	.025	.02257	.024
24	.023	.0201	.022
25	.02	.0179	.02
26	.018	.01594	.018
27	.017	.01419	.0164
28	.016	.01264	.0148
29	.015	.01125	.0136
30	.014	.01002	.0124
31	.0135	.00893	.0116
32	.013	.00795	.0108
33	.011	.00708	.01
34	.01	.0063	.0092
35	.0095	.00561	.0084
36	.009	.005	.0076

WIRE GLASS. See GLASS, WIRE.

WIRELESS TELEGRAPHY. The art of telegraphing without wires by electricity. It comprises a number of different methods, of which the principal ones are those based on (1) dispersion or the leakage of electric currents when projected into the earth or water; (2) magnetic lines of force set up in space by magnetic induction; (3) strains in the intervening dielectric or medium separating the instruments due to electro-static stresses or differences of potential; and (4) radiation of electro-magnetic waves.

DISPERSION METHOD. This is also known as the leakage and as the conductivity method. In the simplest form of this arrangement four metal plates are placed in the earth or water in parallel as shown in the diagram Fig. 1. A represents the sending station and B the receiving station; the distance separating the plates 1, 2 and 3, 4 should be at least as great as the distance between A and B, over which the signals are to be transmitted.

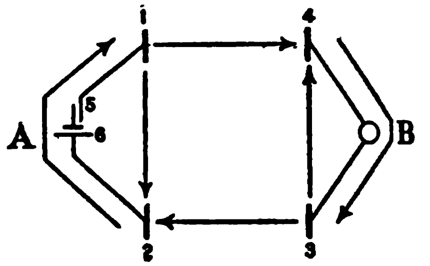


FIG. 1.

At the sending station the plates 1, 2 are connected in series with a battery, 6, and a telegraph key, 5, by means of a wire. The earth completes the circuit through which the current flows in the direction of the arrows. A portion of the current flowing through this circuit is dispersed through the earth, since the latter is a very good conductor owing to its immense cross section, and the leakage of the current takes place in form of elliptical lines, as in Fig. 2. A small portion of the electric current sent through the circuit A finds its way to B, where the earth again completes the circuit of the receiver. A galvanometer, telephone, or other means of indication may be used to receive the message.

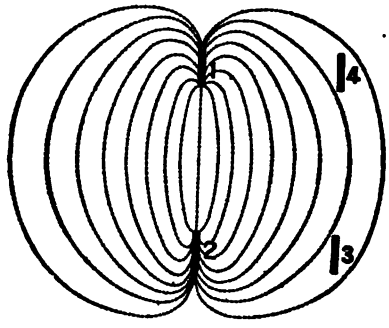


FIG. 2.

A modification of this method is employed for alternating currents. At the sending and receiving stations (Fig. 3) plates 1, 2, 3, 4 are placed in the same relative positions as before, but an interrupter, 7, is included in the circuit with the battery, 6, and key, 5, which are connected with the primary winding of an induction coil, 8; the terminals of the secondary coil, 9, are connected with the plates 1, 2; the direct current flows through the primary circuit when the key is depressed and the interrupter rapidly makes and breaks the circuit which sets up alternating currents in the secondary circuit. It was found that

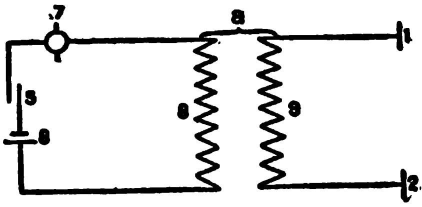


FIG. 3.

alternating currents propagated the electric impulses to a greater distance than direct currents. The receiving end is similar to that in Fig. 1.

INDUCTION METHOD. Another method for wireless telegraphy and one that is ideal in its simplicity is based on induction. Two coils of wire, A, B, Fig. 4, are arranged parallel with each other and at some little distance apart. When the key is depressed a direct current will flow through the circuit A and a magnetic field of force will be produced around the coil of wire, the curved lines proceeding at right angles from the coil itself, and these will extend to a considerable distance; some of these magnetic lines will thread through the receiving coil B, and alternating currents having the same frequency phase and amplitude will manifest themselves, but owing to the fact that the magnetic energy decreases as the square of the distance, the potential as well as the current impressed upon the receiving coil will be very much less in accordance with the laws of magnetic induction.

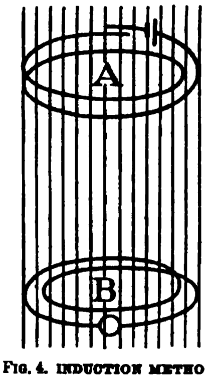


FIG. 4. INDUCTION METHOD.

In this method of wireless telegraphy the distance to which signals may be transmitted depends on several factors, including the number of turns of wire on the coils, on the size of the latter and their distance apart, etc.

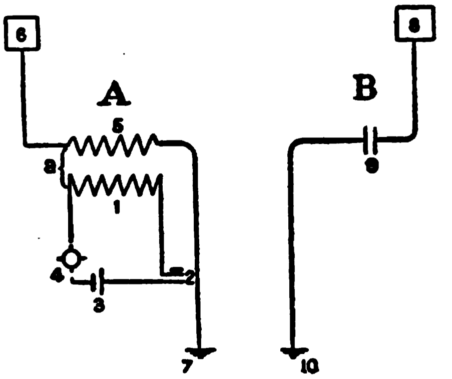


FIG. 5. ELECTRO-STATIC METHOD.

ELECTRO-STATIC METHOD. In the electro-static method of signaling through space the primary winding, 1, of the induction coil *a* is connected in series with a telegraph key, 2, and a battery, 3, as shown in A, Fig. 5; the secondary terminals of the coils are connected to the elevated condenser or capacity area, 6, and the earthed plate, 7; the receiver comprises an electro-static telephone receiver, 9, made of two thin diaphragms of metal and placed very closely together, forming an air condenser, these being arranged in a telephone receiver; the two diaphragms are connected to the capacities area, the earthed plates, 8 and 10, respectively.

The theory of the action taking place when the instruments are operative is that the earth is charged at the sending station to a certain positive potential and the receiving apparatus to an equal negative potential, producing a difference of potential between the two stations when a current will flow from one to the other, the receiver or indicating device responding to the surging current as the difference of potential is equalized.

ELECTRIC WAVE METHOD. The last and most practical method employs electric waves. The apparatus for the emission and reception of electric waves in its simplest form consists of a sending instrument similar to the one just described in the electro-static method, but having the additional factor of the disruptive discharge included in the transmitter, together with a coherer in the receiver.

These devices are illustrated in Fig. 6, and all workable wireless telegraph apparatus are constructed upon fundamental principles involved in the electric wave method and are modifications of that shown in the diagram.

The sending apparatus, A, consists of an induction coil, *a*, the primary winding of the coil, 1, being included in a circuit with a battery, 2, an interrupter, 3, and a Morse key, 4; a condenser, 5, is shunted around the interrupter, 3. The terminals of the secondary coil, 6, lead to the spark-gap, 7, one side of which leads to the aerial wire, 8, and the opposite side to the earth at 9.

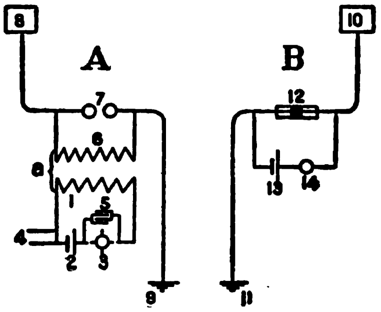


FIG. 6. ELECTRIC WAVE METHOD.

The receiving device, B, consists of similarly elevated and earthed wires, 10 and 11, connected to a wave-detector, 12, usually of the coherer type. The local battery circuit includes the coherer, 12, a battery, 13, and a telephone receiver, 14. When in action the function of the transmitter is to radiate electro-magnetic waves (see ELECTRICITY; WAVES); this is accomplished by a series of transformations of the primary electric current generated by the battery. This low-voltage direct current is rendered intermittent by the interrupter, 3, and for every impulse through the primary winding of the induction coil an alternating current is set up in the secondary; since the secondary coil has many turns of wire in it compared to the primary coil, the low-voltage current is transformed into one of high potential (see INDUCTION COIL) having a frequency equal to the rate at which the primary circuit is made and broken by the interrupter. This low-frequency, high-potential current charges the aerial wire and the wire leading to the earth with positive and negative electricity, establishing a difference of potential of several thousand volts. When this potential difference is maximum the resistance of the air film of the spark-gap is broken down, and a spark passes between the brass balls forming the gap, and the difference of potential is equalized.

The process of restoring the electrical equilibrium requires a very small fraction of a second, since the high-frequency currents oscillate from the top of the aerial wire, 8, to the earthed plate, 9, sometimes at the rate of a million times per second.

Now electric oscillations transform their energy into electric waves, and these electric waves are propagated through space with the rapidity of light to the receiver. When the electric waves impinge upon the aerial wire, 10, of the receiving system they are retransformed into electric oscillations, identical in frequency with those in the sending circuit, but their potential is very much reduced; these enfeebled oscillations surging in the receiving circuit affect the coherer, breaking down its resistance, permitting the local current from the battery, 13, to flow through the wave detector and telephone receiver or relay, 14, and indicating the impinging wave in the form of a dot or a dash, depending upon its length; it ceases, however, the instant the oscillations stop.

HISTORY. In 1795 Salva, a Spanish physicist, suggested that it might be possible to charge the earth at Majorca with positive electricity and that at Alicante with negative electricity, when the attraction of the opposite changes would establish communication between the two cities. The earliest actual experiment by which it was demonstrated that an electrical connection could be established between a transmitting and a receiving instrument with only water as a connecting medium was performed by Sömmerring of Munich on June 5, 1811; this he did by the dispersion or leakage method. The next step toward wireless telegraphy was made when Steinheil accidentally discovered in 1838 that by grounding the terminals of a single telegraph wire the earth would act as a conductor for the returning electrical energy. Prior to this time the Morse wire telegraph employed a complete metallic circuit, which was evidently a modification of the leakage method. To Morse appears due the credit of making the first practical test of wireless telegraphy based on the principles of the dispersion of an electric current, he having connected Governor's Island with Castle Garden, New York, a distance of a mile.

In 1886 Amos E. Dolbear of Tufts College, Mass., evolved his electro-static method of wireless telegraphy, by which he was enabled to transmit and receive signals a distance of half a mile. Thomas A. Edison in 1891 took out a United States patent on what he termed an induction method, but it was based on the principles of electro-statics. Wireless telegraphy by true induction gave so little promise that no serious attempts were made to apply it until 1891, when John Trowbridge advocated the method and deduced the conclusions necessary to be attained for transatlantic signaling. In 1896, however, a new method was brought to light by William Marconi, and although the principles underlying it were known, its practical application had not as yet been tested. This was the electric wave method, and its history began with Michael Faraday's theory of the electro-magnetic origin of light in 1845. This theory was deduced mathematically by James Clerk Maxwell in 1864, but it was not until 1888 that it received a physical demonstration, when Heinrich Hertz experimentally proved that electric waves followed exactly the same laws as light waves. But Hertz did more; he showed how to produce these electric waves by purely physical means as well as how to detect them.

His apparatus, especially his wave detector, was crude, consisting merely of a circlet of wire severed at a given point so that an air-gap formed a miscroscopic portion of it. His transmitter was not unlike those in use at the present time in wireless telegraphy; it consisted of an induction coil, battery, key, and oscillator. This was the real beginning of wireless telegraphy, and from this time its development may be said to date.

What was now needed to transmit signals to greater distances was a more sensitive detector, and this was forthcoming in 1890, when Eduard Branley constructed his radio-conductor or coherer, consisting of a little glass tube containing some metal filings. This was a marvelously sensitive detector to the electric radiations. In 1895 Professor Popoff employed the coherer in meteorological observations, and connected one of the coherer terminals to an aerial wire and the opposite terminal to the earth; a relay, electric bell, and battery completed the apparatus.

Marconi in 1896 produced the first wireless telegraph capable of propagating and indicating electric waves over long distances. This he did by connecting one side of the spark-gap to an aerial wire and the opposite side to the earth. By adapting the receiver of Popoff, connecting an aerial and earthed wire to the receiver, and improving the coherer he was enabled to send messages a distance of 300 feet on his arrival in England in 1896; this distance he gradually extended until now it is possible to signal without cables across the Atlantic Ocean.

THEORY. The theoretical considerations upon which the electric wave method of wireless telegraphy is based may be divided into two parts, namely (a) the conversion of electric oscillations into electric waves and vice versa, and (b) the propagation of electric waves through space.

That portion of the transmitter which includes the aerial and earthed wires and the spark-gap, 7, 8, 9 (see Fig. 6), is termed the *oscillator system*, and that portion of the receiver comprising the aerial and earthed wires and the wave detector, 10, 11, 12, is termed the *resonator system.*

When the spark passes between the balls of the spark-gap, 7, high-frequency high-potential currents are set up in the oscillator system; these oscillatory currents are not constant, but their amplitude decreases from its maximum value to zero potential in geometric progression, as indicated by the curve in Fig. 7. This is due to the damping factor involved in the conversion of the energy of the oscillations into electric waves. The frequency of the oscillations depends on the electrical dimensions of the circuit; these are termed its coefficients, and consist of its electrostatic capacity, its inductance, and its resistance.

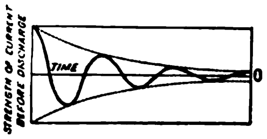


FIG. 7. CURVE OF OSCILLATORY CURRENT.

The capacity of an oscillatory system is measured by the quantity of electricity required to charge it to a certain critical potential where it will disrupt the air-gap, and the capacity of the system is directly proportional to the charge and inversely proportional to the potential. Inductance is the effect of a current flowing in the oscillator system on itself, and in dealing with high frequencies this effect is very marked, so that a finite current requires time to reach its maximum value and time for the current to fall to zero. The resistance of the oscillator system finds its analogue in the frictional resistance a pipe offers to flowing water; when the current is of high potential and frequency the resistance of the system may be regarded as negligible, since the high resistance offered by the spark-gap is broken down by the spark during the period the high-frequency current is oscillating through the system.

In the resonator system the same conditions prevail, but instead of emitting electric waves as in the case of the oscillator the electric waves impinging upon the aerial wire set up electric oscillations, and although very greatly reduced in potential compared with those originally emitted, the frequency is identical.

The mode of electric wave propagation through the ether has been deduced on two different theories. The first is based on the rectilinear propagation of electric waves. An experiment to demonstrate that electric waves traverse space in straight lines may be made by employing an ordinary Hertz oscillator, shown diagrammatically in Fig. 8. When high-frequency currents oscillate through the system spherical electric waves in the form of transverse vibrations in the ether are emitted as depicted in Fig. 9, each one being detached from the oscillator and propagated through space at the velocity attained by light waves, i.e. 186,500 miles per second. Where one terminal is grounded and the opposite terminal of the oscillator system is elevated, as shown in Fig. 6, the theory of rectilinear propagation assumes that the waves are still spherical and travel in a straight line until they come in contact with the upper stratification of rarefied air, which is a conductor of electricity and therefore a non-conductor of electric waves, in which case the waves are reflected back to the surface of the earth.

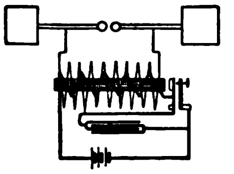


FIG. 8. HERTZ OPEN-CIRCUIT OSCILLATOR.

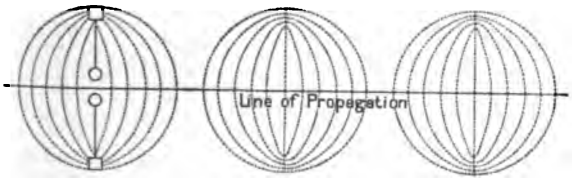


FIG. 9. HERTZ DETACHED ELECTRICAL WAVES.

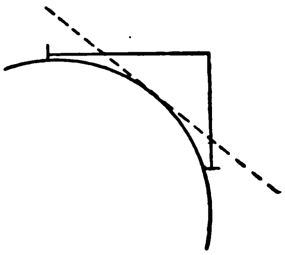


FIG. 10. ELECTRIC WAVES REFLECTED BY STRATA OF RAREFIED AIR.

Electric waves are radiated in every direction at right angles to the oscillator system; now if a resonator system is placed in a direct visual line to the oscillator it will respond, but if the curvature of the earth intervenes as shown in the diagram Fig. 10, then the waves will be reflected from the strata of rarefied air and directed again to the surface of the earth.

This theory is in accordance with Hertz's physical demonstration of the electro-magnetic theory of light, as elucidated in his paper on "Electric Radiation," in which he shows how long, invisible free electric waves are propagated the same as the microscopic visible free waves of light.

The second theory is also based on Hertz's experiments as deduced and reviewed in his paper "On the Propagation of Electric Waves by Means of Wires," in which he shows how electric waves may slide over the surface of conducting wires with the wave front perpendicular to the path of the wire.

In wireless telegraphy this theory offers the earth as the conducting path, and according to Professor Reginald A. Fessenden the wave is virtually cut in half, and is therefore a half-wave skimming along the surface of the earth as shown in Fig. 11. Fortunately, however, the theory of wave propagation has little to do with the practical application of the art.

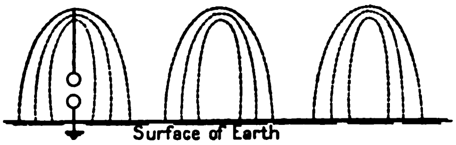


FIG. 11. FESSENDEN SLIDING HALF-WAVES.

SYNTONIC WIRELESS TELEGRAPHY. Since electric waves are radiated in every direction, it is evident that any receiver in the field of force will respond to any transmitter emitting the waves. To enable any operator or operators of different instruments in the same field to send and receive messages independently of all others, apparatus constructed in accordance with the principles of electric resonance have been attempted. The phenomena of electric resonance may be illustrated by Lodge's syntonic jars, Fig. 12. A and B represent the sending and receiving circuits; the jar for emitting the waves, 1, A, is charged to a high potential; it is connected in series with the spark-gap, 2, and the loop of wire, 3; when the jar is discharged through the gap electric oscillations of high frequency are set up in the circuit; in virtue of the circuit being closed—in contradistinction to the Hertz open circuit oscillator—the oscillations are very persistent, that is, it requires a much longer time for their conversion into electric waves than in the open-circuit type, but the emitted waves are much more feeble than where the oscillations are damped out rapidly. The receiving jar 1 B is connected through a spark-gap, 2, and a closed circuit, 3, 3, the induction of which is made variable by the sliding metal bar 4. When the feeble electric waves impinge upon the circuit they are transformed into electric oscillations, and by their cumulative effect the jar is charged to its sparking capacity when it breaks down the gap, thus indicating the presence of the waves.

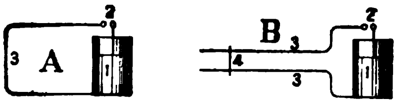


FIG. 12. LODGE'S SYNTONIC JARS.

This action takes place if the jars, A, B, are in tune, i.e. if their inductance capacity and resistance are identical; but if B is not in tune or syntonized to A it will not respond. Syntonic or selective wireless telegraphy is based on these factors, but inasmuch as the open-circuit oscillations are damped out too quickly to obtain good resonance effects and the closed circuit oscillators are too feeble to cover long distances, these inherent difficulties have not been overcome with any degree of success in a practical way.

PRACTICAL CONSIDERATIONS. In ordinary wireless telegraph practice the first requisite is a powerful wave radiator and the second is a sensitive wave detector. For this reason high aerial wires are employed, and both oscillator and resonator are of the open-circuit type. Excellent results are assured without regard to the coefficients of the circuits, for in this type of apparatus the periodicity of the oscillations and the length of the emitted wave may vary considerably without any untoward results.

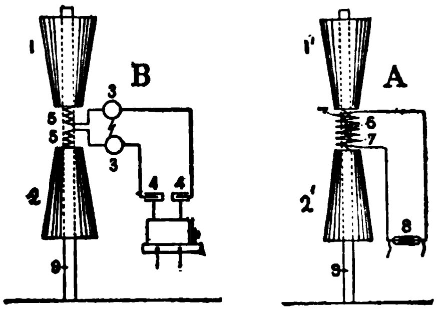


FIG. 13. DIAGRAM OF LODGE TUNED SYSTEM. A, transmitter; B, receiver.

The apparatus shown in Fig. 6 was the first form of wireless telegraph employed by Marconi, and has been found to be the most practical to the present time. All the succeeding systems, whether syntonic or non-syntonic, are modifications of this type.

LODGE-MUIRHEAD TUNED SYSTEM. The first system of wireless telegraphy based on electric resonance was devised by Sir Oliver Lodge of England, and the oscillator and resonator are illustrated diagrammatically in Fig. 13. Recent improvements, to be described, have been added to the original Lodge system both by Dr. Lodge and Dr. Alexander Muirhead; the complete apparatus is shown in the accompanying plate.

Referring to the diagram, A and B represent the sending and receiving circuits respectively; 1, 2, and 1', 2', are capacity areas made of sheet metal in the form of cones; 1 and 2 are connected to the induction coil through the inductances, 5, 5, and the condensers, 4, 4; these are provided for the purpose of increasing the capacity of the oscillator and for prolonging the oscillations in the circuit and to establish a definite frequency of oscillation and the generation of long electric waves. The capacity areas 1' and 2', B, are similar to those of A; they are connected to the primary of a transformer coil, 6; the secondary coil, 7, of the transformer is connected with the coherer, 8; the local battery circuits and indicating appliances are not shown in the diagram, but are clearly shown on the accompanying plate. The coherer of which Fig. 14 is a diagrammatic view is of new type. It consists of a small steel disk *a*, rotating on a column of mercury, *b*, contained in the cup *d*; connection is made through the binding screw *h* and the platinum wire *c*; a copper brush, *k*, bearing on the shaft forms connection with the disk, *a*, thus completing the circuit. No relay is employed, but the coherer is connected direct to a siphon recorder.

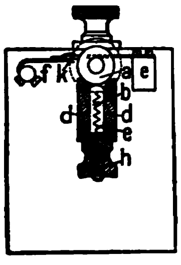


FIG. 14. LODGE COHERER.

The capacity areas and instruments are insulated from the earth by the supports 9, 9, A. B. In this system there are no earthed terminals; the object in eliminating the earth as a factor is that it represents a variable capacity, and by loading it on the oscillator and resonator tuning becomes exceedingly difficult.

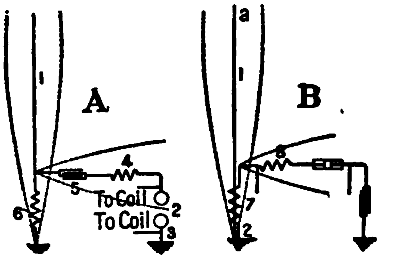
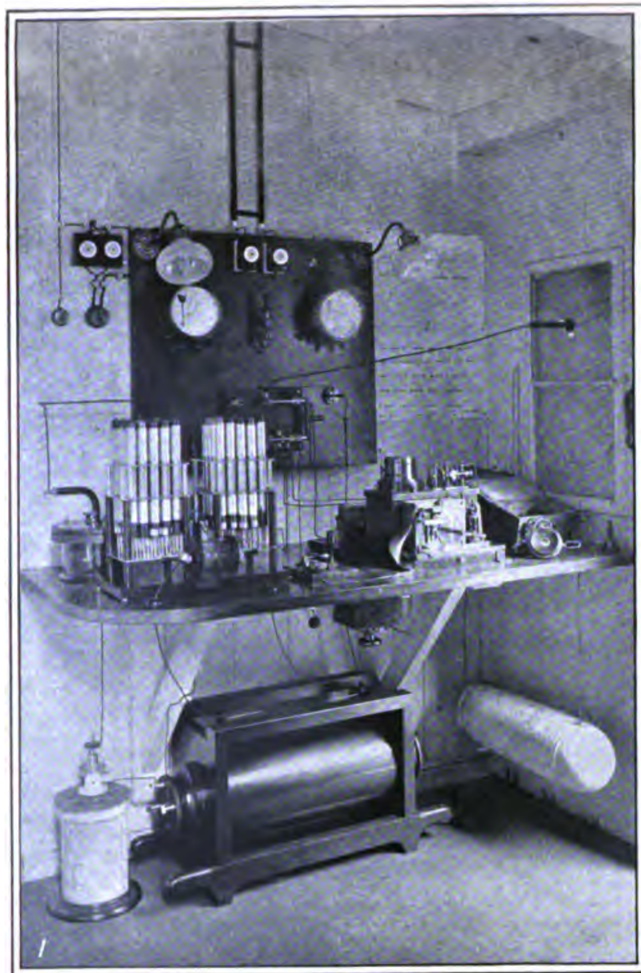
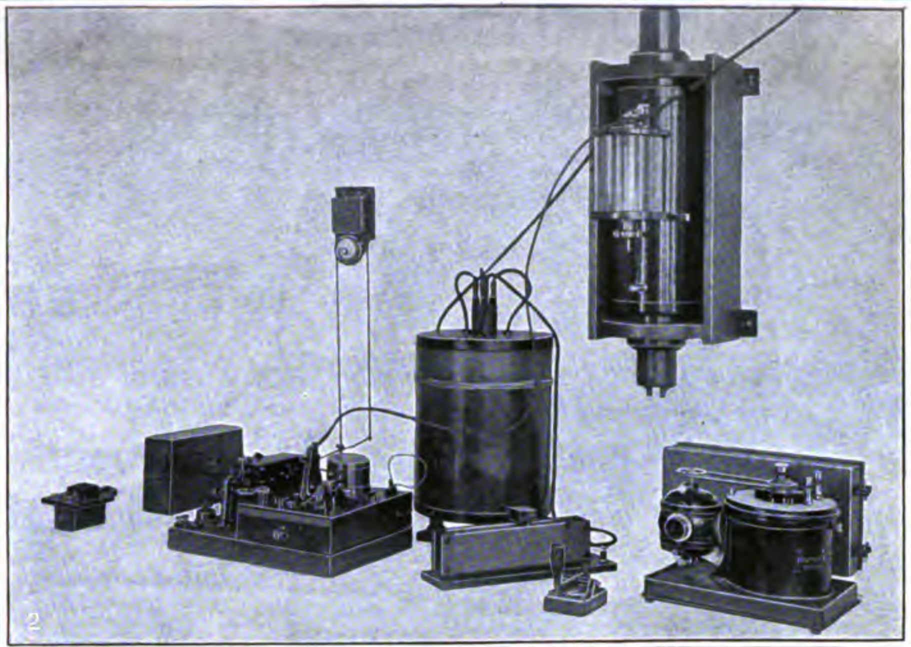


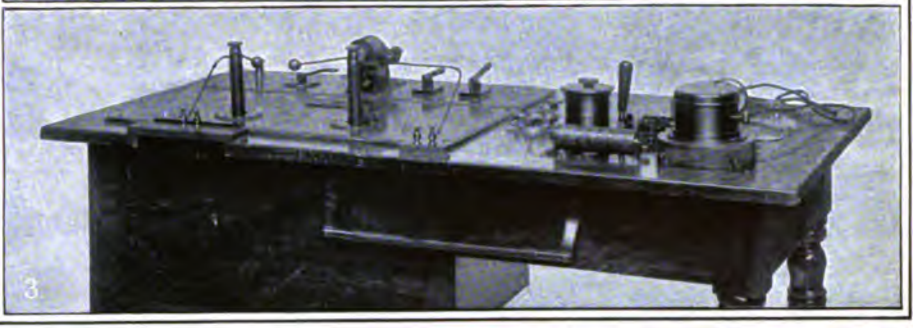
FIG. 15. DIAGRAM OF SLABY-ARCO SYSTEM.

SLABY-ARCO MULTIPLE SYSTEM. That the earth which seems so necessary to the successful transmission of electric waves over long distances could be employed, Dr. Adolph Slaby and Count Georg Arco of Germany devised the type of apparatus shown in diagram in Fig. 15, and by photograph on the plate. By mathematical analysis it was determined that if the aerial wire was one-fourth the length of the

WIRELESS TELEGRAPHY I.







1. BRAUN WIRELESS TELEGRAPH SYSTEM

2. SLABY-ARCO WIRELESS TELEGRAPH SYSTEM

3. FESSENDEN WIRELESS TELEGRAPH SYSTEM

emitted wave the earth would then become a nodal point, and this being the case it must necessarily follow that a second wire of the same length represented by 2, 3, 4, 5, A, in the diagram will, if a current is set up in it, likewise oscillate in the antenna, 1, 6; with the wave crests at the spark-gap, 2, and the free end of the aerial wire, 1, while the wave valley will be at 6, as graphically shown by the dotted lines. In the resonator, B, the oscillations set up in the antenna are communicated to the horizontal auxiliary wire, having a coherer placed at a point where the amplitude of the wave is greatest, as indicated by the dotted lines. In accordance with these principles all wave lengths different from those predetermined, and to which the instruments are tuned, will dissipate their energy into the earth, since the earth at 6 no longer becomes the node of the waves.

Marconi Syntonic System. In combining open and closed circuits William Marconi of Italy has employed radically different methods from those adopted in the preceding systems. This system is, however, largely based on the principles of the syntonic jars, and may be said to be an extension of this experimental apparatus.

In the diagram Fig. 16, the general arrangement of the radiator and resonator is shown. Referring to the sending apparatus, 1 A represents an inner metal cylinder connected to the earth at 5; the outer cylinder, 2, is connected to one side of the spark-gap, 3, the opposite side leading to the inner cylinder and the earth at 5 through the inductance, 4.

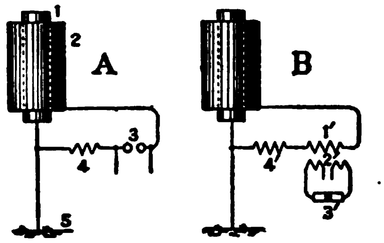


FIG. 16. DIAGRAM OF MARCONI SYSTEM.

When the spark takes place the current oscillates between the cylinders, emitting a long train of waves having a low damping factor. The resonator system of the receiver B is similar to the oscillator; the inner cylinder is connected to the earth, while the outer cylinder is connected to earth through the primary of the transformer coil, 1′, and the inductance, 4′; the secondary of the transformer, 2′, is connected with the coherer, 3′. The object of placing the latter in a separate circuit is so that the free period of oscillation may not be affected by the high resistance of the coherer. When oscillations are set up in A, waves of a given length are emitted, and these impinging on B set up currents of a similar frequency, the cumulative action of which breaks down the resistance of the coherer and registers a dot or a dash as the case may be.

In this system a sensitive relay is connected in series with the coherer; the relay on being actuated closes a second local circuit which includes a Morse printing register and the tapper used for decohering the filings of the coherer. Fig. 1 on plate II. shows the apparatus as arranged in a station.

Braun's Resonance System. Another system employing resonance to effect syntonization is due to Professor Ferdinand Braun of Germany. The oscillator and resonator consist of distinct open and closed circuits, as shown in the diagram Fig. 17. In the oscillator, A, the high frequency currents surge through the closed circuit formed by the spark-gap, s, the condensers, C, C, and the primary of the transformer coil, L, where they are impressed upon the secondary of the transformer, M, in the open circuit oscillator; this oscillator radiates waves as rapidly as the energy is supplied to it, yet of a definite wave length; the aerial wire, *a*, should be one-fourth of the wave length; the opposite terminal, *b*, is not grounded, but to maintain the relations between the coefficients the wire *b* is made equal to *a*.

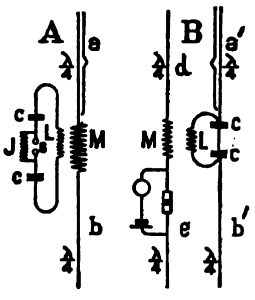


FIG. 17. DIAGRAM OF BRAUN SYSTEM.

The receiver, B, comprises the aerial wire, a′, and its complementary wire, b′, separated by the condensers, C, C. This is a compound-circuit resonator. The closed-circuit resonator is joined through *c*, *c* and the primary of a transformer, L; oscillations set up by the waves in this circuit are transformed into an open-circuit resonator through the secondary coil by the transformer, M; its terminals connect with two wires, *d*, *e*, each of which is one-fourth of the wave length, and equal in length to the aerial wire; the coherer is included in the circuit of the wire *e*, where the amplitude of the wave is greatest. An ordinary coherer of steel filings is employed in a tube which is not exhausted of its air; the tapper is operated by clockwork actuated by the relay and the message is received by a Morse printing register.

Fessenden Tuned System. This system of syntonic wireless telegraphy is the invention of Professor R. A. Fessenden, and embodies many original features. The diagram Fig. 18 illustrates a combined sending and receiving system. The transmitter comprises the aerial wire, 1, the induction coil, 2, spark-gap, 3, and a key, 4, for throwing the aerial wire in and out of tune; the tuning of the oscillator and resonator is accomplished by a variable inductance and capacity made of a number of parallel wires or grid immersed in oil and controlled by movable contacts, 5; this eliminates condensers and coils for obtaining given values of capacity and inductance, and preserves the proper relations between these coefficients. The resonator of the receiver comprises a similar grid, 9, used for tuning an electric wave detector, actuating the telephone receiver; the Morse code is employed, the messages being read from the clicks in the telephone receiver. The electric wave detector is novel in the art of wireless telegraphy; it consists of a short loop of silver wire, 13, Fig. 19, having a platinum core; this wire is drawn down to .002 inch; the loop is then fastened to the leading-in wires, 14; the tip of the silver loop is then dissolved away with nitric acid, leaving the platinum core exposed; the whole is then sealed in a glass bulb, 15, which is finally exhausted.

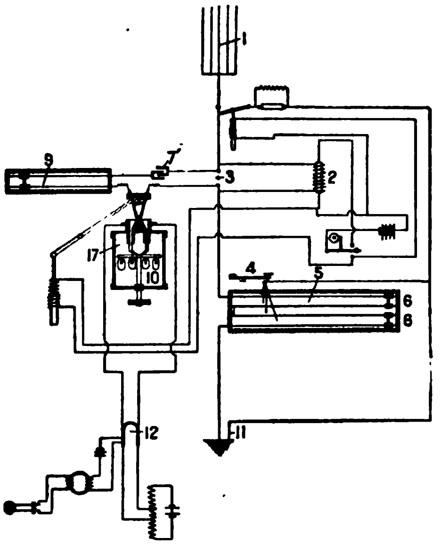


FIG. 18. FESSENDEN COMBINED SENDING AND RECEIVING APPARATUS.

This detector operates by the current developed by the oscillators, whereas detectors of the coherer type operate by the potential established. The current wave detector is very rapid in action, and utilizes all the energy of the impressed oscillators. Fig. 3 on Plate I. is a photographic view of the Fessenden apparatus.

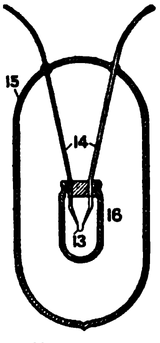


FIG. 19. FESSENDEN ELECTRIC WAVE DETECTOR.

Popp-Branly Non-Syntonic System. In a system devised by Professor Edouard Branly, the original inventor of the coherer, and M. Victor Popp of France, the general arrangement shown in Fig. 20 is employed. The chief feature of this system lies in a new type of coherer invented by Branly. This consists of a bronze disk, D, Fig. 20, with three steel legs fixed on its surface forming a tripod at right angles to its plane. The legs are brought to a point and polished, after which they are oxidized by heating in an alcohol flame and tempered; this gives them a thin insulating film of oxide, which prevents a low-voltage current from flowing through the contact, but when a high-frequency oscillation surges through it the film is broken down, the direct current then follows and indicates the signal. It is a coherer of exceptional sensitiveness and stability. On Plate II. is shown the coherer mounted on the Morse register, which also acts as a tapper for restoring the coherer to its normally high resistance.

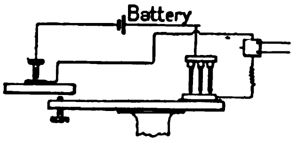


FIG. 20. DIAGRAM OF POPP-BRANLY SYSTEM.

De Forest Non-Tuned System. In this system of wireless telegraphy no attempt has been made to tune the circuits. The transmitter, Fig. 21, employs an ordinary transformer, 3, which steps up an alternating current generated by the dynamo 1 from 500 to 25,000 volts, which charges the Leyden jars, 7, 8, to their capacity, when they discharge through the air-gap, 6, setting up oscillations in the aerial wire, 4, and the earthed wire, 5. The transmitting apparatus is shown on the plate.

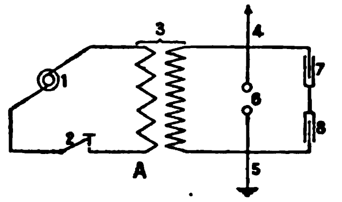


FIG. 21. DE FOREST TRANSFORMER TRANSMITTING APPARATUS.

The receiver (see diagram Fig. 22) consists of a new type of wave detector, 1′, 1″, a battery, 4′, a telephone receiver, 6′; the receiver is connected in shunt with the coherer through the condenser, 5′. Resistances, 2′ 2″ and 3′, are inserted to compensate for the excess of battery current. The wave detector operates diametrically opposite to that of the coherer; in that its resistance is increased by the cumulative action of the oscillations instead of decreased. For this reason it is termed an anti-coherer; instead of metallic filings placed between the conductor plugs of the coherer tube, an oxide of lead mixed with glycerin is employed. It is shown on the accompanying plate. The action is electrolytic in character, since the direct current from the battery builds up connecting threads and these are disrupted when the oscillations take place. Systems have been devised by Monsieur E. Ducretet of France, Señor Julio Cervera Baveria of Spain, Monsieur Emil Guarin Foresio of Belgium, and others, but these are merely modifications of the first system operated in 1896 by William Marconi.

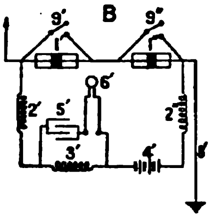


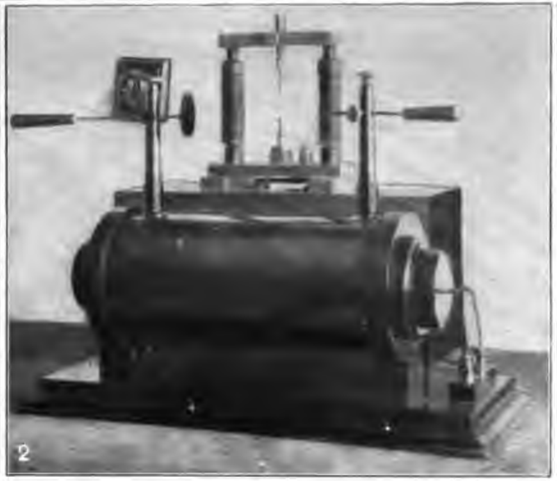
FIG. 22. DE FOREST WIRELESS TELEGRAPHY SYSTEM RECEIVER.

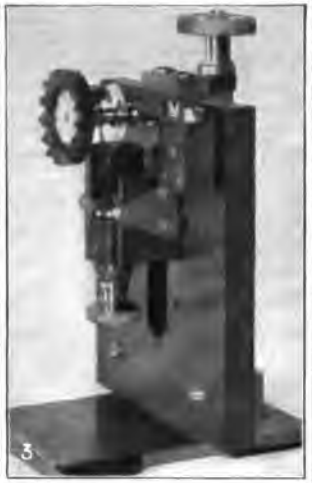
Bibliography. Consult: Fahie, *A History of Wireless Telegraphy* (3d ed., London, 1902); Hertz, *Electric Waves* (New York, 1900); Righi and Dessau, *Die Telegraphie ohne Draht* (Berlin 1903); Turpain, *Les applications practique des ondes electriques* (Paris, 1902); Collins, *Wireless Telegraphy, Its History, Theory, and Practice* (New York, 1904). The reader should also consult the files of the leading electrical journals both American and European, where he will find detailed descriptions of the various systems and the improvements made in them from time to time.

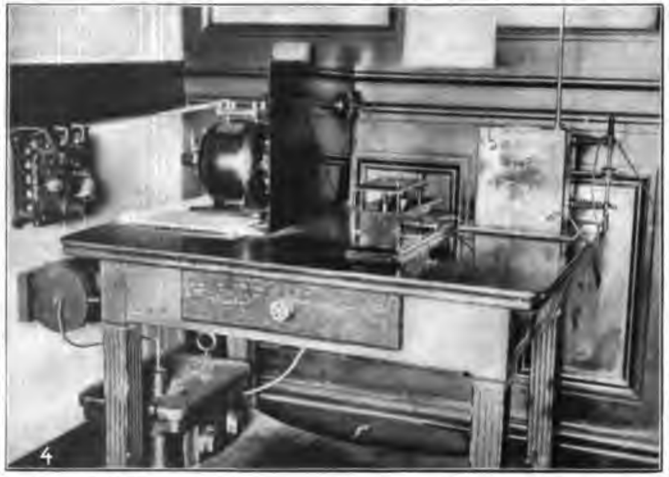
WIRE ROPE. Rope composed of twisted strands each composed of metal wires twisted together. Wire ropes are now used generally

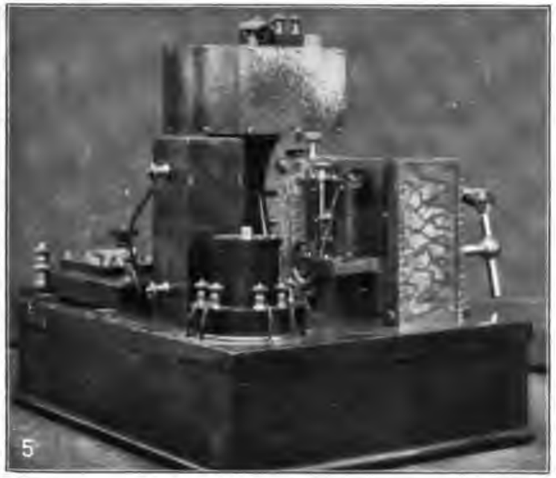
WIRELESS TELEGRAPHY II.

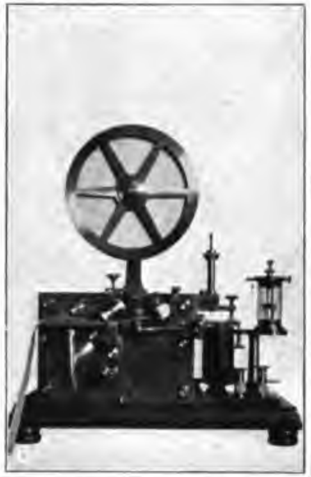
1


2


3

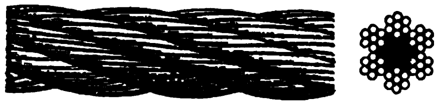

4

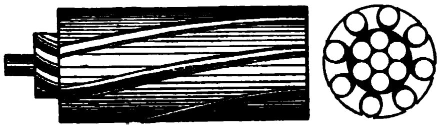

5

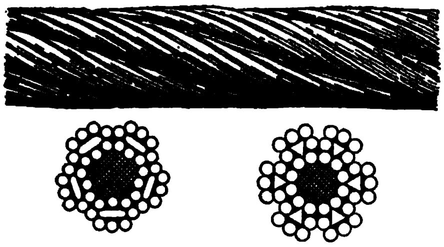

6

1. MARCONI STATION AND APPARATUS
2. INDUCTION COIL WITH SPARK GAP AND SYNTONIZING INDUCTANCES—LODGE SYSTEM
3. LODGE MERCURIAL ROTATING COHERER
4. DE FOREST SYSTEM TRANSMITTER
5. LODGE SYSTEM RECEIVING APPARATUS
6. POPP-BRANLY SYSTEM RECEIVER AND REGISTER

for all purposes for which fibre ropes have been employed, and for many purposes they have displaced fibre ropes entirely. For most kinds of wire ropes steel is the metal employed, but other metals can be twisted into rope equally well, and such rope is made in limited quantities for special purposes. Steel wire rope is referred to alone in the statements which follow. To explain the construction of wire rope it is essential to note first that it is composed of two or more units called strands, and second, that each strand is composed of two or more units or wires. Rope-making consists, therefore, first in making the individual strands, and second in combining these strands into rope. In ordinary rope—special forms of rope will be considered later—the wires forming the strand are twisted together to the left; for running ropes nineteen wires usually form a strand, and for standing ropes seven wires form a strand. To make the rope, six strands are twisted together to the right. The reason for using a greater number of wires for running rope is that rope which works over pulleys must be flexible, and the greater the number of component wires is, the more flexible is the rope. Ropes for certain purposes are made with as many as 400 wires. Flexibility is also increased by twisting the strands around a centre core of hemp, and in some instances by also twisting the wires of each strand around a hemp core. The length of twist or the lay adopted in rope depends upon the diameter of the wires employed and upon the size of the rope. Broadly speaking, the lays in strands vary from six to twelve inches. Short-laid ropes are more flexible than those with a comparatively long lay. It has just been stated that round-wire ropes of ordinary construction have the composite wires of their strands twisted in one direction, while the strands forming the rope are closed the opposite way about. In 1880 Mr. G. Craddock, an Englishman, introduced a construction of roping known as 'the Lang lay,' in which the wires forming the strands and the strands composing the rope are all laid in the same direction. Ropes of this type have been extensively used for running or winding purposes. In recent years many special forms of wire ropes have been invented. They are generally made of wires of special section designed to interlock with each other, and increased strength and wearing capacity may be secured by having the strands so woven as to form a flat surface which will take up the wear more evenly, as it comes on a number of wires instead of the single one nearest the periphery of the rope. The strength of wire rope varies, of course, with the strength of the material from which the wire is made, and it is usually about 10 to 15 per cent. less than the aggregate strength of the component wires. Flat wire ropes are now little used; they were generally formed of four, six, or more round ropes of alternate lays sewn together by wires in a zigzag direction. The earliest form of wire rope was the 'selvagee' construction, in which several wires were laid parallel to each other and wound with fine wire; such ropes are still used for suspension bridge cables.


STANDING ROPE (seven-wire strands around hemp-core).


PATENT LOCK COIL WIRE ROPE.


PATENT FLATTENED STRAND WIRE ROPE.

The manufacture of wire rope appears to have originated in Germany about 1821; in this year ropes of the 'selvagee' type were made for the Geneva Suspension Bridge. Shortly afterwards formed or stranded wire ropes were made and utilized. Wire rope manufacture in England dates from about 1838; in that year R. S. Newall, of Dundee, invented a rope-making machine, and later he established a wire rope works. From this origin the vast wire rope industry of Great Britain, and afterwards of the United States, was developed. Wire rope is now made altogether by machinery. The machines used are all built on the same principle, although they vary in form and arrangement and in their capacity. To understand the principle of a wire rope machine, picture a large wheel free to revolve on a horizontal axle. At regular intervals on the side of the wheel rim, assume spools or reels of wire to be attached, so that they revolve with the wheel. If now we carry the free end of the wire on each wheel through a hole in a block of metal placed in line with the axle, and some distance away from the wheel, we have a crude form of rope-making machine, since by revolving the wheel the wires leading from the reels are twisted together at the metal block or head. Generally separate machines are used for twisting the wires into strands and for twisting the strands into rope, but some machines accomplish both processes simultaneously. A full description of wire rope making is given in J. B. Smith's *Wire: Its Manufacture and Uses* (New York, 1891).

WIRE-TAILED BIRDS OF PARADISE. See BIRDS OF PARADISE.

WIRE-WORM. The larva of any one of the click-beetles of the family Elateridæ. (See CLICK-BEETLE; ELATERIDÆ.) The name is also sometimes applied to certain small myriapods.

WIRE-WOUND GUN. See ORDNANCE; GUNS, NAVAL.

WIRNT VON GRAFENBERG, vêrnt fôn grä'fen-bĕrk (or Gravenberg). A Middle High German poet of the thirteenth century. He was a Bavarian nobleman who between 1202 and 1205 wrote an epic, entitled *Wigalois,* which describes the adventures of Gawain's son, the name being a corruption of Guinglain le Galois. Wirnt took his material from the French romance *Le bel inconnu* of Renaud de Beaujeu, and used it with great freedom. Though extravagant and didactic, the poem is one of the best romances of the Arthurian cycle written in Germany, apart from the work of Wolfram von Eschenbach and Hartmann von Aue. A prose version was made toward the close of the fifteenth century and printed at Augsburg in 1493. *Wigalois* was edited by F. Pfeiffer (Leipzig, 1847). Consult F. Saran, *Beiträge zur Geschichte der deutschen Sprache und Litteratur,* vol. xxi. (Halle, 1896).

WIRT, wẽrt, William (1772-1834). An American lawyer, statesman, and author, born at Bladensburg, Md. He obtained a grammar school education, served as a tutor, studied law, and, moving to Virginia, practiced his profession and held office. In 1803 he printed his *Letters of a British Spy,* containing sketches of popular speakers, which were Addisonian in style and highly popular. A second series of essays, entitled *The Rainbow,* appeared later in the *Richmond Enquirer,* but was not so successful. *The Old Bachelor* (1812), first published in the same paper by Wirt and some of his friends, was more popular, but as an author Wirt achieved more fame by his readable though not very accurate *Life of Patrick Henry* (1817). Meanwhile he had settled in Richmond in 1806 and gained a high reputation by his speech in prosecution of Aaron Burr. He supported Jefferson in politics, and became a member of the Virginia Legislature (1807-08), and United States District Attorney (1816) and Attorney-General of the United States during the administrations of Monroe and J. Q. Adams (1817-29). On retiring he settled in Baltimore, and in 1832 accepted the Anti-Masonic nomination for the Presidency. He was an able and amiable man, a good speaker, an effective though somewhat florid writer, and a lawyer and statesman of tried integrity and success. Consult the *Memoir* by J. P. Kennedy (Philadelphia, 1849); also "English Culture in Virginia," by W. P. Trent, in *Johns Hopkins University Studies.*

WISBECH, wĭs'bĕch *or* wĭz'-, or **WISBEACH.** A river-port in the Isle of Ely, Cambridgeshire, England, on the Nene, 12 miles above its mouth in the Wash (North Sea), and 40 miles north of Cambridge (Map: England, G 4). One of the principal buildings is the restored Church of Saint Peter and Saint Paul. Vessels of upward of 500 tons can reach the town. There are manufactures of rope. Wisbech is mentioned in 664; became noted for its extensive fisheries; in 1190 it received privileges from Richard I., and in 1549 was incorporated by Edward VI. Population, in 1901, 9831.

WIS'BY or **VISBY.** The capital of the Swedish island and län of Gotland, on the western coast of the island, about 44 miles from the mainland of Sweden (Map: Sweden, H 8). The town is imposingly situated amid gardens on and at the foot of a rugged cliff. It has greatly declined, as is attested by the half-vacant area inclosed within the interesting mediæval walls with their thirty-eight ancient towers. The many houses dating back to the period from the thirteenth to the seventeenth century give the place a quaint appearance. Of the many churches, only one, the Cathedral of Saint Mary, at the foot of the cliff, now remains in service. It was erected by the Germans and was completed in 1225. The interesting ruined Church of Saint Nicholas, partly Romanesque and partly Gothic, has two beautiful rose windows, supposed to have contained the two carbuncles which, tradition says, now lie at the bottom of the sea with the bones of Valdemar. The charming Gothic Saint Catharine Church dates from about 1230. Near the southeast corner of the walls is a monolithic cross marking the sepulchre of the defenders of the city in 1361. The Gotland Museum, rich in antiquities, the high school with a museum, the chemical station, and the library are the principal public buildings. The little modern harbor, south of the old Hanseatic harbor, which has disappeared, has two basins to accommodate the present traffic. Population, in 1900, 8376.

The history of Wisby is that of Gotland (q.v.). The town was probably a place of human sacrifice and a trading place of some importance in pagan times. In the Middle Ages, when it was a member of the Hansa, it was a great distributing centre for the commerce between the Orient and the Baltic countries. A famous maritime code bore its name. Valdemar IV. of Denmark practically destroyed the town in 1361, and it never regained its supremacy.

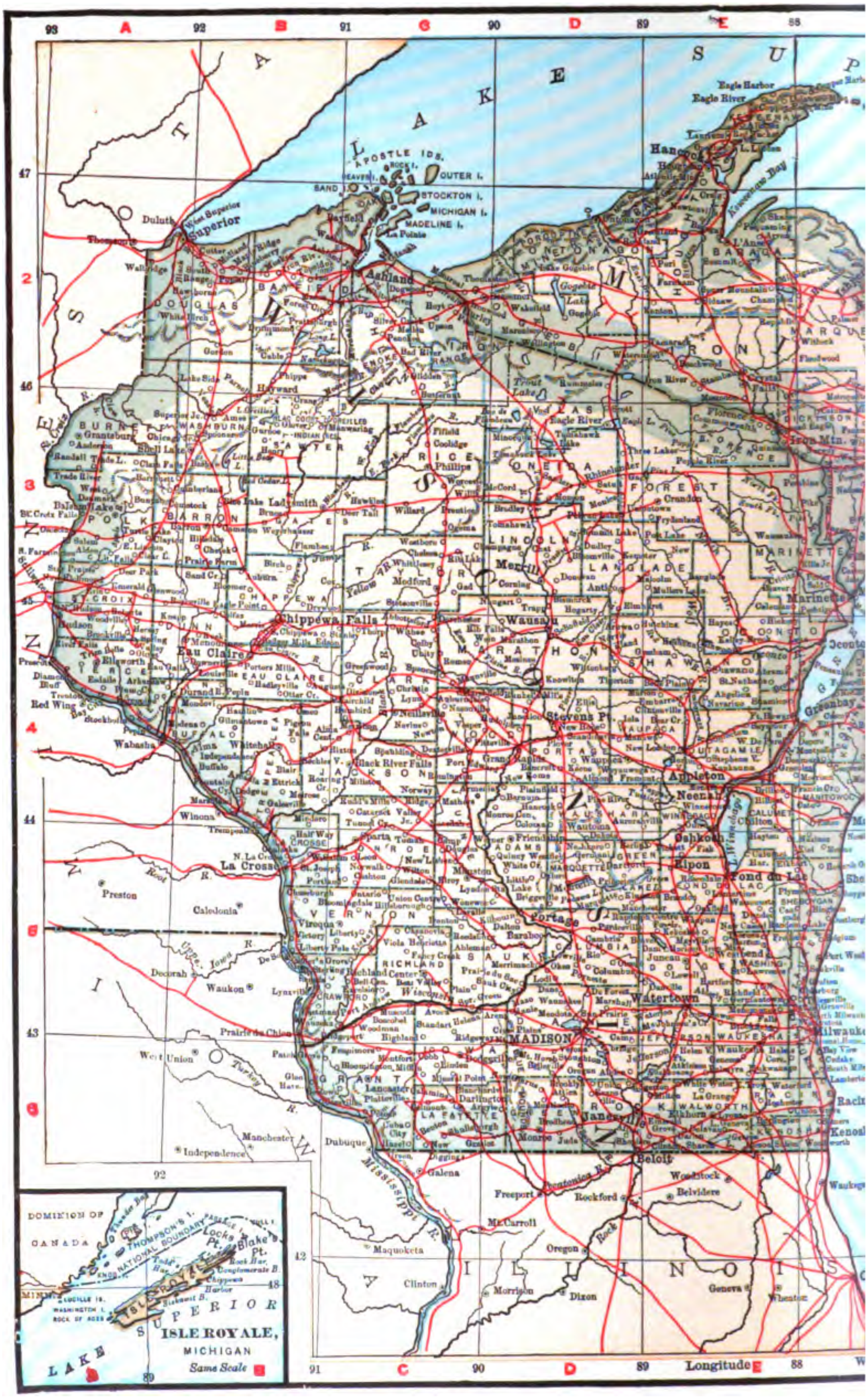
WISBY, Laws of. A collection of mercantile customs and regulations, dating from the last years of the thirteenth century and taking its name from the celebrated trading town in Gotland, Sweden. The laws of Wisby were in force throughout the Baltic Sea and were made the basis of the ordinances of the Hanseatic League. They were an important factor in the development of the modern system of maritime law. Scandinavian legists claim for the Wisby code an antiquity antedating that of the celebrated laws of Oleron, but the evidence is greatly against so early an origin.

WISCON'SIN. A north central State of the United States, popularly called the 'Badger State.' It is bounded on the north by Lake Superior and upper Michigan, on the east by Lake Michigan, on the south by Illinois, and on the west by Iowa and Minnesota, the greater part of the western boundary being formed by the Mississippi River. Its greatest length, between latitudes 42° 30′ and 47° 3′ N., is 315 miles, and its greatest breadth, between longitudes 86° 49′ and 92° 54′ W., 294 miles. These dimensions include the Apostle Islands, in Lake Superior, and the islands at the entrance to Green Bay, in Lake Michigan. Wisconsin has an area of 56,040 square miles, including 1590 square miles of water, and it ranks twenty-first in size among the States.

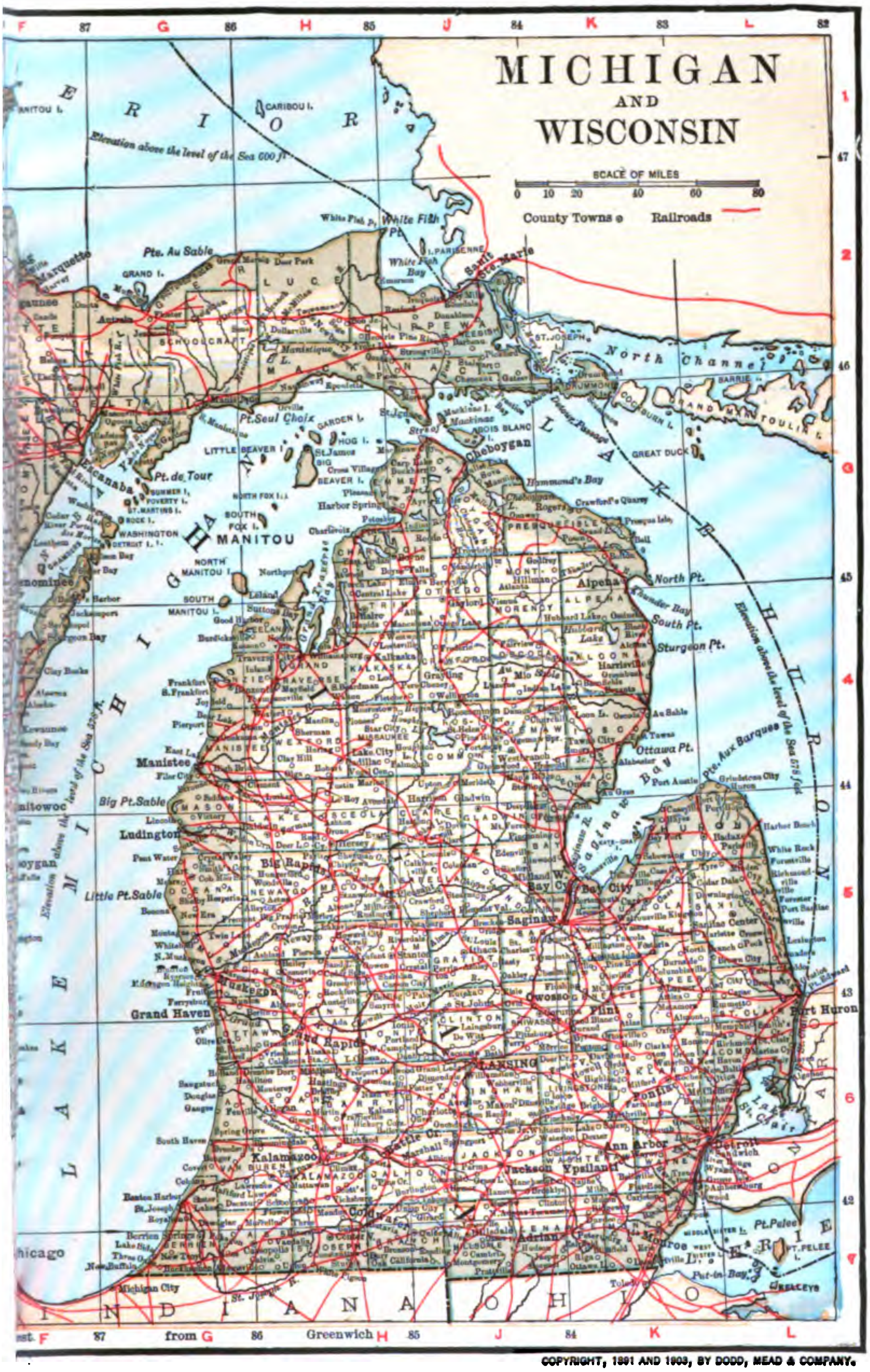
Topography. The surface of Wisconsin is a nearly level plain or undulating plateau with three faces or slopes, divided by a T-shaped ridge or line of highest elevation. The longitudinal arm of this ridge runs southward through the

AREA AND POPULATION OF WISCONSIN BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Adams	D 5	Friendship	682	6,889	9,141
Ashland	C 2	Ashland	930	20,063	20,176
Barron	A 3	Barron	878	15,416	23,677
Bayfield	B 2	Washburn	1,497	7,390	14,392
Brown	E 4	Greenbay	518	39,164	46,359
Buffalo	B 4	Alma	662	15,997	16,765
Burnett	A 3	Grantsburg	881	4,393	7,478
Calumet	F 4	Chilton	317	16,639	17,078
Chippewa	B 3	Chippewa Falls	1,938	25,143	33,037
Clark	C 4	Neillsville	1,200	17,708	25,848
Columbia	D 5	Portage	776	28,350	31,121
Crawford	B 5	Prairie du Chien	557	15,987	17,286
Dane	D 5	Madison	1,188	59.578	69,435
Dodge	E 5	Juneau	884	44,984	46,631
Door	F 4	Sturgeon Bay	454	15,682	17,583
Douglas	A 2	Superior	1,319	13,468	36,335
Dunn	A 4	Menomonie	844	22,664	25,043
Eau Claire	B 4	Eau Claire	620	30,673	31,692
Florence	E 3	Florence	498	2,604	3,197
Fond du Lac	E 5	Fond du Lac	720	44,088	47,589
Forest	E 3	Crandon	1,421	1,012	1,396
Gates	B 3	....	....	......	......
Grant	C 6	Lancaster	1,157	36,651	38,881
Green	D 6	Monroe	576	22,732	22,719
Green Lake	D 5	Dartford	364	15,163	15,797
Iowa	C 6	Dodgeville	763	22,117	23,114
Iron	C 2	Hurley	786	......	6,616
Jackson	C 4	Black River Falls	978	15,797	17,466
Jefferson	E 5	Jefferson	548	33,530	34,789
Juneau	C 4	Mauston	790	17,121	20,629
Kenosha	E 6	Kenosha	274	15,581	21,707
Kewaunee	F 4	Kewaunee	327	16,153	17,212
La Crosse	B 5	La Crosse	475	38,801	42,997
Lafayette	C 6	Darlington	634	20,265	20,959
Langlade	D 3	Antigo	855	9,465	12,553
Lincoln	D 3	Merrill	885	12,008	16,269
Manitowoc	F 4	Manitowoc	590	37,831	42,261
Marathon	D 4	Wausau	1,532	30,369	43,256
Marinette	E 3	Marinette	1,396	20,304	30,822
Marquette	D 5	Montello	451	9,676	10,509
Milwaukee	F 5	Milwaukee	228	236,101	330,017
Monroe	C 5	Sparta	915	23,211	28,103
Oconto	E 4	Oconto	1,080	15,009	20,874
Oneida	D 3	Rhinelander	900	5.010	8,875
Outagamie	E 4	Appleton	634	38,690	46,247
Ozaukee	F 5	Port Washington	226	14,943	16,363
Pepin	A 4	Durand	238	6,932	7,905
Pierce	A 4	Ellsworth	543	20,385	23,943
Polk	A 3	Balsam Lake	933	12,968	17,801
Portage	D 4	Stevens Point	800	24,798	29,483
Price	C 3	Phillips	1,241	5,258	9,106
Racine	E 6	Racine	323	36,268	45.644
Richland	C 5	Richland Center	576	19,121	19,483
Rock	D 6	Janesville	706	43,220	51,203
St. Croix	A 3	Hudson	711	23,139	26,830
Sauk	E 5	Barabos	820	30,575	33,006
Sawyer	B 3	Hayward	1,342	1,977	3,593
Shawano	D 4	Shawano	1,135	19,236	27,475
Sheboygan	E 5	Sheboygan	510	42,489	50,345
Taylor	C 3	Medford	965	6,731	11,262
Trempealeau	B 4	Whitehall	934	18,920	23,114
Vernon	B 5	Viroqua	792	25,111	28,351
Vilas	D 3	Eagle River	907	......	4,929
Walworth	E 6	Elkhorn	562	27,860	29,259
Washburn	B 3	Shell Lake	834	2,926	5,521
Washington	B 5	Westbend	423	22,751	23.589
Waukesha	E 5	Waukeska	562	33,270	35,229
Waupaca	D 4	Waupaca	749	26,794	31,615
Waushara	D 4	Wautoma	689	13.507	15,972
Winnebago	E 4	Oshkosh	472	50.097	58,225
Wood	C 4	Grand Rapids	785	18,127	25,865



93
A
92
B
91
C
90
D
89
E
88
47
46
45
44
43
2
3
4
5
6
LAKE SUPERIOR
APOSTLE IDS.
OUTER I.
STOCKTON I.
MICHIGAN I.
MADELINE I.
Duluth
Superior
Ashland
Hancock
Eagle Harbor
Eagle River
Keweenaw Bay
MINNESOTA
WISCONSIN
DOUGLAS
BAYFIELD
ASHLAND
IRON
VILAS
ONEIDA
FOREST
FLORENCE
MARINETTE
PRICE
SAWYER
WASHBURN
BURNETT
POLK
BARRON
RUSK
TAYLOR
LINCOLN
LANGLADE
ST. CROIX
DUNN
CHIPPEWA
PIERCE
PEPIN
EAU CLAIRE
CLARK
MARATHON
SHAWANO
OCONTO
BUFFALO
TREMPEALEAU
JACKSON
WOOD
PORTAGE
WAUPACA
OUTAGAMIE
LA CROSSE
MONROE
JUNEAU
ADAMS
WAUSHARA
WINNEBAGO
CALUMET
VERNON
RICHLAND
SAUK
COLUMBIA
DODGE
FOND DU LAC
MARQUETTE
GREEN LAKE
CRAWFORD
GRANT
IOWA
DANE
JEFFERSON
WAUKESHA
LA FAYETTE
GREEN
ROCK
WALWORTH
Chippewa Falls
Eau Claire
Wausau
Merrill
Stevens Pt.
Appleton
Neenah
Oshkosh
Ripon
Fond du Lac
Green Bay
Marinette
Black River Falls
La Crosse
Winona
Portage
MADISON
Watertown
Milwaukee
Racine
Kenosha
Janesville
Beloit
Prairie du Chien
Dubuque
Galena
Freeport
Rockford
Belvidere
Mt. Carroll
Oregon
Dixon
Clinton
Maquoketa
Morrison
Geneva
Wheaton
Woodstock
Red Wing
Wabasha
Preston
Caledonia
Decorah
Waukon
West Union
Manchester
Independence
IOWA
ILLINOIS
Mississippi R.
Upper Iowa R.
Root R.
Turkey R.
Rock R.
Lake Winnebago
DOMINION OF CANADA
THOMPSON'S I.
NATIONAL BOUNDARY
Blake's Pt.
Rock Harbor
Siskiwit B.
ISLE ROYALE
LAKE SUPERIOR
ISLE ROYALE,
MICHIGAN
Same Scale
48
89
Longitude



COPYRIGHT, 1891 AND 1903, BY DODD, MEAD & COMPANY.

AREA AND POPULATION OF MICHIGAN BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Alcona	K 4	Harrisville	690	5,409	5,691
Alger	G 2	Autrain	924	1,238	5,868
Allegan	K 4	Allegan	839	38,961	38,812
Alpena	K 4	Alpena	584	15,581	18,254
Antrim	H 4	Bellaire	491	10,413	16,568
Arenac	J 4	Standish	365	5,683	9,821
Baraga	E 2	L'Anse	890	3,036	4,320
Barry	H 6	Hastings	572	23,783	22,514
Bay	J 5	Bay City	437	56,412	62,378
Benzie	G 4	Frankfort	309	5,237	9,685
Berrien	G 7	Saint Joseph	566	41,285	49,165
Branch	H 7	Coldwater	504	26,791	27,811
Calhoun	H 6	Marshall	697	43.501	49,315
Cass	G 7	Cassopolis	500	20,953	20,876
Charlevoix	H 3	Charlevoix	423	9,686	13,956
Cheboygan	J 3	Cheboygan	785	11,986	15,516
Chippewa	J 2	Sault Sainte Marie	1,580	12,019	21,338
Clare	J 5	Harrison	575	7,558	8,360
Clinton	J 6	Saint Johns	570	26,509	25,136
Crawford	J 4	Grayling	575	2,962	2,943
Delta	F 3	Escanaba	1,127	15,330	23,881
Dickinson	F 3	Iron Mountain	756	......	17,890
Eaton	J 6	Charlotte	566	32,094	31,668
Emmet	J 3	Harbor Springs	462	8,756	15,931
Genesee	K 5	Flint	648	39,430	41,804
Gladwin	J 5	Gladwin	510	4,208	6,564
Gogebic	C 2	Bessemer	1,152	13,166	16,738
Grand Traverse	H 4	Summit City	496	13.355	20,479
Gratiot	J 5	Ithaca	572	28.668	29,889
Hillsdale	J 7	Hillsdale	605	30,660	29,865
Houghton	E 2	Houghton	1,077	35,389	66,063
Huron	K 5	Badaxe	841	28,545	34,162
Ingham	J 6	Mason	547	37,666	39,818
Ionia	H 5	Ionia	575	32,801	34,329
Iosco	K 4	Tawas City	560	15,224	10,246
Iron	E 2	Crystal Falls	1,143	4,432	8,990
Isabella	J 5	Mount Pleasant	568	18,784	22,784
Jackson	J 6	Jackson	695	45,031	48,222
Kalamazoo	H 6	Kalamazoo	575	39,273	44,310
Kalkaska	H 4	Kalkaska	570	5,160	7,133
Kent	H 5	Grand Rapids	862	109,922	129,714
Keweenaw	E 1	Eagle River	570	2,894	3,217
Lake	H 5	Baldwin	575	6,505	4,957
Lapeer	K 5	Lapeer	667	29,213	27,641
Leelanaw	H 4	Leland	355	7,944	10,556
Lenawee	J 7	Adrian	742	48,448	48.406
Livingston	J 6	Howell	575	20,858	19,664
Luce	H 2	Newberry	915	2,455	2,983
Mackinac	H 2	Saint Ignace	1,146	7,830	7,703
Macomb	L 6	Mount Clemens	460	31.813	33,244
Manistee	G 4	Manistee	547	24.230	27,856
Marquette	F 2	Marquette	1,839	39,521	41,239
Mason	G 4	Ludington	501	16,385	18,885
Mecosta	H 5	Big Rapids	567	19,697	20,693
Menominee	F 3	Menominee	1,044	33,639	27,046
Midland	J 5	Midland	518	10,657	14,439
Missaukee	H 4	Lake City	566	5.048	9,308
Monroe	K 7	Monroe	572	32,337	32,754
Montcalm	H 5	Stanton	720	32,637	32,754
Montmorency	J 4	Atlanta	561	1,487	3,234
Muskegon	G 5	Muskegon	522	40,013	37.036
Newaygo	H 5	Newaygo	851	20,476	17,673
Oakland	K 6	Pontiac	897	41,245	44,792
Oceana	G 5	Hart	565	15.698	16,644
Ogemaw	J 4	Westbranch	568	5,583	7,765
Ontonagon	D 2	Ontonagon	1,355	3,756	6,197
Osceola	H 5	Hersey	575	14,630	17,859
Oscoda	J 4	Mio	572	1,904	1,468
Otsego	J 4	Gaylord	529	4,272	6,175
Ottawa	G 6	Grand Haven	561	35,358	39,667
Presque Isle	J 3	Rogers	660	4,687	8,821
Roscommon	J 4	Roscommon	535	2,033	1,787
Saginaw	J 5	Saginaw West Side	832	82,273	81,222
St. Clair	L 6	Port Huron	690	52,105	55,228
St. Joseph	H 7	Centerville	506	25,356	23.889
Sanilac	L 5	Sanilac Center	966	32,589	35.055
Schoolcraft	G 2	Manistique	1,151	5,818	7,889
Shiawassee	J 6	Corunna	542	30,952	33,866
Tuscola	K 5	Caro	814	32,508	35,890
Van Buren	G 6	Paw Paw	625	30,541	33,274
Washtenaw	K 6	Ann Arbor	690	42,210	47,761
Wayne	K 6	Detroit	626	257,114	348,793
Wexford	H 4	Cadillac	575	11,278	16,845

centre of the State. It is very flat, the land sloping gradually from an altitude of a little over 1000 feet along the summit of the ridge to somewhat less than 600 feet on the shore of Lake Michigan and to somewhat more than 600 feet at the Mississippi, a slope of 400 feet in 100 miles. The transverse arm of the ridge is higher and more abrupt, being sometimes called the Penokee Mountains or Range. It stretches parallel with Lake Superior, about 30 miles south of it, and extends eastward into the northern peninsula of Michigan. Its general elevation is between 1500 and 1600 feet, and the highest point within the State is about 1700 feet above sea level. This ridge falls rapidly northward to an altitude of 600 feet on the shore of Lake Superior. A peculiar diagonal valley runs across the State from southwest to northeast, guiding the course of the lower Wisconsin and Fox River, and occupied in the northeast by Green Bay and Lake Winnebago. It is bounded on the south by a somewhat bold escarpment. Otherwise there are no sharp irregularities in the surface except the cliffs along the river valleys in the southwestern part of the State, and the rounded drumlins, mounds, or morainic peaks and ridges composed of glacial drift, which are scattered over the remaining area.

The drainage systems are, of course, determined by the three plateau slopes described above. North of the Penokee Range a number of short streams fall into Lake Superior. Those on the eastern slope, flowing into Lake Michigan, are larger, and include the Menominee, which forms part of the northeastern boundary and flows into Green Bay, the Fox, which drains Lake Winnebago and also enters Green Bay, and the Milwaukee River, which flows directly into Lake Michigan. The western and southern slopes of the State, including the greater part of its area, are drained by tributaries of the Mississippi, of which the principal are the Saint Croix, forming part of the northwestern boundary, the Chippewa, and the Wisconsin, the last being the largest river within the State. Several streams rise in the southern part of the State and flow southward into Illinois, all of them joining the Mississippi. The chief of these are the Rock River and the Des Plaines and Fox rivers, two headstreams of the Illinois. The longitudinal divide is so flat that some of its lakes and swamps send their waters in both directions, west to the Mississippi and east to the Great Lakes; this is especially noticeable at Portage, where the waters of the Wisconsin and Fox rivers unite during the floods. A multitude of lakes are scattered over the northern and eastern parts of the State, but only one, Lake Winnebago (q.v.), is of considerable size.

CLIMATE. Owing to the proximity of the Great Lakes, the climate is more tempered than that of the more western interior States, and the range of temperature is not excessive, though the winters are very cold and prolonged. The mean temperature for January is 12.8° at Bayfield, in the extreme northern part of the State, 15.5° at La Crosse, on the Mississippi, and 19.3° at Milwaukee, on the southeastern lake shore. For July the mean is 67° at Bayfield, 73° at La Crosse, and 69.2° at Milwaukee, showing that the summers are cooler on the lake shore than at corresponding latitudes in the interior. The maximum temperature is generally between 90° and 95°, and seldom exceeds 100°; the average minimum is between 10° and 25° below zero. The average annual precipitation for the State is 31 inches, which is very evenly distributed through the State, being only slightly greater in the east than in the west. The greatest amount falls between July and October. Thunderstorms are frequent in summer, but in winter the air is dry and clear, and the snowfall light.

SOIL AND VEGETATION. With the exception of a rocky area in the Penokee highland and an area of poor sandy soil in the central part of the State, the soils of Wisconsin are of good quality. In the northern and eastern sections they are composed of glacial drift and alluvium, forming a rich sandy or clayey loam, while in the southwest there is a very fertile soil formed by disintegration of Silurian limestone. The southern and western parts of the State belong to the prairie region, but in the north and east there are extensive forest belts, which, however, have been much depleted. The forests are largely coniferous—pine, fir, and hemlock—but there is a considerable admixture of deciduous trees, especially on the southern and eastern outskirts, and the composition of the forests in general resembles that of the northern Appalachian region.

GEOLOGY. The whole State is of very ancient formation, the uppermost strata being of Silurian or Devonian age. In the north central portion there is a large area of Archæan granites, gneiss, syenite, and other crystalline rocks belonging chiefly to the Laurentian period. They are bounded on the north by rocks of the Algonkian system, which extend to the shores and under the bottom of Lake Superior. On the south the Archæan rocks disappear under extensive beds of Potsdam sandstone which cover a large area in the central part of the State, and which in turn disappear under the Silurian strata. The latter extend along the entire western shore of Lake Michigan and across the southern boundary into Illinois, with isolated patches along the banks of the Mississippi. The most widely exposed member of the series is the Niagara limestone, whose northern escarpment, a continuation of the Niagara escarpment, forms the southern wall of the diagonal valley occupied by Green Bay and the lower Wisconsin River. The Pleistocene ice sheet extended far beyond the limits of Wisconsin, and covered the greater part of it with a layer of drift, but left a large, isolated driftless area in the southwestern quarter of the State. The most important mineral deposits are lead and iron ores. The former are found, associated with zinc and copper, in the Galena or Trenton limestone in the northwestern part of the State, and the iron ores in the Clinton series in eastern Wisconsin, and in the Archæan and Algonkian regions in the north. Granite, sandstones, and limestones are abundant, and cement rock occurs in the neighborhood of Milwaukee. Diamonds have been found in the glacial drift in various parts of the State.

MINING. Wisconsin is rising in importance as an iron-mining State. In 1901, 738,868 long tons of ore were obtained, making the State seventh in rank. There were 725,496 tons of red hematite and 13,372 tons of brown hematite. The ore is obtained mainly from the Gogebic and

	National	State July 7, 1902	Savings July 7, 1902	Private June 30, 1902
Number....	99	178	1	187
Capital.....	$11,425,000	$1,429,000	......	$1,132,000
Surplus....	3,219,000	1,302,000	......	190,000
Cash, etc..	6,916,000	3,583,000	$8,116	713,000
Loans......	64,867,000	45,831,000	412,200	8,635,000
Deposits...	76,256,000	58,963,000	719,000	11,503,000

Constitution and Government. The present Constitution is the original one under which the State came into the Union. Voters must be citizens or foreigners who have declared their intention of becoming citizens of the United States, or civilized Indians not members of any tribe, and who have resided in the State one year and in the district a period prescribed by law. Proposed amendments must be passed by a majority of the members elected to either House at two successive sessions of the Legislature and afterwards receive a majority vote of the people. A proposal to call a constitutional convention must receive a majority vote of both Houses and be approved by a majority of the popular vote.

Legislative. The Assembly has a maximum and minimum limit of 100 and 54 respectively, and the Senators must be not more than one-third nor less than one-fourth of the number of the members of the Assembly. Elections are biennial, on the Tuesday after the first Monday of November. The salary of members is $500 and mileage for each regular session, and mileage alone for extra sessions. The Legislature meets, according to statutory provision, on the first Monday in January; the sessions are not limited in duration. The power of impeachment rests with the Assembly, and the trial of impeachment with the Senate.

Executive. The Governor, Lieutenant-Governor, Secretary of State, Treasurer, and Attorney-General are elected for a term of two years. The Governor has the usual pardoning power, and a veto which may be overridden by a two-thirds vote of each House. The Governor receives $5000 per year. The Lieutenant-Governor and Secretary of State are respectively eligible to the Governorship in case of a vacancy in that office.

Judiciary. There is a Supreme Court of five members elected for ten years. The Legislature determines judicial circuits, in each of which a judge is elected by the people.

Local. Sheriffs, coroners, registers of deeds, and district attorneys are elected in the counties every two years. Sheriffs cannot serve two successive terms.

Madison is the capital. The State has eleven representatives in the National House of Representatives.

Finance. The Constitution places the usual restrictions upon all expenditures. The State, with the assent of a majority of all members elected to either branch of the Legislature, may contract a public debt to defray extraordinary expenses, but the amount must not exceed $100,000. A debt of $2,251,000 was created to meet the State expenditures incurred during the Civil War. The balance on hand in the treasury on September 30, 1902, was $496,408.74. The receipts for the year ending on that date aggregated $5,321,304.89, and the expenditures $5,124,553.12. The chief sources of revenue are railroad license fees, taxation, and insurance companies' license fees. The valuation of all property in 1902 was $1,504,346,000.

Militia. In 1900 the State had 425,825 men of military age. The organized militia in 1901 numbered 2773.

Population. The following figures show the growth of the population by decades: 1840, 30,945; 1850, 305,391; 1860, 775,881; 1870, 1,054,670; 1880, 1,315,497; 1890, 1,686,880; 1900, 2,069,042. In 1900 Wisconsin ranked thirteenth in population among the States of the Union. The State has a very large foreign-born population, numbering, in 1900, 515,971, or 24.9 per cent. of the total population. It probably has the largest proportion of German blood of any State. That nationality began to come to the United States in large numbers during the first decade of the period of rapid colonization—1840-50—and settled in large numbers, especially in the southeastern half of the State. In 1900 there were 242,777 foreign-born Germans. The Norwegians came later and went farther to the northwest. There were 61,575 foreign-born Norwegians in 1900. The early settlements in the lead-mining region of the southwest were made by Southerners by way of the Mississippi River, but they were soon overwhelmed in numbers by the New England element. In 1900 there were 8372 Indians, 2542 negroes, and 217 Chinese. The males numbered 1,067,562 and the females 1,001,480. In 1900 there was an average of 38 persons to the square mile. The largest cities were as follows: Milwaukee, 285,315; Superior, 31,091; Racine, 29,102; La Crosse, 28,895; Oshkosh, 28,284; Sheboygan, 22,962; Madison, 19,164; Green Bay, 18,684; Eau Claire, 17,517; Marinette, 16,195; Fond du Lac, 15,110; Appleton, 15,085; Ashland, 13,074; Janesville, 13,185; Warsaw, 12,354; Manitowoc, 11,786; Kenosha, 11,606; Beloit, 10,436.

Religion. The Catholics are the strongest sect. Other leading organizations include the Lutherans, Methodists, Baptists, Congregationalists, and Presbyterians.

Education. The public schools are under the control of a State Superintendent of Public Instruction. The school and university lands and the revenues accruing from them are, however, under the supervision of a board consisting of the Secretary of State, the Treasurer, and the Attorney-General. Each town and city is required to raise annually by tax a sum of not less than one-half the amount received by them from the income of the school fund. In the census year 1900 there was a school population of 730,685, and an actual attendance of 427,624, or 51.7 per cent. The per cent. of illiterates in the population of ten years of age and upward was 4.7. Wisconsin is one of the leading States as regards the facilities it offers for higher education. Among the principal institutions are the University of Wisconsin (q.v.), at Madison; Northwestern University, at Watertown; Beloit College (q.v.), at Beloit; Lawrence University (q.v.), at Appleton; Ripon College (q.v.), at Ripon; and Marquette College and Concordia College, at Milwaukee. The Milwaukee Medical College and the Wisconsin College of Physicians and Surgeons are prominent among the professional schools. Normal schools are located at Milwaukee, Oshkosh, Platteville, River Falls, Stevens Point, West Superior, and Whitewater.

Charitable and Penal Institutions. The State charitable and penal institutions are under the control of a State Board of Control, which is appointed by the Governor. This board appoints superintendents, wardens, stewards, and general matrons, and a number of minor officials upon the nomination of superintendents or wardens. Staple supplies used by the institutions are purchased by the board. The State has originated a new system for caring for its chronic insane, namely, in county asylums which are supported by both State and county. In 1900 there were 27 of these institutions with inmates aggregating 3394. The building of two more county asylums has been authorized. The State insane asylums at Mendota and Winnebago and the Home for Feeble Minded at Chippewa Falls contained in the aggregate 1464 inmates (1900). In October, 1900, the School for the Deaf at Delavan had 190 pupils, the School for the Blind at Janesville 105 pupils, the Industrial School for Boys at Waukesha 328, and the State Public School (children's home) at Sparta 147. On the same date there were 1103 males and 430 females in the poorhouses of the State. Three Milwaukee institutions, an insane asylum, house of correction, and industrial school for girls, are semi-State institutions, as is also the Veterans' Home at Waupaca. There is a State reformatory near Green Bay, with 115 convicts, and a State prison at Waupun, with 496 inmates.

History. At the time the region now included within the State was first made known to Europeans it was the border land between the hunting grounds of the Algonquian tribes, which were gradually pushing westward, and the Dakotas or Sioux, the great body of whom already lay beyond the Mississippi. In 1634 Champlain, Governor of New France, dispatched Jean Nicolet, a *coureur des bois*, westward along the Great Lakes to make treaties with the remote tribes of Indians, and to encourage them to trade with the French. Nicolet first set foot upon what is now the State of Wisconsin late in 1634 or early in 1635. He landed first at Green Bay, where he found a large Indian settlement, thence ascended the Fox River to a point beyond its passage through Lake Winnebago, and then turned southward. He probably proceeded as far south as the site of Chicago, and returned east by way of Lake Michigan. The next white explorers in the Wisconsin region of whom we have any record were Radisson and Groseilliers, two fur traders, who reached the country in 1658-59. They followed in the track of Nicolet, but probably crossed the Fox-Wisconsin portage, and descended the latter river almost, if not quite, to its mouth. Recent investigations make it seem more than probable that they were actually the first discoverers of the Upper Mississippi. In the winter of 1661 they built a stockade on the south shore of Chequamegon Bay, near the present site of Ashland. On the same spot Father Allouez in 1665 established the La Pointe Mission—the first in Wisconsin. Subsequently (1669) he built the Mission of Saint Francis Xavier at the Rapides des Pères on the Fox River, on the site of the city of De Pere. Here was built the first church in Wisconsin and about this mission grew up the first white settlement of any permanence. In 1673 Louis Joliet and Père Marquette, setting out from the Saint Francis Mission, sailed up the Fox and descended the Wisconsin to the Mississippi. In 1674 Marquette made a canoe trip from Green Bay to the site of what is now Chicago along the shores of Lake Michigan. In the years that followed the region became one of the principal fields of activity of the *coureurs des bois*, prominent among whom were Nicolas Perrot and Daniel Greysolon du Lhut, from whom the city of Duluth takes its name. La Salle (q.v.) thoroughly explored the Wisconsin region before he attempted his remarkable trip down the Mississippi which ended in his tragic death. Although the region became dotted with trading posts and missions, there was no permanent settlement in Wisconsin until toward the middle of the eighteenth century, when the De Langlade family established themselves at Green Bay. In the French and Indian War Charles de Langlade led a body of *coureurs des bois* and Wisconsin Indians to the aid of the French, and commanded them in the battle which resulted in Braddock's defeat. After the Revolution, in which De Langlade and the Wisconsin Indians remained true to the British, although by the terms of the treaty Wisconsin became part of the United States, the British continued to exercise authority in the region. Nor did Jay's treaty of 1794, in spite of its provisions for the surrender of the outposts, result in a change of authority. During the War of 1812 the French and Indians took the field against the Americans, and an expedition starting from the British fort at Green Bay assaulted and captured an American garrison at Prairie du Chien.

For a decade after the close of the war the fur trade remained the principal business of the inhabitants of the region between Lake Michigan and the Mississippi River and the growth in population was slow, the number of white inhabitants as late as 1824 being not more than 6000 or 7000. The authority of the United States was firmly established in 1816, when several detachments of the Regular Army were sent into the Territory, and forts built at Green Bay (Fort Howard) and at Prairie du Chien. In 1820-21 several bands of Oneida and Brotherton Indians from New York State were settled in the Territory. In 1822 the opening of the lead diggings in the southwestern part of the Territory was followed by an influx of immigrants, largely Southerners, many of whom brought their slaves with them. By 1828 the population of the lead region was over 10,000. An uprising of the Winnebago under Red Bird in 1825 was suppressed with little bloodshed, and no further trouble was experienced from the Indians until the outbreak of the Black Hawk War (q.v.) in 1832. After the defeat of Black Hawk a large immigration of agricultural settlers from New England and New York set in and the movement for the erection of Wisconsin as a separate Territory was begun in earnest. Wisconsin had formed a part of the old Northwest Territory from 1787 to 1800, of Indiana Territory from 1800 to 1805, of Michigan Territory from 1805 to 1809, of Illinois Territory from 1809 to 1818, and in the latter year was again placed under the jurisdiction of Michigan Territory. In 1836, on the admission of Michigan into the Union, Wisconsin—including then the present States of Iowa and Minnesota and parts of the Dakotas—was erected into a Territory. Belmont and Burlington were successively temporary Territorial capitals; the Legislature met at Madison for the first time in 1838. The next decade was a period of wonderful growth in population. In 1844 at Ripon was founded 'The Wisconsin Phalanx,' a communistic settlement organized on the Brook Farm plan. This proved one of the most successful communities of the sort ever attempted. At about the same time a Mormon settlement was planted in Racine and Walworth counties.

In 1847, a bill having passed Congress for the admission of Wisconsin as a State, a constitutional convention was held, but the instrument drawn up was rejected by popular vote. In the following year a second Constitution was prepared, submitted, and adopted and Wisconsin was formally admitted to the Union, May 29, 1848. The extensive German and Scandinavian immigration which began about 1840 increased annually for a dozen years after the admission of the State, and at one time, shortly after 1848, when the revolutionary movements of that year in Europe had driven thousands of cultured Germans to this country, the project was formed of concentrating German immigration in Wisconsin and making it a German State. The early history of the State was marked by scandals in connection with the sale of public lands and the granting of railroad charters, but before the outbreak of the Civil War a better tone pervaded political life. The anti-slavery sentiment in the State was strong, and at Ripon in 1854 began one of the earliest movements which resulted subsequently in the organization of the Republican Party. In the same year occurred the noteworthy rescue of the fugitive slave Grover, at Milwaukee, which resulted in prolonged litigation, one of the most interesting points of which was the development of a pronounced nullification sentiment among the Republican and Free-Soil elements of the population, and which reached its climax when the State Supreme Court decided that the Fugitive Slave Law was unconstitutional in the State. Wisconsin's share in the Civil War was noteworthy. The State furnished a total of 91,379 men, more than the required quota, the ratio being 1 man to every 9 of its inhabitants. In 1871 the northeastern portion of the State was visited by destructive forest fires, and in 1894 the northwestern part of the State suffered from a similar visitation. In 1886 labor riots at Milwaukee necessitated the calling out of the State militia, which came into armed conflict with the mob. The first Republican Governor was elected in 1856, when Coles Bashford was chosen after a bitter contest. Since that time the State has been Republican in every Presidential election except that of 1892. Democratic fusion with the Greenback movement in 1874 resulted in the defeat of the Republican candidate for Governor, since which year, with the exception of 1890 and 1892, when the issue was again complicated by a school law which alienated the support of the Germans, the State has been regularly Republican.

GOVERNORS OF WISCONSIN

TERRITORIAL

Henry Dodge	1836–41
James Duane Doty	1841–44
Nathaniel P. Tallmadge	1844–45
Henry Dodge	1845–48

STATE

Nelson Dewey	Democrat	1848–52
Leonard J. Farwell	Whig	1852–54
William A. Barstow	Democrat	1854–56
Arthur McArthur	(acting)	1856
Coles Bashford	Republican	1856–58
Alexander W. Randall	"	1858–62
Louis P. Harvey	"	1862
Edward Salomon	"	1862–64
James T. Lewis	"	1864–66
Lucius Fairchild	"	1866–72
Cadwallader C. Washburn	"	1872–74
William R. Taylor, Democrat Greenback		1874–76
Harrison Ludington	Republican	1876–78
William E. Smith	"	1878–82
Jeremiah Rusk	"	1882–89
William D. Hoard	"	1889–91
George W. Peck	Democrat	1891–95
William H. Upham	Republican	1895–97
Edward Scofield	"	1897–1901
Robert M. LaFollette	"	1901-

BIBLIOGRAPHY. Lapham, *Wisconsin* (Milwaukee, 1844-46); Smith, *History of Wisconsin* (2 vols., Madison, 1854); Strong, *History of the Territory of Wisconsin* (Madison, 1885); Thwaites, *Story of Wisconsin* (Boston, 1890), in Story of the States series; Legler, *Leading Facts in the History of Wisconsin* (Milwaukee, 1898); Butterfield, *Discovery of the Northwest by Jean Nicolet in 1634* (Cincinnati, 1881); Hebberd, *History of Wisconsin Under the Dominion of France* (Madison, 1890); Thwaites, *Historic Waterways* (Chicago, 1888); and publications of the Parkman Club (Milwaukee) and of the Wisconsin State Historical Society.

WISCONSIN, UNIVERSITY OF. The highest institution of learning in the educational system of Wisconsin, situated at Madison. It was founded in 1838, organized in 1848, and opened for instruction in 1851. In 1865 the attendance was only 304, of which number all but 51 were preparatory students. In 1880 the preparatory department was abolished. The period of rapid expansion began about 1885, the number of students reaching 500 in the college year of 1886-87. In 1903-04 there were 225 on the regular force of instruction, and an attendance of more than 3000 students. The institution is co-educational in all its departments. The College of Letters and Science has been in the past and still is the centre of the institution, about which the technical work has grown up. The other colleges are those of Law, Agriculture, and Engineering. The College of Engineering includes courses in civil engineering, sanitary engineering, mechanical engineering, electrical engineering, and general engineering. In the College of Letters and Science are included technical courses in commerce, in pharmacy, in pre-medical studies, in home economics, and in music. The graduate work is being developed rapidly, and is organized as a school. The university confers the baccalaureate degree in arts, science, law, and philosophy; the Master's degree in arts and science; the Doctor's degree in philosophy; and the degrees of Civil, Mechanical, and Electrical Engineer. The university grounds, of remarkable beauty, extend for more than a mile along the shores of Lake Mendota. There were in 1903 eighteen large buildings devoted to instructional and investigative work, besides a number of buildings upon the agricultural farm, some of them of considerable size, of which a part are used for instructional purposes. In 1904 the estimated value of the buildings and equipment, exclusive of the grounds and the library building, was $1,500,000. Of the buildings of the university, the more noteworthy are University Hall, Science Hall, the Engineering Building, the Law Building, the Washburn Observatory, the Chemical Building (in construction), the Central Building of the College of Agriculture, and the State Historical Library. The latter building was completed at a cost of $650,000, and is one of the finest and best appointed library buildings in the United States. It contains the library of the State Historical Society, 250,000 volumes; the library of the university, 85,000 volumes; the library of the Wisconsin Academy of Sciences, Arts, and Letters, 5000 volumes; and many thousands of unbound documents and pamphlets. The income of the university for the year 1903-04 was $650,000. Tuition is free to all students from the State of Wisconsin, except in the College of Law.

WISCONSIN RIVER. The principal river in the State of Wisconsin. It rises in Lake Vieux Desert, and flows first southward as far as Portage, then southwest, emptying into the Mississippi near Prairie du Chien after a course of about 600 miles (Map: Wisconsin, D 3). Its upper and middle courses are very picturesque. It flows at first through immense pine forests, in which it receives the water of a large number of small lakes. Farther down it is broken by several falls and rapids, the most noted of which are the Dalles of the Wisconsin. The river is navigable 200 miles to Portage, where a short canal connects it with the Fox River.

WISDOM, Book of. See Solomon, Wisdom of.

WISE, Daniel (1813-98). A Methodist Episcopal clerical author. He was born in Portsmouth, England, came to America in 1833, and entered the New England Conference (1840). He was editor of *Zion's Herald* (1852-56), and corresponding secretary of the Sunday-School Union and Tract Society of his Church (1856-72). The rest of his life was spent in literary work. Part of his duty as secretary was to edit all the publications of the society. His published works include more than forty titles. The best known are: *The Path of Life* (1847); *The Saintly and Successful Worker* (1879); *Heroic Methodists of the Olden Time* (1882); *Our Missionary Heroes and Heroines* (1884); *Young Knights of the Cross* (1887); and *Faith, Hope, Love, and Duty* (1891).

WISE, Henry Alexander (1806-76). An American political leader, born at Drummondtown, Accomack County, Va., December 3, 1806. He graduated at Washington College, Pa., in 1825, was admitted to the bar in 1828, and settled in Nashville, Tenn., the same year, but returned to Accomack County in 1830. He was elected to Congress in 1832 as a Jacksonian Democrat and was twice reëlected. On the question of the rechartering of the United States Bank he broke with the Jackson Administration, and became a Whig, but was sustained by his constituents. After his first election in 1832 he fought a duel with his competitor for the seat in Congress. Wise was active in securing the nomination of John Tyler as Vice-President in 1840. He declined the appointment as Secretary of the Navy under Tyler, but from 1844 to 1847 was Minister to Brazil. After his return he identified himself with the Democratic Party, and in 1855, after a remarkable campaign, he was elected Governor of Virginia over the Know-Nothing candidate. During his administration the John Brown raid occurred, and one of the last acts of his term was the signing of Brown's death warrant. Wise was a member of the Virginia secession convention of 1861, and opposed immediate secession. Upon the withdrawal of the State from the Union, however, he joined the Confederate Army as brigadier-general and afterwards was promoted to the rank of major-general. He took part in the campaigns of western Virginia, commanded at Roanoke Island, and was present at Appomattox. After the war he resumed his law practice, and wrote an historical work entitled *Seven Decades of the Union* (1872). He died September 12, 1876. Consult his *Life*, (New York, 1899), written by his grandson, B. H. Wise.

WISE, Henry Augustus (1819-69). An American naval officer and author, born in Brooklyn, N. Y. He entered the navy in 1834. During the Mexican War he was lieutenant on board the razee *Independence*, and took part in the operations in the Gulf of California. In the Civil War he served for a time on board the *Niagara* off Charleston, was promoted to the rank of commander in 1862, and served during the remainder of the war as assistant chief of the Bureau of Ordnance and Hydrography. He was promoted to be captain in 1866, and while on leave of absence died at Naples. Under the pseudonym of Harry Gringo he wrote: *Los Gringos, or an Interior View of Mexico and California, with Wanderings in Peru, Chili, and Polynesia* (1849); *Tales for the Marines* (1855); *Scampavias, from Gibel-Tarek to Stamboul* (1857); *The Story of the Gray African Parrot* (1859); and *Captain Brand of the Centipede* (1860-64).

WISE, Isaac Mayer (1819-1900). An American rabbi and educator, born at Steingrub, Bohemia. He graduated at the University of Vienna in 1843 and became a rabbi at Radnitz. So advanced were his opinions in both religion and politics that he decided to seek a land of greater liberalism, and went to the United States in 1846. His first charge was at Albany, N. Y., and from 1854 until his death he was rabbi of the Congregation Bene Yeshurun, Cincinnati. Here he became a recognized leader of progressive Judaism. In 1854 he established *The Israelite* (subsequently *The American Israelite*) and afterwards *Die Deborah* (published in German) and the Chicago *Israelite*. He remained the editor of these publications, and was president of the Hebrew Union College, which he founded at Cincinnati in 1875, up to the time of his death. In 1889 he organized the Central Conference of American Rabbis and became its president. His works include: *History of the Israelitish Nation* (1854), severely criticised by both Jews and Christians and said to be the first rationalistic account of Judaism in English; *Origin of Christianity* (1870); *Judaism: Its Doctrines and Duties* (1872); *The Martyrdom of Jesus of Nazareth* (1874); *The Cosmic God* (1876); *Judaism and Christianity* (1883).

WISE, John (c.1652-1725). A New England clergyman and author, born in Roxbury, Mass.

He graduated at Harvard in 1673, and in 1683 settled in Ipswich as pastor of the Second Church, where he remained until his death. He was noted for great physical strength and for moral and intellectual courage. In 1687 he resisted the tyranny of Andros and was in consequence fined and imprisoned. When Andros was expelled, Wise came to the front as a legislator, and in 1690 he accompanied as chaplain Sir William Phips's expedition against Canada. He is chiefly noted for the democratic stand he took against the Mathers in the ecclesiastical controversies that marked the opening of the eighteenth century. His liberal views were presented with much force and eloquence in two treatises, in *The Churches' Quarrel Espoused* (1710) and, more fully, in *A Vindication of the Government of New England Churches* (1717)—both of which were reissued on the eve of the Revolutionary and the Civil wars. For a good account of Wise, see M. C. Tyler, *History of American Literature*, vol. ii.

WISE'MAN, Luke Holt (1822-75). An English Wesleyan Methodist minister. He was born at Norwich, England, and entered the ministry in 1840; he was elected missionary secretary (1868), in which position he served until his death. In 1872 he was elected president of the British Conference. He published: *Industry Prompted by Conscience, and Not by Covetousness* (1852); *Thoughts on Classmeetings and Their Improvement* (1854); *The Employment of Leisure Time* (1856); *Men of Faith; or Sketches from the Book of Judges* (1856); *Christ in the Wilderness: Or Practical Views of Our Lord's Temptation* (1857); *Memoir of T. S. Monkhouse* (1863); and *Testimonial to C. Garrett* (1872).

WISEMAN, Nicholas Patrick Stephen (1802-65). An English Roman Catholic prelate. He was born at Seville, of an Irish family. He was brought to Ireland in his childhood, and received his education at the College of Saint Cuthbert at Ushaw, near Durham, and at the English College at Rome. He received holy orders at Rome in 1824, and was appointed professor of Oriental language in the University of the Sapienza, 1828, in recognition of the value of his *Horæ Syriacæ*, and in the end of that year was named rector of the English College. It was while he held this office that he delivered his *Lectures on the Connection of Science and Revealed Religion* (1836). But in England he first became known by a series of lectures on *The Principal Doctrines and Practices of the Catholic Church*, delivered at Moorfields Church (1836; 3d ed. 1851). In the same year he established, in concert with Mr. O'Connell, the *Dublin Review*, to which Wiseman, even while residing abroad, was a regular contributor. In 1840 he was named coadjutor vicar apostolic of the central district of England, with the title of Bishop of Melipotamus. At the same time he was appointed president of Saint Mary's College, Oscott, where he took up his residence. In 1850, when the Roman Catholic hierarchy in England was restored by the Pope, he was made Archbishop of Westminster and cardinal. While excitement among the Protestant part of the population was at its height, Wiseman published an explanatory address of great ability and moderation, but yet firmly asserting the strictly constitutional rights of his fellow-Catholics, entitled *An Appeal to the Reason and Good Feeling of the People of England on the Subject of the Catholic Hierarchy* (1850), which did much to mitigate the excitement. He published numerous volumes upon controversial and literary topics, but they are mostly forgotten. Two, however, seem destined to live: *Recollections of the Last Four Popes* [Pius VII., Leo XII., Pius VIII., and Gregory XVI.] (1858), and *Fabiola, or the Church of the Catacombs* (1854), the best known Roman Catholic story in English upon this theme. Consult his *Life* by W. Ward (London, 1897, 2d ed. 1900); Fitzgerald, *Fifty Years of Catholic Progress* (London, 1900).

WISE MEN OF THE EAST. See Cologne, Three Kings of.

WISHART, wĭsh'ẽrt, George (c.1513-46). A Scottish reformer and martyr. He was probably born in 1513 at Pittarrow, and is thought to have studied Greek at Montrose. He is known to have taught the New Testament in Greek at the same place. In 1538 he fled from Scotland to escape persecution for heresy and was absent for about six years. From 1539 or 1540 to about 1543, he was in Germany and Switzerland, and on his return translated the *Confession of Faith of the Church and Congregation of Switzerland*. In 1543 he was teaching in Corpus Christi College, Cambridge, with Latimer and other reformers. In the same year or the following, he returned to Scotland. It has been generally assumed that he is the 'Scottishman called Wyshart' who was involved in the plot with Henry VIII. to murder Cardinal Beaton (q.v.), Archbishop of Saint Andrews, but the identity has not been proved. We do not know that Wishart left Scotland at the time, and the incident accords ill with what we know of his character. The last two years of his life were spent in preaching in various parts of Scotland, in Dundee, Montrose, Ayrshire, and East Lothian. He hastened back to Dundee when he learned that the plague was raging there. When driven from the churches he preached in the fields. His most important convert and disciple was John Knox, who has left a detailed account of these two years of his life. Wishart was burnt for heresy by Cardinal Beaton, March 1, 1546, at Saint Andrews. Three months later Beaton was murdered, principally in revenge for Wishart's death. Consult: John Knox, *History of the Reformation*, in *Works*, ed. by David Laing (Edinburgh, 1846-64); Rogers, *Life of George Wishart the Scottish Martyr* (Edinburgh, 1876).

WISHAW, wĭsh'ą. A town in Lanarkshire, Scotland, 13 miles east-southeast of Glasgow, near the South Calder Water (Map: Scotland, E 4). Its growth and importance are due to its collieries, blast furnaces, iron and steel works, etc. Population, in 1891, 14,869; in 1901, 20,869.

WISH'FORT, Lady. An elderly coquette in Congreve's *Way of the World*, the guardian of Millimant's property. Mirabel, the latter's lover, tries to secure it for himself and its rightful owner by marrying the aged flirt to his valet in disguise, but Fainall and Mrs. Marplot disclose the scheme.

WISLER MENNONITES. See Mennonites.

WISLICENUS, vĭs'lē-tsā'nụs, Gustav Adolf (1803-75). A German theologian, one of the leaders of the Free Congregations (q.v.). He was born at Battaune, Prussian Saxony, studied theology at Halle, and as member of the Burschenschaft was sentenced in 1824 to twelve years' confinement in a fortress. He was pardoned in 1829 and continued his studies in Berlin. Since 1841 pastor at Halle, he became associated with the "Friends of Light," and in consequence of a lecture delivered at Köthen in 1844, was deprived of his pastorate in 1846. Henceforth preacher of the free congregation at Halle, his pamphlet *Die Bibel im Lichte der Bildung unserer Zeit* caused him to be sentenced to two years' imprisonment, in 1853, when he fled to America, lectured at first in Boston and in 1854 established a school at Hoboken, N. J. Returning to Europe in 1856, he opened a school at Zurich, where he wrote his principal work, *Die Bibel, für denkende Leser betrachtet* (2d ed. 1866).

WISLICENUS, HERMANN (1825-99). A German historical painter, born at Eisenach. In 1844 he began his studies at the Dresden Academy, where he afterwards became a pupil of Bendemann and of Jules Schnorr, under whose influence he painted his first picture, "Abundance and Misery," which was acquired by the Dresden Gallery. A stipend from the Grand Duke of Weimar enabled him to study (1853-57) in Italy, where he became a follower of Cornelius. On his return he settled at Weimar, and among other oil paintings, water-colors, and cartoons executed "Night With Its Retinue," for the Grand Duke of Weimar, the "Myth of Prometheus" (1862, Leipzig Museum), "The Flood of Deucalion" (1865, Weimar Museum); the mural paintings "Brutus as Judge of his Sons" and "The Mother of the Gracchi," in the staircase of Dr. Härtel's Roman House at Leipzig; "Fancy Borne by the Dreams" (Schack Gallery, Munich); "Angels Singing Psalms," mural painting (Grand-ducal chapel, Weimar). Appointed professor at the Düsseldorf Academy, in 1868, he painted there "The Four Seasons" (1877, National Gallery, Berlin). In the competition for the decoration of the restored Kaiserhaus at Goslar he won the first prize, and, assisted by some of his pupils, completed the frescoes depicting various characteristic episodes in the evolution of the German Empire, in 1897.

WISLICENUS, JOHANNES (1835-1902). A German chemist, born at Kleineichstädt, near Querfurt, Prussian Saxony, a son of Gustav Adolf Wislicenus. He studied at Halle, then went with his father to the United States, and for a time was an assistant at Harvard. In 1861 he became professor in the canton school of Zurich; in 1864 was called to the university there, and in 1870 became professor in the Polytechnic Institute at Zurich, of which in the following year he was made director. A year later he accepted a chair in Würzburg, and in 1885 in Leipzig. He did important work upon the alcohols, upon the salts, upon lactic acid, and upon acetic ether. Among his published works are *Theorie der gemischten Typen* (1859) and *Lehrbuch der Chemie* (9th ed. 1876-81).

WISMAR, vĭs′mär. A seaport of the Grand Duchy of Mecklenburg-Schwerin, Germany, at the head of a bay of the same name, one of the best harbors of the Baltic, 18 miles north of Schwerin (Map: Germany, D 2). It has manufactures of tobacco, sail-cloth, machinery, paper, malt liquors, and sugar. Shipbuilding and fishing are important industries. Population, in 1900, 19,758. Wismar was the capital of Mecklenburg from 1256 to 1358 and a Hanseatic town of importance. In 1648 it passed to Sweden, and in 1803 to Mecklenburg-Schwerin.

WISSMANN, vĭs′män, HERMANN VON (1853—). A German-African explorer, born at Frankfort-on-the-Oder. He entered the army and became lieutenant in 1874. In 1880 he accompanied Dr. Pogge, in the service of the German African Society, on an expedition into Central Africa. Setting out from Saint Paul de Loanda on the west coast, they reached Nyangwe in April, 1882. Thence Pogge returned to the west coast, but Wissmann kept on eastward and reached Zanzibar. In 1883-85 he explored the region of the Kassai River and other parts of the Congo Basin for the Belgian Government, and in 1886-87 traveled from Lubuku on the Congo to Mozambique, by way of Nyangwe and lakes Tanganyika and Nyassa. In 1889-90, as Imperial commissioner, he suppressed the Arab uprising under Bushiri in German East Africa. In 1892 he failed in an attempt to take two steamers to the Victoria Nyanza by way of lakes Nyassa and Tanganyika. In 1895-96 he was Governor of German East Africa. Among his published works are: *Im Innern Afrikas* (3d ed. 1891); *Unter deutscher Flagge quer durch Afrika, 1880-83* (7th ed. 1890); *Meine zweite Durchquerung Aequatorial-Afrikas vom Kongo zum Zambesi während der Jahre 1886 u. 1887* (1890); *Schilderungen und Ratschbäge zur Vorbereitung für den Aufenthalt und den Dienst in den deutschen Schutzgebieten* (1895). Consult Ruhle, *Hermann von Wissmann* (Münster, 1892).

WISSOWA, vĭs-sō′vȧ, GEORG (1859—). A German classical philologist, born at Breslau, and professor in the University of Halle. He is distinguished for his studies in the field of Roman religion, and was editor of Pauly's *Real-Encyklopädie der klassischen Altertumswissenschaft* (1892 et seq.). His more important works are: *De Veneris Simulacris Romanis* (1882); *Die Religion der Römer* (1901); and *Tertulliani Opera*, vol. i. (1890). He also edited the second edition of Marquardt's *Römische Staatsverwaltung*, vol. iii. (1885).

WISTAR, CASPAR (1761-1818). An American physician, born in Philadelphia. He graduated in medicine at the University of Edinburgh in 1786, and in 1789-92 was professor of chemistry and physiology at the College of Philadelphia. This institution in the latter year united with the medical department of the University of Pennsylvania, and Wistar was made adjunct professor of anatomy and surgery. In 1808 he became full professor and remained such till his death. In 1815 he succeeded Thomas Jefferson as president of the American Philosophical Society, and held the position until his death. He published, among other works, *A System of Anatomy* (1811).

WISTARIA (Neo-Lat., named in honor of Caspar Wistar). A genus of climbing deciduous shrubs of the natural order Leguminosæ. The species have drooping racemes of bluish flowers, for which they are commonly grown against the walls of houses or over arbors and trellises. Some of them are among the most magnificent ornamental climbers known in flower gardens. The Chinese wistaria (*Wistaria Chinensis*), the finest and most popular cultivated species,

AMERICAN WISTARIA.

produces long clusters of showy blue flowers. It sometimes blossoms a second time in the fall. There are white, double-flowered and variegated-leaved horticultural varieties. This species is not hardy in the Northern United States. The American wistaria (*Wistaria frutescens*) produces clusters of dark blue flowers a little later in the season than the foregoing species. Wistarias grow in almost any soil and are propagated by seeds, layers, cuttings, and division. The young shoots are frequently layered in the summer and the young plants separated from the parent plant the next spring.

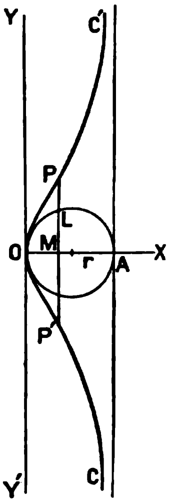
WIS'TER, Annis Lee (Furness) (1830—). An American translator, born in Philadelphia. She was the daughter of the Rev. William H. Furness, by whom she was educated. In 1854 she married Dr. Caspar Wister. She early began the study of German, busying herself with translation. During her literary career she translated and adapted the novels of many leading contemporary German writers, and these were assembled in 1888 in a uniform edition of thirty volumes. Some of the titles are: *Old Mam'selle's Secret* (1868); *Gold Elsie* (1868); *The Second Wife* (1874); *Violetta* (1886); and *The Owl's Nest* (1888). She published in collaboration with Dr. F. H. Hedge *Metrical Translations and Poems* (1888).

WISTER, Owen (1860—). An American writer, born in Philadelphia, Pa. He graduated at Harvard in 1882 and at the Harvard Law School in 1888, and was admitted to the Philadelphia bar in 1889, but after 1891 devoted himself almost wholly to literature. His stories, which deal largely with Western life and character, are widely popular. Besides contributing a number of short stories and some verse to the magazines, he published: *The Modern Swiss Family Robinson* (1883); *The Dragon of Wantley: His Tail* (1892, new ed. 1902); *Red Man and White* (1896); *Lin McLean* (1898); *The Jimmy John Boss and Other Stories* (1900); *U. S. Grant, a Biography* (1900); *The Virginian* (1902), which was exceedingly popular; *Oliver Wendell Holmes* (1902), in the "American Men of Letters Series;" *Benjamin Franklin* (1904), in the "English Men of Letters Series;" and *Philosophy Four* (1903), a short sketch. In coöperation with G. B. Grinnell and Caspar Whitney, he also published *The Bison, Musk-Ox, Sheep, and Goat Family* (1903), in the "American Sportsman's Library."

WITAN. A term frequently used for the national council in Anglo-Saxon England, more formally known as the Witenagemote (q.v.).

WIT AT SEVERAL WEAPONS. A comedy by Beaumont and Fletcher, possibly with assistance from Middleton, produced in 1614, printed in 1647. It gives a humorous picture of contemporary London life. Fleay suggests that it is an alteration of the *Devil of Dowgate.*

WITCH (AS. *wicca*, wizard, *wicce*, witch, probably from *witga*, *wītiga*, *wītega*, OHG. *wizago*, *wīzzago*, seer, soothsayer, magician, from AS., Goth. *witan*, OHG. *wizzan*, Ger. *wissen*, to know; connected with Lat. *videre*, Gk. *ἰδεῖν*, *idein*, OChurch Slav. *vidyeti*, Skt. *vid*, to see, know) (versiera). A higher plane curve. It resembles somewhat the shell-shaped branch of the conchoid (q.v.) and is defined as follows: The locus of a point P so taken on the perpendiculars to the diameter OA of a circle that in the figure $\frac{LM}{PM} = \frac{MA}{OA}$. If r is the radius of the circle, the Cartesian equation of the witch referred to the axis OX, OY in the figure is $y^2 = \frac{4r^2x}{2r-x}$. (See Coördinates.) The curve is symmetric with respect to the X-axis, lies between the Y-axis and the line $x = 2r$, and has the line $x = 2r$ as an asymptote (q.v.) to its two infinite branches. The area of the witch is four times that of the auxiliary circle and has 4-point contact (see Contact) with the circle at the origin.



Consult: Loria, "Versiera visiera e pseudoversiera," in *Bibliotheca Mathematica* (1897); Aubry, in the *Journal de mathématiques spéciales* (1895); *Intermédiare des mathématiciens* (1894).

WITCH, The. A comedy by Thomas Middleton, produced probably in 1621, and printed in 1778 from a unique manuscript in the Bodleian Library. The plot is taken from Machiavelli's *Florentine History*, and from R. Scott's *Discovery of Witchcraft.* A resemblance to the witches in *Macbeth* aroused a controversy concerning the priority of the two plays.

WITCH BROOMS. The peculiar tufted shoots produced upon various trees, especially conifers, by the presence of certain parasitic fungi. The branches ordinarily have their structure modified, becoming larger and softer in texture. The direction and mode of branching is completely altered, and the number of branches much increased. The occasion for the name is obvious, since these tufts of branches are often very conspicuous. See MALFORMATION.

WITCHCRAFT (AS. *wiccecræft, wiccræft,* from *wicce, wicca,* wizard, witch + *cræft,* OHG. *chraft,* Ger. *Kraft,* strength, power, art). The art and trade of a witch or of a wizard. To a certain extent the witch may be considered the predecessor of the modern scientist. At a time when no systematic knowledge of nature existed, it was taken for granted that the future could be predicted and controlled by appropriate actions and expressions, through 'sympathetic magic' or potent formulas, of which the 'wise' man or woman was the repository, often possessing also such skill in the use of drugs, simples, or surgery as belonged to the period. Another and more essential element, however, entered into the conception, inasmuch as it was believed that these powers were attainable through intimacy with spirits whose supernatural force was at the disposal of their representative. In this dependence on spiritual beings the witch only followed universal belief and practice, exercising the same powers as the priest or medicine man, whose recognized business it was to converse with unseen powers. The only difference lay in the fact that the priest occupied an accepted position, and served spirits recognized as friends or masters of the tribe, whereas the witch employed private demons, not so universally accredited, and therefore supposed to be inclined to malevolence. Professional jealousy would cause the irregular practitioners to be opposed and detested by the official mediums, while the independent attitude of the former would naturally result in a lower ethical status, as freer from restraints of public opinion. Witches were ready, therefore, to put their knowledge and energy at the disposal of any person who would pay them, and were equally willing to work evil and good, not only to foreigners, but to members of the community. Hence the witch, or supposed witch, has been always and everywhere the object of general hatred and assault.

That in Rome the witch was also exposed to the public vengeance is manifest from the account which Horace gives in his fifth Epode of Canidia, whom he threatens with stoning at the hands of the people. The crimes attributed to her form a curious parallel to those ascribed to her class in modern times, and show that these accusations depended on world-old superstition. She is made to devise the death of a boy, who is buried to the neck in the earth, and mocked by the offer of food out of his reach, to the end that the marrow of the victim, being full of desire, may be used as a love charm. Her rites included invocation of the gods below, the use of the poison of a toad, the plumage of birds of darkness, and the sprinkling of water from Acheron; yet it is not to be supposed that Horace, herein like all his contemporaries of the higher class, actually believed in the efficacy of such witchcraft, and in this incredulity must be sought the reason why the laws of Greece and Rome were so lax. There could be no general prohibition of a trade which corresponded to that of the accepted augur (see AUGURIES AND AUSPICES), and enchantment, when directed against individuals with murderous intent, would be criminal exactly as any other attack on their welfare. Considering that the employment of such practitioners was universal, and their activity must constantly have been intended to destroy, it is singular that legal proceedings offer few processes. Evidently the lawgivers and judges were not in sympathy with the popular fear and indignation, and were inclined to regard the business rather as one followed by charlatans than as the work of persons really endowed with supernatural influence.

This laxity was handed down to Christian time. The opinion of the Church oscillated between contempt of witchery as a delusion and abhorrence of it as a form of intercourse with evil spirits. One opinion was that belief in the existence of such power was in itself heretical, and that Christians were bound to believe in the impotence of magicians. This was the doctrine expressed in the decree of an unidentified council called that of Anquira, which has been traced as far back as the ninth century. During the Middle Ages, therefore, the Church had little to do with promoting the punishment of witches, who suffered rather from the fury of the populace, or at times from the severity of secular authority. The accepted punishment, as in the case of heresy, was by fire. These punishments, however, were sporadic, and involved no systematic attempt to suppress the practice. It is one of the anomalies of history that the legal crusade against witchcraft should be modern, belonging to the time of the Renaissance. The impulse was religious, and witchcraft was identified with heresy, as consisting in converse with the source of all evil. With this movement the Inquisition had much to do, and the bull *Summis desiderantes,* of Innocent VIII., in 1484, gave the occasion for unexampled severity. The composition by Sprengel, one of the Inquisitors appointed by Innocent, of the *Malleus maleficarum,* or *Hammer of Witches,* gave precision and fixed form to the charges of witchcraft. The weight of accusation now consisted, not in the evil use made of the enchanter's power, but in every exercise of that power; the witch was punished as an idolater and servant of Satan. This attitude was promoted by the imperfectly understood language of the Bible, in which witchcraft was identified with the worship of idols, and by the command of Exod. xxii. 18, "Thou shalt not suffer a witch to live." Judicial procedure, by the employment of torture, placed in the hands of the judge a means to enforce confession of any charges he might please to approve. Very soon, therefore, a body of evidence was constructed, supported apparently by irresistible experience. The accusations took a definite form, which was repeated with uniform persistency. The supposed witches were made to confess that they were able to fly through the air on brooms or by the aid of their familiar spirits, and thus to resort to desolate localities, where they held a 'Sabbath' or religious festival, in the presence of Satan, to whom they offered worship, and with whom they had criminal relations. The character of the services at the Sabbath consisted in the Black Mass, a parody and inversion of the ceremony of the mass; homage was paid to the demon in the shape of goat, dog, or ape; the worshipers held lighted candles and spat on the ground; a banquet was attended with sacrifice of children and cannibalism, and the whole meeting concluded with an orgy. Herein lies an important source of modern Satanism (q.v.). The witches, who at all times might call on the aid of their Satanic master, were supposed to have the power of transformation (especially into cats and hares), and could torment persons whom they wished to injure by thrusting invisible needles into their flesh. All this account of the gatherings and potency of sorcerers depended on world-old superstitions, now reinforced, formulated, and judicially attested. Accusations were multiplied by malicious intentions, and in many cases a charge of witchcraft was only a method of getting rid of an enemy or of confiscating the property of the rich. During two centuries the destruction was terrible; one judge of Nancy is said to have put to death 800 culprits in six years; at Toulouse 400 perished in a single execution; in the city of Trèves alone 7000 perished. The whole number of victims has been estimated at 300,000. In Great Britain a peculiarly bad record belongs to Scotland. In England the law enacted in 1603 against those "making invocation or conjuration of any evil and wicked spirit, or taking up any dead person with view to employing in sorcery, or practicing witchcraft," remained on the statute book for a century. Examinations were conducted in the spirit of pure superstition; one way of ascertaining guilt was by forcing the witch to swim, it being believed that the devotee of Satan would be lighter than water. Certain bodily marks, insensible to pain, were supposed to indicate guilt, and were sought by pricking with a needle.

At all times there were incredulous persons, but their disbelief was generally held to be synonymous with atheism; this was the attitude of Luther, and of John Wesley as late as 1768. In America prosecutions for witchcraft during the seventeenth century occurred in Massachusetts, Connecticut, Virginia, and elsewhere, but the only extensive panic was that which prevailed at Salem, Mass., in 1692, near the end of the delusion, being especially nourished by the extravagant opinions of Cotton Mather. The accusations were only an echo of those credited through Europe, but the colony soon became ashamed of its credulity. In England the last trial for witchcraft was that of Jane Wenham in 1712, who was not put to death; in Scotland an execution took place in 1722, and the witchcraft statute was repealed in 1735. Among the people belief in witches everywhere continued, and has hardly become extinct even yet.

Consult: Grässe, *Bibliotheca Magica* (Leipzig, 1843); Schindler, *Aberglaube des Mittelalters* (Breslau, 1858); Lecky, *History of the Rise and Influence of the Spirit of Rationalism in Europe* (New York, 1866); Roskoff, *Geschichte des Teufels* (Leipzig, 1869); Nippold, *Die gegenwärtige Wiederlebung des Hexenglaubens* (Berlin, 1875); Soldan, *Geschichte der Hexenprozesse* (2d ed. by Heppe, Stuttgart, 1880); Mejer, *Die Periode der Hexenprozesse* (Hanover, 1882); Adams, *Witch, Warlock, and Magician* (London, 1889); Längin, *Religion und Hexenprozess* (Leipzig, 1888); Snell, *Hexenprozesse und Geistesstörung* (Munich, 1891); Henne am Rhyn, *Der Teufel- und Hexenglaube* (Leipzig, 1892); Steinhausen, *Quellen und Studien zur Geschichte der Hexenprozesse* (Weimar, 1898); Hansen, *Zauberwahn, Inquisition und Hexenprozess im Mittelalter* (Munich, 1900); id., *Quellen und Untersuchungen zur Geschichte des Hexenwahns und der Hexenverfolgung im Mittelalter* (Bonn, 1901); Garinet, *Histoire de la magie en France* (Paris, 1818); Baissac, *Les grands jours de la sorcellerie* (ib., 1890); Scheltema, *Geschiedenis der Heksenprocessen* (Haarlem, 1828); Scott, *Letters on Demonology and Witchcraft* (new ed. London, 1884); Wright, *Narratives of Sorcery and Magic* (ib., 1851); Sharpe, *Historical Account of the Belief in Witchcraft in Scotland* (ib., 1884); Ashton, *The Devil in Britain and America* (ib., 1896); Upham, *History of the Salem Delusion* (new ed., Boston, 1867). See DEMONOLOGY; MAGIC; SATANISM.

WITCH-HAZEL (*Hamamelis Virginiana*). A North American shrub of the natural order Hamamelidaceæ. It sometimes attains a height of 20 or 30 feet. The clustered, yellow, showy flowers appear in very late autumn; the fruits ripen the following year. The English name is derived from the supposed virtues of a forked twig as a divining rod. The name is usually spelled as above, though some insist on the form 'wych-hazel.' A fluid extract made from the leaves is used as a tonic, sedative, and astringent. The bark, which is similarly employed, contains tannin, resin, and a volatile oil, is bitter and astringent, and has a sweetish pungent taste. Its reputation is probably exaggerated, as several investigators have failed to find any active physiological properties in it.

WITCH-HAZEL.

WITCH OF ATLAS, THE. A poem written in Italy in the winter of 1819-20, by Percy Bysshe Shelley, and published in London in 1824.

WITCH OF ED'MONTON, THE. A play by Rowley, Dekker, and Ford, acted in 1623 and printed in 1658. It was founded on the story of Elizabeth Sawyer, who was hunted down by peasants and hanged as a witch.

WITCH OF ENDOR. See ENDOR.

WITENAGEMOT, wĭt'ĕ-nă-gĕ-mōt' (AS., assembly of counselors). The supreme council of the English nation in Anglo-Saxon times. Each of the separate kingdoms in the so-called heptarchy (q.v.)

had its Witenagemot, and when the kingdoms were brought under a common overlord he had his Witenagemot. The members of the Witenagemot were usually the King, the bishops, the ealdormen, and the dependents of the King, who were called *ministri*, or thanes. It is probable that the Witenagemot was earlier a much larger body, and that the less wealthy and less powerful members ceased to attend because of the expense or from lack of interest. The actual numbers recorded as present on various occasions are not large. Stubbs regards the Witenagemot of the year 966 as a fair example; there were present then the King's mother, 2 archbishops, 7 bishops, 5 ealdormen, and 15 *ministri*. The Witenagemot participated in the enactment of laws, both civil and ecclesiastical; assented to grants of land; was a court of last resort; gave its consent for extraordinary taxation; advised as to the determination of war and peace; consented, in theory, to the appointment of ealdormen and possibly of bishops; and elected and sometimes deposed the kings. Kemble lays down a number of canons about the power of the Witenagemot. His first, which, as Stubbs says, "is large enough to cover all the rest," is: "First, and in general, they [the members of the Witenagemot] possessed a consultative voice and a right to consider every public act which could be authorized by the King." The actual power of the Witenagemot would vary inversely with that of the King; and under a strong king the Witenagemot would tend to become merely the King's council. This would be especially true if the King had, as he seems to have had, the right of packing the Witenagemot by introducing more *ministri*. Consult: Stubbs, *Constitutional History*, vol. i. (6th ed., Oxford, 1897); Gneist, *Verwaltungsrecht* (2 vols., 2d ed., Berlin, 1867); Kemble, *History of the Anglo-Saxons in England*, vol. ii. (London, 1876); Freeman, *History of the Norman Conquest* (5 vols., Oxford, 1870-76).

WITH'ER or **WITH'ERS**, George (1588-1667). An English poet, born at Bentworth, near Alton, in Hampshire. He spent two years at Magdalen College, Oxford (1604-06), but left without a degree. In 1610 he settled in London as a student of the law and made the acquaintance of the poet William Browne (q.v.). He published *Mournful Elegies* (1612) on the death of Prince Henry, and a collection of *Epithalamia* (1613) on the marriage of Princess Elizabeth with the Elector Palatine. A volume of satires, entitled *Abuses Stript and Whipt* (1613), led to his imprisonment for a few months in the Marshalsea. To Browne's *Shepherd's Pipe* (1614) he contributed two eclogues, and wrote, while in prison, the beautiful *Shepherd's Hunting* (pub. 1615), containing the famed address to Poesy. To about the same time belongs *Fidelia* (pub. 1617), the lament of a maiden forsaken by her lover. To the edition of 1619 was added the precious lyric beginning "Shall I, wasting in despair." This poem was followed by "Fair Virtue, or the Mistress of Philarete" (1622, but composed much earlier), the last of his pure lyrics. Wither now turned to religious verse, publishing the *Songs of the Old Testament*, to each of which was added "a new and easie Tune" (1621), and *Hymns and Songs of the Church* (1623); both volumes had considerable vogue. He collected his early poems under the title *Juvenilia* (1622; revised 1626; 2d ed. 1633). Religious verse was continued in *The Psalms of David* (1632), *Emblems* (1635), and *Halelujah* (1641). The last volume contains Wither's finest religious poems.

Joining Parliament against King Charles I., Wither sold his estates and raised a troop of horse (1642). Though unsuccessful in the field, he was appointed major. He took an important hand in the scurrilous pamphlets known as *Mercuries* and squandered his fine talents. After the Restoration he was sent to Newgate and then to the Tower for a verse pamphlet called *Vox Vulgi*. He remained in prison from March 24, 1662, till July 27, 1663. He died in London. His later work has no literary interest. Most of Wither's works were issued by the Spenser Society (20 parts, Manchester, 1870-83). Consult: Selections from *Poems of Wither*, ed. by H. Morley (in *Companion Poets*, London, 1891); *Fidelia* and *Fair Virtue*, ed. by E. A. Arber (in *English Garner*, vols. iv. and vi., ib., 1882 and 1883); T. H. Ward's *English Poets*, vol. ii. (ib., 1880); and Charles Lamb's essay entitled "Poetical Works of George Wither" (in Lamb's *Works*, ib., 1818).

WITH'ERSPOON, John (1723-94). An American Presbyterian clergyman and statesman. He was born at Gifford, Scotland, graduated at the University of Edinburgh in 1742, and served as minister of several parishes in Scotland from 1745 to 1768, winning a high reputation as preacher and writer. In 1768 he accepted an invitation to become president of Princeton College in New Jersey and held the position till his death. During the suspension of the college by the war he was a member of the constitutional convention of New Jersey in 1776, and for six years of the Continental Congress; he advocated and signed the Declaration of Independence and the Articles of Confederation; was an active member of several important committees and of the board of war, visiting the camps to increase the comfort of the troops. When the college was reopened he lectured on moral philosophy and rhetoric. He visited England in 1783 and 1784 to solicit funds, but found the state of public opinion too hostile to admit of much success. For the last two years of his life he was blind. His works were collected at New York in four volumes (1800-01), and at Edinburgh in nine volumes (1804). Among them are: *Ecclesiastical Characteristics* (1753); *Essay on Justification* (1756); *Serious Inquiry into the Nature and Effects of the Stage* (1757); *Essays on Important Subjects* (1764); and *Authority of the British Parliament* (1774). He also published many sermons, lectures, essays, etc. A memoir by his son-in-law, the Rev. Samuel S. Smith, prefaced the New York edition of his works and also appeared separately (New York, 1795). Consult *Proceedings at the Unveiling of the Statue of John Witherspoon*, edited by W. P. Breed (Philadelphia, 1877).

WITH'INGTON. A town in Lancashire, England, 4 miles southeast of Manchester, of which it is a residential suburb and with which its chief public industries are connected. Population, in 1891, 25,729; in 1901, 36,201.

WITH'ROW, William Henry (1839—). A Canadian author, born at Toronto, and educated at Victoria College, Toronto. He entered the Methodist ministry in 1866 and served on various circuits till 1874, when he became editor of the *Canadian Methodist Magazine*. Among his published works are: *The Catacombs of Rome* (1874, and several editions); *Worthies of Early Methodism* (1878); *The Romance of Missions* (1879); *Valeria, the Martyr of the Catacombs* (1880); *Barbara Heck: a Story of the Founding of Upper Canada* (1882); *Life in a Parsonage* (1882); *The Native Races of North America* (1893); *A Harmony of the Gospels, from the Revised Version* (1894); and *Makers of Methodism* (1898).

WITKOWITZ, vĭt′kô-vĭts. A town of Moravia, Austria, near Mährisch-Ostrau. It is noted for its extensive iron works. Population, in 1900, 19,128.

WITNESS (AS. *witnes*, *ge-witnes*, testimony, from *witan*, to know). A witness is any person who is summoned by a court of law or an officer authorized to take evidence in a legal proceeding, to appear before the court or officer for the purpose of giving testimony under oath or affirmation. Attendance as a witness is a compulsory duty, and the presence of any person for the purpose of acting as a witness can be compelled both in civil and criminal cases. At common law the mode of summoning a witness in a court of law is by serving him with process of the court called a *subpœna*, i.e. the formal writ issued in the name of the sovereign; or if the witness is required to produce a document in his possession, by the writ called a *subpœna duces tecum*. If a witness do not attend at the time and place mentioned, he is liable to be punished, either by attachment, i.e. summary imprisonment for contempt, or by a fine. He is also liable in an action for damages at the suit of the party summoning him. During a witness's attendance on this public duty he is privileged from civil arrest, and cannot be lawfully served with summons or other process of the court while he is going to, remaining at, or returning from the court. Moreover, he is entitled to have his reasonable traveling expenses paid to him, and a sum for subsistence while he remains in attendance. He is also entitled to a reasonable allowance for his loss of time while attending a civil trial; the amount of such allowance is now generally fixed by statutes, which provide that it must be paid at the time of the service of the subpœna.

Any person is competent to become a witness who has sufficient mental capacity to understand the nature and obligation of an oath or affirmation and the nature of the matters about which he is to testify. The special rules governing the competency of such witnesses as infants, married women, and parties interested in the controversy, as well as the rules governing the examination of witnesses, are considered under the topic Evidence (q.v.). The testimony of witnesses was required at common law to be given under oath. At common law, therefore, an atheist or one not believing in a God and a future state of rewards and punishments was not a competent witness; but, either by modern statute or relaxation of practice, throughout the United States the absence of religious belief does not render one incompetent as a witness. The witness may now qualify either upon oath or affirmation. A person residing in one State or country cannot be compelled to attend as a witness in another State or country; but in many States there are statutes authorizing the issuance of a commission directed to some person residing in another State empowering him to take the testimony of a nonresident witness with the same force and effect as if the witness appeared and gave his testimony in open court. In many States there are also statutes authorizing the issuance of subpœnas to compel a witness within the State to appear and give testimony before a commissioner to take testimony appointed by the court of another State. There are also generally statutes authorizing the issuance of a commission to take the testimony in advance of trial of aged or infirm witnesses or those who are about to leave the State. This was formerly one of the extraordinary remedies afforded by courts of equity. See further under such titles as Evidence; Contempt; Oath; Perjury; Subpœna; Dies Non; Holiday; Sunday; Jurisdiction; Service (of papers), etc.

WITS, The. A popular comedy, by Sir William Davenant, generally considered his masterpiece, produced in 1633, printed in 1636.

WITT, Cornelius de. See De Witt, Cornelius.

WITT, Jan de. See De Witt, Jan.

WITTE, vĭt′te, Emanuel de (1607-92). A Dutch painter, born at Alkmaar. A pupil of Van Aalst, he devoted himself to portraits and historical paintings at first, but afterwards included interior decoration, in which he was not equaled by any of his contemporaries. He had the talent of combining accuracy of detail with suitable lighting. Pictures by him are in Sir Richard Wallace's collection in the National Gallery, and in the museums of Berlin, Brussels, Weimar, Hamburg, and Düsseldorf.

WITTE, Karl (1800-83). A German jurist and distinguished Dante scholar, born at Lochau, near Halle. In his boyhood he attracted attention by his proficiency in linguistics, and as early as 1810 began his university studies at Leipzig, continuing them at Göttingen, Giessen, and Heidelberg. In 1816 he intended to qualify as docent at the University of Berlin, but met with great opposition on account of his youth, and, being granted a stipend, spent more than two years in Italy, devoting himself principally to the study of Italian literature. Since 1821 established as lecturer on jurisprudence at Breslau, he was appointed professor there in 1823 and at Halle in 1834. Apart from his juridical writings he produced, in collaboration with Kannegiesser, a translation with commentary of Dante's lyric poems (2d ed. 1842), and prepared the excellent critical edition of the *Divina Commedia* (1862), the result of protracted investigations, which was followed by a metrical translation in blank verse, with commentary (3d ed. 1876). He also edited the *Monarchia* (2d ed. 1874) and *Vita nuova* (1876), translated Boccacio's *Decamerone* (3d ed. 1859), and wrote *Alpinisches und Transalpinisches* (1858), and *Danteforschungen* (vol. i., 1869; vol. ii., 1879).

WITTE, vĭt′tĕ, Sergei Yulievitch (1840—). A Russian statesman. He was born at Tiflis, where his father, of German extraction, was an official. His mother was a daughter of Fadeyeff, Governor of Saratov, who married into one of the oldest Russian noble families. Witte was educated at the New Russian University, Odessa, in physical science and mathematics. He engaged in journalism, in 1877 entered the railway service, and during the Russo-Turkish War (1877-78) distinguished himself in managing the transportation of troops on the Odessa Railway. In 1879 he was called to Saint Petersburg and appointed to an executive position on the Southwestern Railway. He was a member of Baranoff's Imperial railway commission, and wrote in part the history of its proceedings. In 1883 he published *Principles of Railway Tariffs.* In 1886 he became director of the Southwestern Railway and in 1888, through Finance Minister Vishnegradski, chief of the Imperial Railway Department and president of the tariff commission. He was appointed Minister of Communications in 1892 and soon afterwards succeeded Vishnegradsky as Minister of Finance. He held this important position until 1903. As Finance Minister he promoted industrial development, favored protection of home industries, introduced the gold standard, and established Government monopoly of the sale of alcohol. Witte increased the revenue and negotiated large loans abroad, particularly in France. These were used partly for railway extension, especially trans-Siberian. He concluded important commercial treaties, particularly with Germany and Austria-Hungary. In his economic policy he was influenced by the views of the German economist Friedrich List, on whom Witte published an essay in 1888. In 1903 he was appointed president of the Committee of Ministers and a member of the Council of the Empire. It was not understood at the time whether this was a real promotion or, by exchange of actual power for nominal honors, a victory for his reactionary opponents. Witte was regarded by many as the most competent statesman in Russia.

WITTEKIND, vĭt′te-kĭnt, or **WIDUKIND**, vē′dōō-kĭnt (?-c.807). A Westphalian chieftain, the most celebrated leader of the Saxons against Charles the Great. When most of the Saxon nobles submitted to the Frankish King, at the Imperial Diet at Paderborn, in 777, Wittekind fled to Siegfried, King of Jutland, whose sister Geva he is said to have married. In 778 he returned, and while Charles was absent in Spain, began to lay waste the Rhine country. In 782 he fell upon the Frankish army by surprise at the Süntelberg, and annihilated it—an act for which Charles took frightful vengeance by the execution of 4500 Saxons at Verden. On this, all the Saxon tribes rose in arms, and the war was again led by Wittekind until 785, when Charles entered into negotiations with him; the result of which was that Wittekind repaired to the King's camp at Attigny in Champagne, and received baptism. After that he appears no more in history. According to the legend, however, that is still current among the people in Westphalia, Charles promoted Wittekind to be Duke of the Saxons, and made over Enger to him. From his castle, called Babilonie, situated in the neighborhood of Lübeck, he is said to have ruled with gentleness and justice till 807, when he met his death in a campaign against Duke Gerold of Swabia. His tomb was shown in the parish Church of Enger, in the County of Ravensberg, where Charles IV. in 1377 erected a monument to him. On October 18, 1812, another monument in his honor was erected at Minden by the Westphalian Society. The higher of the two hills which form the Westphalian gates on the Weser, near Minden, bears the name of Wittekindsberg. Consult: Mombert, *Charles the Great* (New York, 1888); and Diekamp, *Widukind, der Sachsenführer, nach Geschichte und Sage* (Münster, 1877).

WITTEN, vĭt′ten. A town in the Province of Westphalia, Prussia, on the Ruhr, 31 miles northeast of Cologne. Coal is mined in the surrounding district, and there are extensive manufactures of machinery, iron, steel, glass, wire ropes, chemicals, leather goods, soap, and wagons. Population, in 1895, 28,769; in 1900, 33,514.

WITTENBERG, vĭt′ten-bĕrk. A town of the Province of Saxony, Prussia, on the Elbe, 55 miles southwest of Berlin (Map: Prussia, E 3). It is celebrated as the cradle of the Reformation, and the seat of the university in which Luther was professor, and which was incorporated with that of Halle in 1817. In the Schlosskirche (restored 1885-92) are the tombs of Luther and Melanchthon. Upon the doors of this church, replaced by new ones of metal in 1858, Luther hung up his 95 theses against the doctrine of indulgences. The house of the great reformer, almost unaltered, and the houses of Melanchthon and Cranach are preserved. In the market-place is a bronze statue of Luther by Schadow, not far from which is also one of Melanchthon; and outside the Elster Gate a spot is pointed out where Luther burned the Papal bull. Manufactures of woolen and linen goods, hosiery, machinery, essential oils, pottery, cement, bricks, electrical apparatus, and leather are carried on. Wittenberg was down to 1422 the capital of the electors of Saxony of the Ascanian line. Later it was the residence of the electors of the Ernestine line. (See Saxony.) The Elector Frederick the Wise founded the university in 1502. Population, in 1900, 18,333.

WIT′TENBERG COLLEGE. An educational institution at Springfield, Ohio, founded by the Lutherans of Ohio in 1845. Women are admitted to the undergraduate courses on the same terms as men, and may also pursue an abridged course of study known as the Young Woman's Course, leading to a diploma of graduation without a degree. In addition to the academic course the institution maintains a preparatory school, with a summer school of methods and reviews, a school of expression, elocution, and oratory, a conservatory of music, a school of art, and a theological seminary. In 1903 the faculty numbered 21, and the students in all departments 515. The library contained about 12,500 volumes. The productive funds amounted to about $300,000.

WITTHAUS, wĭt′hous, Rudolph August (1846—). An American toxicologist, born in New York City. He graduated at Columbia University in 1867, and at the medical department of New York University in 1875; studied in the Sorbonne and the College of France; became professor of chemistry and toxicology at the universities of New York, Vermont, and Buffalo successively, and then at Cornell University. He acted as toxicological expert in several famous criminal cases. His publications include: *Essentials of Chemistry* (1879); *Manual of Chemistry* (1879); *General Medical Chemistry* (1881); and *Laboratory Guide in Urinals and Toxicology* (1886). With T. C. Becker he also edited *Medical Jurisprudence, Forensic Medicine, and Toxicology* (1896), to which he contributed a large part of the material.

WITTIG, vĭt′tĭG, AUGUST (1823-93). A German sculptor, born at Meissen. He was a pupil of Rietschel at Dresden and subsequently studied in Florence and Rome (1850-63). In 1864 he was appointed professor at the Düsseldorf Academy. His principal works include a "Caritas with Three Children" (1851); the heroic size statue of a "Huntsman" (1852); "Hagar and Ishmael" (1853), executed in marble (1871), for the National Gallery, Berlin; "Pietà" (1858); the two excellent reliefs of "Entombment" (1860) and "Loreley" (1860); the colossal busts of "Wilhelm von Schadow" (1869), in the Schadowplatz at Düsseldorf, and of "Cornelius" (1875), in the National Gallery, Berlin; and the statues of "Apostles Peter and Paul," in the Basilica at Treves.

WITTY FAIR ONE, THE. A comedy by James Shirley (q.v.), licensed in London October 3, 1628, printed in 1633, and revived on the stage in 1667.

WITU, vē′tōō. A former sultanate on the east coast of Africa, between 2° and 3° south latitude, forming a part of the Tanaland Province of the British East Africa Protectorate. The area is about 550 square miles and the population about 10,000, mostly Swahili. Witu has a good harbor in Manda Bay. From 1885 to 1890 the district was a German protectorate.

WITWATERSRAND, vĭt-vä′tẽrs-rȧnt (South African Dutch, White-Waters Range). A gold-mining district in the southern part of the Transvaal, the most productive in the world, extending some 40 miles along a low range of hills known by the same name (Map: Transvaal Colony, L 3). The gold-bearing conglomerate or 'banket' was first discovered in 1885, and active mining operations began two years later, when the output amounted to 23,000 ounces of gold. Since this date the development of the gold mines has proceeded very rapidly, as is well shown by the growth of the town of Johannesburg, which is situated near the centre of the district and which in 1899 contained about 100,000 inhabitants. The gold is found in certain mineralized beds called 'reefs' formed of quartz pebbles cemented by silica, iron oxides, and pyrites. In the principal series of deposits there are as many as three separate auriferous beds which have an aggregate width of five to six feet and carry about one-half an ounce or $10 per ton in gold. While the ore is low-grade, the great extent of the deposits both laterally and in depth has permitted its exploitation on a large and very profitable scale. In 1899 there were 79 mines engaged in productive operations, and the year's output of gold amounted to 4,008,326 crude ounces, valued at over $71,000,000. With the outbreak of the Boer War in October of that year most of the mines suspended work, and operations since have been conducted on a much smaller scale. Up to the end of 1902 the total output of the Witwatersrand was 24,755,000 ounces, valued at about $440,000,000. It has been estimated by high authorities that the deposits lying within 6000 feet of the surface will yet produce gold to the value of $6,000,000,000, and there is every probability that mining will be carried on below that depth. No other district in the world is known to have such enormous stores of gold. See TRANSVAAL; GOLD.

WIT WITHOUT MONEY. A comedy by Fletcher, produced about August, 1614, and printed in 1639. The hero, Valentine, determines to live by his wits alone, and loses his property, but is consoled by an attractive widow.

WIZARD OF THE NORTH. A title frequently given to Sir Walter Scott.

WOAD (AS. *wād*, *waad*, OHG. *weit*, Ger. *Waid*, *Wait*, woad; connected with Lat. *vitrum*, woad), *Isatis*. A small genus of plants of the natural order Cruciferæ, mostly natives of the Mediterranean region. Dyer's woad (*Isatis tinctoria*) is a biennial herb about three feet high, with much-branched leafy stems and small yellow flowers. It was formerly cultivated for its large root-leaves, which furnish a blue dye now largely replaced by indigo. The leaves when cut are reduced to a paste, fermented in heaps for about two weeks, and then formed into balls for sun-drying. These balls, which have an agreeable odor and are blue internally, are subjected to a further fermentation before being used. Even by itself woad yields a good and very permanent blue, but it is generally used with indigo. It is supposed to be the dye with which the Picts painted their bodies.

WOADWAXEN. See DYER'S BROOM.

WOBURN, wōō′bûrn. A city in Middlesex County, Mass., 10 miles north-northwest of Boston, on the Boston and Maine Railroad (Map: Massachusetts, E 3). It is attractively laid out and has many handsome residences, a large number of Boston business men making their home here. The Public Library is the most noteworthy building in the city. It contains about 42,000 volumes and a valuable art collection. The industrial interests of Woburn are chiefly confined to the manufacture of leather. Under the charter of 1898, the government is vested in a mayor, chosen annually, and a unicameral council. The water-works are owned and operated by the municipality. Woburn was settled as 'Charleston Village' in 1640; was incorporated as a town in 1642; and was chartered as a city in 1888. From its original territory several townships have been created. Woburn was the birthplace and early home of Benjamin Thompson, Count Rumford. Population, in 1890, 13,499; in 1900, 14,254. Consult: Sewall, *History of Woburn* (Boston, 1868); and Hurd, *History of Middlesex County* (Philadelphia, 1890).

WODE′HOUSE, JOHN, Earl of Kimberley. See KIMBERLEY.

WODEN, vō′den. See ODIN.

WODROW, wụd′rō, ROBERT (1679-1734). A Scotch ecclesiastical historian, born at Glasgow, and educated at the university there. At an early age he devoted a considerable portion of his time to historical researches, and was appointed librarian to the university (1697-

1701). In 1703 he took charge of a pastorate at Eastwood, near Glasgow, where he remained till his death. Soon after his settlement there he began writing *The History of the Sufferings of the Church of Scotland from the Restoration to the Revolution*, published in 1721-22. Wodrow contemplated other works, chiefly of a biographical character, illustrative of the ecclesiastical history of Scotland. None of these were published till the following century, when three volumes of his collections on *The Lives of the Scottish Reformers and Most Eminent Ministers* (1834-45), and four volumes entitled *Analecta, or a History of Remarkable Providences* (1842-43) were printed by the Maitland Club. Three volumes of his correspondence were published by the Wodrow Society, a literary club instituted in 1841. This correspondence, covering the period 1709-31, throws much light on the ecclesiastical history of the time.

WOERMANN, vĕr′män, KARL (1844—). A German art-historian and poet, born in Hamburg, where for a short time he practiced law, after having studied jurisprudence at Heidelberg, Berlin, Kiel, and Göttingen. He then traveled in France, England, and North America, took up the study of art-history at Heidelberg and Munich, and qualified as privat-docent at the former place in 1871. After visiting Italy, Greece, and Asia Minor, he was called to the academy at Düsseldorf in 1874 as professor of the history of art and literature, and in 1882 became director of the picture gallery at Dresden, intrusted until 1895 also with the supervision of the cabinet of engravings. His works include: *Die Landschaft in der Kunst der alten Völker* (1876); *Die antiken Odysseelandschaften vom Esquilinischen Hügel in Rom* (1877); *Kunst- und Naturskizzen aus Nord- und Südeuropa* (1880); *Was uns die Kunstgeschichte lehrt* (4th ed. 1894). To the *Geschichte der Malerei*, begun by Woltmann, he contributed the part on antique painting, and after Woltmann's death completed the entire work. His most recent publication is a *Geschichte der Kunst aller Zeiten und Völker* (1900 et seq.). As a poet he made himself known by *Geharnischte Sonette aus Norddeutschland* (1866), *Aus der Natur und dem Geiste* (1870), *Anathema sit*, sonnets (1871), *Neapel. Elegien und Oden* (1877), *Neue Gedichte* (1884), *Zu Zweien im Süden* (1893), and *Deutsche Herzen* (1896).

WOF′FINGTON, MARGARET (PEG) (c.1714-60). A celebrated Irish actress, born of poor parents in Dublin, where it was long remembered how as a child she sold salad on College Green, and charmed purchasers by her bright and vivacious ways. When about ten years old, she appeared in a 'lilliputian' production of *The Beggar's Opera*, and thereafter for several years played various parts at one of the newer Dublin theatres, often dancing between the acts. In 1737 she took the rôle of Ophelia at the Smock Alley Theatre, and this was the beginning of her great success. Her London début she made in 1740 at Covent Garden, as Silvia in *The Recruiting Officer*. She was an immediate favorite, and when a few weeks later she repeated her Sir Harry Wildair (in *The Constant Couple*), which had already excited the enthusiasm of Dublin, she showed her versatile powers in a part with which no man of her time succeeded so well. During her career at Drury Lane and Covent Garden, she played most of the heroines who then ruled the stage, in both comedy and tragedy; in the former, perhaps, with the greater charm and distinction. Some of her best characters were the fine ladies, like Lady Betty Modish and Lady Townley. Rôles, too, in which the heroine appears in masculine disguise afforded some of her special triumphs. Her last appearance was as Rosalind in *As You Like It*, in 1757. Tate Wilkinson describes how, though ill, she persisted in going on with the play, till in the epilogue she suddenly broke down with a cry of horror and was led from the stage. Three years later, in Westminster, she died. She was one of the most beautiful of actresses, and what a hostile critic called her 'impudence' was to most people an additional charm. Her voice alone was said to be less agreeable. Countless stories are told both of her frailty and of her goodness of heart. Garrick, with whom she lived for a time, was only one of her lovers; but she ended her days in respectable retirement, leaving much of her property in charity. Much of her charming and generous personality is revealed in Charles Reade's novel of *Peg Woffington* and the play *Masks and Faces*. Consult: Daly, *Woffington, a Tribute to the Actress and the Woman* (Philadelphia, 1888); Molloy, *The Life and Adventures of Peg Woffington, with Pictures of the Period in which She Lived* (London, 1884).

WOF′FORD COLLEGE. An institution of higher learning at Spartanburg, S. C., founded in 1853 by a legacy of $100,000 from the Rev. Benjamin Wofford. The institution is under the control of the Methodist Church, South. It offers an academic course leading to the bachelor's degree, and maintains a preparatory school on the college campus. The courses of instruction are arranged in four groups, within which considerable freedom of election is permitted after the sophomore year. The campus of 70 acres contains 19 buildings, together valued at $204,000. In 1903 the students numbered 295 and the faculty 11. The library contained 10,000 volumes. The endowment was $75,000, with an income of $17,000. Extension work is carried on through lectures.

WÖHLER, vẽ′lĕr, FRIEDRICH (1800-82). A German chemist, born near Frankfort-on-the-Main. He was educated at the Gymnasium at Frankfort, then studied medicine and chemistry at the universities of Marburg and Heidelberg, and subsequently worked under the direction of Berzelius at Stockholm. In 1825 he returned to Berlin and was invited to teach chemistry at the newly established industrial school of that city. In 1831 he received a similar appointment at Cassel. In 1836 he was made professor of chemistry in the medical department of the University of Göttingen and inspector-general of the pharmacies of Hanover. He died at Göttingen. Wöhler is justly considered as one of the founders of organic chemistry, his name being connected with the most important discoveries in the early history of the science. In 1828 he effected the synthesis of urea—the first organic compound produced by artificial laboratory means, without the agency of life. The first cases of isomerism (i.e. the existence of different compounds having the same composition) were likewise observed by Wöhler (see CHEMISTRY; CARBON COMPOUNDS), and no less a contribution was formed by the classical research on the benzoyl compounds, carried out by Wöhler in conjunction with Liebig. (See CHEMISTRY, historical section.) Many other results of importance were achieved by Wöhler in all branches of chemistry. He isolated the elements aluminum, glucinum, ytilium, and titanium, and founded the nickel industry by devising a process of manufacturing the pure metal on a large scale. As a teacher, too, he was brilliant and many-sided. His *Grundriss der Chemie* and *Die Mineralanalyse in Beispielen* passed through numerous editions and were translated into several languages. He also edited in German Berzelius's voluminous *Lehrbuch der Chemie* and *Jahresberichte.* Hofmann published an excellent biography of Wöhler in the *Berichte der deutschen chemischen Gesellschaft* (1882), and edited *Aus Justus Liebigs und Friedrich Wöhlers Briefwechsel* (1888). Wöhler published the results of his investigations in Liebig's *Annalen der Chemie und Pharmacie,* of which he became co-editor in 1838. In 1890 a monument was erected to his memory at Göttingen.

WOHLGEMUTH or **WOLGEMUT,** vōl'ge-mōōt, MICHEL (1434-1519). A German painter and engraver, the chief master of the older Franconian school. Born at Nuremberg, he was a pupil of Hans Pleydenwurff, but may also have studied in Flanders or at least formed his style after Flemish models. At Nuremberg, where he first appears on record in 1473, he established a studio which was frequented by Albrecht Dürer, among others, and exercised a far-reaching influence. From it issued a large number of carved altar-pieces with painted wings, executed for the greater part rather mechanically with the aid of journeymen. The most prominent among these include four panels with "Episodes from the Life of Christ" (1465, Pinakothek, Munich), an altar-piece with "Scenes from the Youth and Passion of Christ" (1479, Saint Mary's, Zwickau), and the Peringsdörffer altar with "Scenes from the Legend of Saint Vitus, and Saints" (c.1490, Germanic Museum, Nuremberg). As compared with the Flemish masters of his day, Wohlgemuth, even in his better pictures, done exclusively by himself, appears inferior to them as regards sentiment and delicacy of execution, aside from the prevalence of angular forms and the monotony of types, which occasionally are of exaggerated homeliness. He also painted portraits and designed for the wood-cut, notably the spirited illustrations for Schedel's *Weltchronik* (1493). All his paintings are reproduced in the publication *Die Gemälde von Dürer und Wohlgemuth,* 117 plates with text by Riehl and Thode (Nuremberg, 1889-95). Consult Thode, *Die Malerschule von Nürnberg* (Frankfort, 1891).

WO'KING. A market town in Surrey, England, 24½ miles southwest of London (Map: London, H 2). Its chief importance is derived from the proximity of the London Necropolis Cemetery, which covers 2000 acres and to which special funeral trains are dispatched from London daily. It contains a crematory erected in 1878, the first one established in England. Population, in 1891, 9776; in 1901, 16,222.

WOLCOT, wụl'kut, JOHN (1738-1819). An English poet, better known under the pseudonym of PETER PINDAR. He was born at Dodbrook, in Devon. He was educated by an uncle, at Kingsbridge and in France, and subsequently studied medicine in London and in Aberdeen. In 1767 he went to Jamaica with Sir William Trelawny, the newly appointed Governor. After serving two years as physician-general, he went to England, and was ordained priest in the English Church. He immediately returned to Jamaica, where he received a small living. On the death of his patron (1773), he left the island for good. After practicing medicine with little success in Truro and other places, he settled in London as a writer of audacious squibs and satires on all sorts of persons from George III. down to liverymen. Among his seventy distinct pieces were *Lyric Odes to the Royal Academicians* (1782-86); *The Louisiad: an Heroic-comic Poem,* five cantos, in ridicule of the King's domestic life (1785-95); *Ode upon Ode, a Comic Account of a Visit of the Sovereign to Whitbread's Brewery* (1787); *Bozzy and Piozzi,* on Boswell and Mrs. Piozzi (1786); and *A Poetical Epistle to a Falling Minister,* i.e. Pitt (1789). These and other verses achieved wide popularity. From their sale the author received an annuity of £250; and the Government attempted to buy him off with a pension of £300. Wolcot was severely handled by William Gifford (q.v.) in his *Epistle to Peter Pindar* (1800). Unscrupulous, impudent, and coarse, Wolcot was yet a master of burlesque humor and caricature. During his lifetime Wolcot's satires were issued in cheap quarto pamphlets. About twenty editions of the collected works appeared between 1788 and 1837. That of 1812 contains a memoir and portrait. For the latest and best account, consult Theodor Reitterer, *Leben und Werke Peter Pindars* (Vienna and Leipzig, 1900).

WOLCOTT, EDWARD OLIVER (1848—). An American lawyer and politician, born at Long Meadow, Hampden County, Mass. Toward the close of the Civil War he served for a short time in the 150th Ohio Volunteers. He then studied for a time at Yale, graduated at the Harvard Law School in 1871, and settled in Colorado, where he taught school, and later began the practice of law at Georgetown. In 1876 he was elected district attorney for the first judicial district of Colorado, and in 1878 was elected to the State Senate, in which he at once became the Republican leader. In 1879 he became attorney for the Denver and Rio Grande Railroad, and in 1884 was appointed general counsel for the road. From 1889 until 1901 he was a member of the United States Senate. He was an ardent champion of bimetallism, but supported the Republican candidates in the 'free-silver campaign' of 1896, and in 1897 was named by President McKinley as chairman of the commission sent to Europe to report on international bimetalism. In 1900 he was president of the Republican National Convention at Philadelphia, and in 1903 was an unsuccessful candidate for the United States Senate against Senator Henry M. Teller.

WOLCOTT, OLIVER (1726-97). An American soldier, and a signer of the Declaration of Independence; the son of Roger Wolcott (q.v.). He was born in Windsor, Conn., graduated at Yale in 1747; and in King George's War (q.v.) commanded a company of volunteers, raised by himself, on the northern frontier. He was sheriff of Litchfield County in 1751; a member of the Council from 1774 to 1786, and in the meantime was judge of the Court of Common Pleas, and of the Litchfield District Probate Court. In 1775 Congress appointed him one of the Indian Commissioners for the Northern Department, with instructions to secure the neutrality of the Iroquois. He was a member of the Continental Congress in 1776-78 and in 1780-84, and was one of the supporters and a signer of the Declaration of Independence. Entering the army as colonel of the Connecticut militia in 1775, he became a brigadier-general in August, 1776, commanding the fourteen Connecticut regiments raised to coöperate with the Continental army in the defense of New York, and taking an active part in the campaign against Burgoyne; and in May, 1779, he was appointed a major-general. Again in 1784 he was an Indian Commissioner for the Northern Department, and as such negotiated a treaty with the Iroquois. He was Lieutenant-Governor of Connecticut from 1786 to 1796, and Governor from 1796 until his death. Consult Sanderson, *Biographies of the Signers*, vol. iii. (Philadelphia, 1820-27).

WOLCOTT, Oliver (1760-1833). An American political leader, son of the preceding. He was born in Litchfield, Conn., graduated at Yale in 1778, and served in the Connecticut militia, as an aide to his father, during the latter part of the Revolutionary War. He was admitted to the bar in 1781, and was employed for several years in the financial department of the State Government, acting in 1784 as commissioner, with Oliver Ellsworth, to adjust the accounts between Connecticut and the United States. He was Comptroller of Public Accounts for the United States in 1788-89, was Auditor of the United States Treasury in 1789-91, and was again Comptroller of Public Accounts from 1791 to 1795, when he succeeded Alexander Hamilton as Secretary of the Treasury. He was retained in this position by John Adams, and while performing the duties of his office took an active part in Hamilton's oposition to the President, but resigned from the Cabinet in November, 1800. Subsequently he was a judge of the United States Circuit Court (in 1801-02), was engaged in mercantile pursuits in New York from 1802 to 1812, establishing several large factories at Wolcottville (near Litchfield); was president of the Bank of North America in 1812-14; presided over the Connecticut constitutional convention in 1817, and was Governor of that State from 1817 to 1827, when he returned to New York. He wrote several pamphlets, including an *Address to the People of the United States on the Subject of the Report of a Committee of the House of Representatives* (1802), and *British Influences on Affairs in the United States Proved and Explained* (1804). His papers have been edited by Gibbs as *Memoirs of the Administrations of Washington and John Adams* (New York, 1846).

WOLCOTT, Roger (1679-1767). A colonial Governor of Connecticut. He was born in Windsor, Conn., was apprenticed to a weaver at the age of twelve, and began an independent business career at twenty-one. In the campaign against Canada in 1711 he was commissary of the Connecticut troops, and in the celebrated Louisburg expedition of 1745 he was second in command, with the rank of major-general. After serving as a member of the executive council, judge of the Supreme Court, and Deputy Governor, he was for four years (1750-54) Governor of the colony. He wrote some crude verse, including *Poetical Meditations, being the Improvement of some Vacant Hours* (1725), and a *Brief Account of the Agency of the Honorable John Winthrop, Esq., in the Court of King Charles the Second, A.D. 1662, when he obtained a Charter for the Colony of Connecticut* (printed in the Collection of the Massachusetts Historical Society, 1st series, vol. iv.). His journal of the Louisburg expedition is in the possession of the Massachusetts Historical Society.

WOLCOTT, Roger (1847-1901). An American political leader, Governor of Massachusetts. He was born in Boston, Mass., graduated at Harvard in 1870, was a tutor in French and history there in 1871-72, and graduated at the Harvard Law School in 1874. From 1877 to 1879 he was a member of the Boston Common Council, from 1882 to 1885 a member of the State House of Representatives, and was then again a member of the Common Council from 1887 to 1889. In 1892 he was elected Lieutenant-Governor of the State, although W. E. Russell (q.v.), the Democratic candidate for Governor, was chosen. He was reëlected in 1893, 1894, and 1895. Before the termination of his fourth term he became by the sudden death of Governor Greenhalge, in May, 1896, acting Governor. In the following November he was chosen Governor by the largest majority ever given to any candidate for that office in the history of the State, and was reëlected in 1897 and 1898. Subsequently he was offered by President McKinley the position of a member of the Philippine Commission, and later the Ambassadorship to Italy, both of which honors he declined. Consult Lawrence, *Roger Wolcott* (Boston, 1902).

WOLF (AS. *wulf*, Goth. *wulfs*, OHG. *wolf*, Ger. *Wolf*, wolf, connected with Lat. *lupus*, Gk. **λύκος**, *lykos*, OChurch Slav. *vlŭkŭ*, Lith. *vilkas*, Skt. *vṛka*, wolf, and with Skt. *vraśc*, to rend, Gk. **ἕλκειν**, *helkein*, OChurch Slav. *vlěkati*, to haul). The name of several typically canine animals; specifically *Canis lupus*. This, the 'wolf' of the whole Northern Hemisphere, is yellowish gray, with strong coarse hair, which is longest on the ears, neck, shoulders, and haunches, and especially on the throat; the muzzle is black, the upper lip and chin white. The ears are erect and pointed, the muzzle sharp; the legs rather longer than those of the shepherd-dog; the tail bushy, but not curling; the eyes oblique, giving a peculiarly vicious expression to the countenance. The wolf is swift of foot, and hunts deer and other animals, packs of wolves associating for this purpose; it also often commits great ravages at night among sheep, and attacks calves, but seldom full-grown oxen or man, unless hard pressed by hunger, when it becomes very dangerous. In general, the wolf is cowardly and stealthy. It is not easily trapped, being extremely cautious, and appearing to understand the nature and purpose of a trap almost as well as those by whom it is set.

Diversities appear in the wolves of different countries of Europe and Asia, but not very considerable. The French wolves are generally browner, and rather smaller, than those of Germany; the wolves of Russia are larger, and have longer hair; in Italy and Turkey a tawny color predominates. The great black Pyrenean wolf is the most marked variety. Wolves are still very plentiful in some parts of Europe. In the Pyrenees and Ardennes, among the Carpathian Mountains and in Turkey, they are common; and in the forests of Poland and Russia wolves often appear in formidable packs, and still cause much loss by their attacks on cattle, sheep, and horses. The wolf was formerly common in Great Britain, and the last wolf in Scotland is said to have been killed in 1743.

Although systematic naturalists have named numerous species and subspecies among American wolves, there are practically only two kinds —the large 'gray,' 'timber,' or Canadian wolf, which is practically identical with the wolf of the Old World; and the prairie wolf, or coyote.

The American form of the first-named species is more robust, and has longer, lighter hair on the average, than the Old World form, but is practically the same. It is possible that the black wolf (*Canis ater*), a few of which remain in the Florida Everglades, and an Arctic species (*Canis albus*), pure white except the black tip of the tail, may prove to be distinct species. Once numerous all over the country, wolves are now unknown east of the Mississippi and Lake Huron, never having been able to hold their place, in spite of plentiful refuges in the forests and mountains, as have the wolves of Europe. They are still numerous in the Rocky Mountains and on the Pacific coast, and exceedingly so in the northern part of British America, where they live upon the game and occasionally do great damage to the horses, sheep, and cattle on open ranches. They keep themselves hidden in the woods, and hence are known everywhere in the West as 'timber' wolves.

The other American wolf, smaller, redder, and addicted to an open country rather than to the forests, is the red or prairie wolf, or coyote. Until recently this wolf, which formerly ranged eastward as far as the prairies extended, but now is not known east of the dry plains, was regarded as only a single widespread and variable species (*Canis latrans*); but systematists now believe that several distinct species of these small wolves should be recognized. See Coyote.

South America has several wolf-like canine animals, described under Fox-Dog, Maned Wolf, and other names. For illustrations and bibliography, see Canidæ; Dog.

WOLF, Tasmanian or Zebra. See Dasyure.

WOLF, vôlf, Adam (1822-83). An Austrian historian, born at Eger. He studied jurisprudence and philosophy in Prague and in Vienna, where he established himself as docent of history at the university, in 1850. Appointed professor at the University of Pest in 1852, he became tutor of the daughters of Archduke Albrecht in 1856 and professor at the University of Gratz in 1865. His works, based on thorough investigations, are valuable contributions to the history of Austria under Maria Theresa and her successors, and include: *Oesterreich unter Maria Theresia* (1855); *Aus dem Hofleben Maria Theresias* (2d ed. 1859); *Marie Christine, Erzherzogin von Oesterreich* (1863); *Kaiser Franz I.* (1866); *Die Aufhebung der Klöster in Inneroesterreich* (1871); *Geschichtliche Bilder aus Oesterreich* (1878-80); *Oesterreich unter Maria Theresia, Joseph II. und Leopold II.* (1882); and others, besides many treatises on Austrian history in the publications of the Vienna Academy of Sciences.

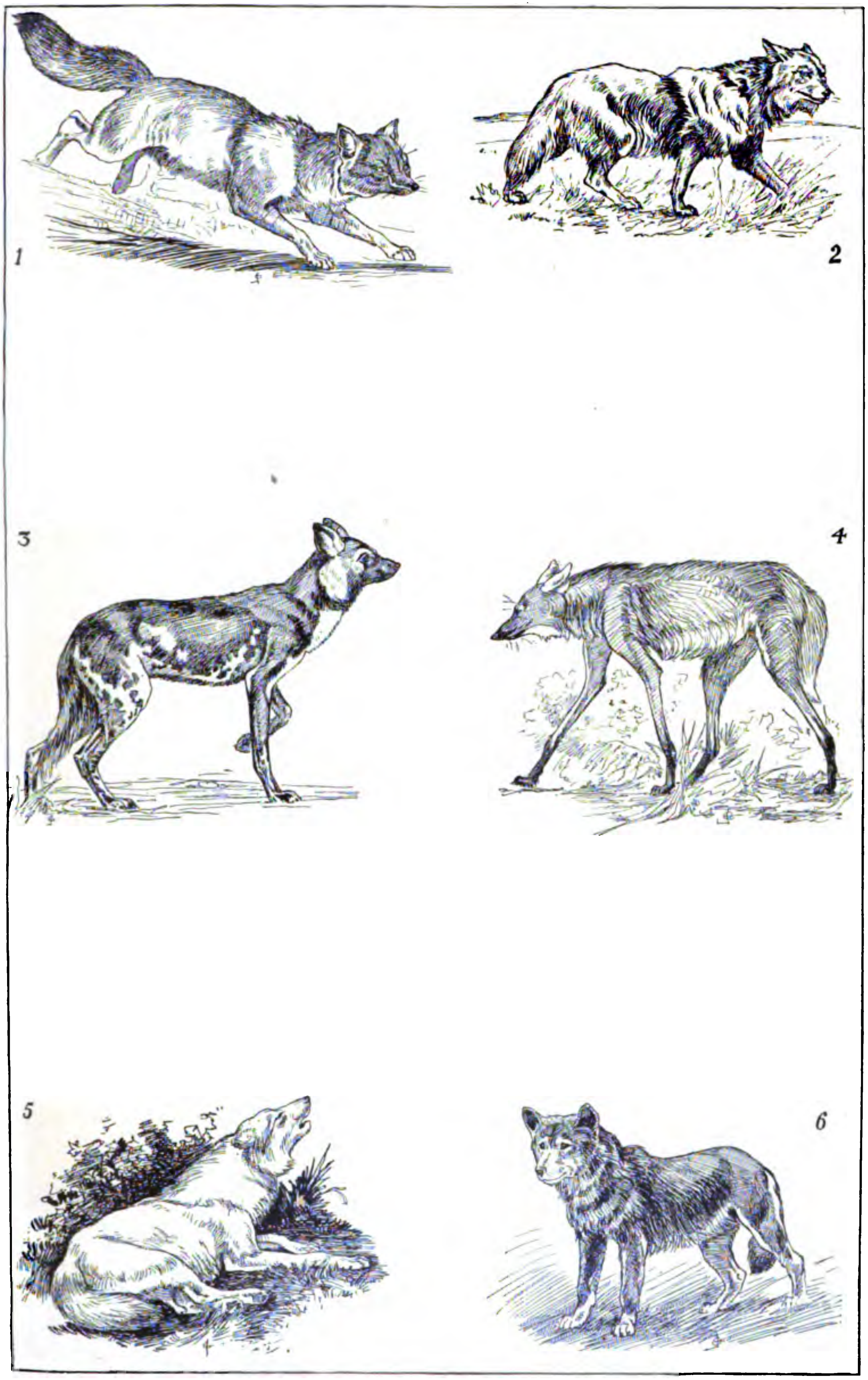
WOLF, Edmund Jacob (1840—). An American Lutheran minister and scholar. He was born at Rebersburg, Pa., and graduated at Pennsylvania College, Gettysburg, in 1863. He studied theology at Gettysburg, Tübingen, and Erlangen, and entered the ministry in 1865. After several years in the pastorate, he became professor of Church history and New Testament exegesis in the theological seminary at Gettysburg in 1874. Among his publications is *The Lutherans in America* (New York, 1889).

WOLF, vôlf, Ferdinand (1796-1866). An Austrian Romance scholar, born in Vienna and educated at the University of Gratz. Upon his return to Vienna his tastes led him to the study of mediæval literature, and he became connected in 1827 with the Imperial Library. When the Academy of Sciences was founded, he was made a member and secretary of the institution. Wolf did work of sterling value in opening the field of Romance literature, especially that of Spain, to modern scholarship. With Ebert he founded in 1858 the *Jahrbuch für romanische und englische Litteratur*, and he edited, either alone or in company with others, a large number of texts. Some of his more important independent publications are: *Die Sage vom Bruder Rausch* (1835); *Floresta de rimas modernas castellanas* (1837); *Ueber die Lais, Sequenzen und Leiche* (1841); *Ueber die Romanzenpoesie der Spanier* (1847); *Studien zur Geschichte der spanischen und portugiesischen Nationallitteratur* (1859); and *Histoire de la littérature brésilienne* (1863).

WOLF, Friedrich August (1759-1824). A German classical scholar, born at Haynrode, Prussian Saxony. He studied at Göttingen and began his career as a teacher in the seminary at Ilfeld in 1779, then became rector of the gymnasium at Osterode (1782), and in 1783 was called to the chair of philosophy and pedagogy at Halle, where he taught until the university was closed after the battle of Jena (1806). Wolf founded his teaching upon the proposition that classical study or "Altertumswissenschaft" should properly deal with all phases of the life and thought of antiquity, as expressed in all the evidence, both literary and monumental, that has been preserved. He saw in classical antiquity a model public and private life, resting on the highest ideals, and the development of the study of antiquity along broad lines since his time may be largely traced to his influence.

In 1807 Wolf went to Berlin, where he was active in the founding of the new university. He became involved in a number of petty quarrels, and in April, 1824, he undertook a journey to Southern France, in the hope of regaining his impaired health, but died at Marseilles in August of the same year. Wolf's fame rests chiefly upon his *Prolegomena ad Homerum*, published at Halle in 1795. In this work he traced the history of the Homeric poems from about B.C. 950, the date at which he placed the maturity of Ionic poetry, to the time of Pisistratus

WOLVES AND WILD DOGS



1. **AZARA'S DOG** (*Canis Azaræ*).
2. **COYOTE** (*Canis latrans*).
3. **CAPE HUNTING-DOG** (*Lycaon pictus*).
4. **MANED WOLF** (*Canis jubatus*).
5. **GRAY WOLF** (*Canis lupus*).
6. **DINGO** (*Canis dingo*).

(about B.C. 550), and endeavored to show that the *Iliad* and the *Odyssey* as we now have them have been materially changed from their original form, and that they are made up of separate poems, not all by the same author, but he did not deny the existence of a personal Homer, as has often been stated. This view is not entirely original with Wolf, as many of his arguments had been anticipated by Giambattista Vico (whose work, however, was not known to Wolf), and by Robert Wood, but he was able to enforce his theory with many new arguments drawn from the scholia of the Venice manuscript of Homer, which had been published by Villoison in 1788. The *Prolegomena* called forth a storm of criticism and attack, and the Homeric question, as the question of 'one or many Homers' came to be called, easily overshadowed all other philological discussions of the last century. (See HOMER.) Although many of Wolf's arguments, especially his principal argument based upon the age of writing in Greece, have been seriously weakened by later discoveries, the book remains of fundamental importance for the student, and the minute examination of the Homeric writings which the *Prolegomena* called forth has been of inestimable value for the knowledge and appreciation of the poems.

Aside from the *Prolegomena*, and editions of Homer (*Iliad*, Halle, 1794; *Iliad* and *Odyssey*, Leipzig, 1804-1807), Wolf's works include an edition of Demosthenes's speech *Against Leptines*, with an introduction and a commentary (1789); editions of Plato's *Symposium* (1782); Hesiod's *Theogony* (1783); selections from Lucian (1791); the history of Herodian (1792); Cicero's *Quæstiones Tusculanæ* (1792; 4th ed. 1825); Cicero's speeches *Post Reditum in Senatu*, *De Domo Sua ad Pontifices*, *De Haruspicum Responsis*, and *Pro Marcello* (1801)—wrongly regarded as spurious by Wolf; *Suetonius* (1802); and selected dialogues of Plato—the *Euthyphro*, *Apology*, and *Crito* (1812 and 1820). His editions of the *Clouds* of Aristophanes (1812) and a part of the *Acharnians* (1811) are accompanied by a translation. Other works include: *Geschichte der römischen Litteratur* (1787); *Vermischte Aufsätze in lateinischer und deutscher Sprache* (1802); *Litterarische Analekten*—a periodical, with interesting sketches of English philologists (Berlin, 1817-1820). Several of his writings were published after his death—so his *Vorlesungen über die vier ersten Gesänge von Homers Ilias*, edited by Usteri (1830-31); *Encyklopädie der Philologie*, by Stockmann (1831; 2d ed. 1845); *Darstellungen der Altertumswissenschaft*, by Hoffmann (1839); and *Consilia Scholastica*, by Föhlisch (1829-30). A collection of Wolf's minor works was published by Bernhardy (Halle, 1869). Consult: Pattison, *Essays* (Oxford, 1889); Hanhart, *Erinnerungen an Friedrich August Wolf* (Basel, 1825); Körte, *Leben und Studien Friedrich August Wolfs, des Philologen* (Essen, 1833); Arnoldt, *Friedrich August Wolf in seinem Verhältnisse zum Schulwesen und zur Pädagogik* (Brunswick, 1861-62); Bernays, *Goethes Briefe an Wolf* (Berlin, 1868); Bursian, *Geschichte der klassischen Philologie in Deutschland* (Munich, 1883).

WOLF, HUGO (1860-1903). An Austrian composer, born at Windischgraz, Styria. After studying at the Conservatory in Vienna, he became musical critic for the *Wiener Salonblatt*. Attacked by a serious nervous disease, he was taken to a sanitarium in Vienna, in 1896, and died there. He composed *Penthesilea*, a symphonic poem; *Fenerreiter*, a choral work; *Der Corregidor*, a comic opera; and *Manuel Vanegas*, an opera which he left unfinished; but it was especially as a writer of songs that he made his mark. He published *Goethe-Lieder*, *Möricke-Lieder*, *Spanisches Liederbuch*, and *Italienisches Liederbuch*. For his biography, consult Haberlandt (Leipzig, 1903) and Decsey (Berlin, 1903).

WOLFBERRY. See SNOWBERRY.

WOLF-DOG, or WOLFHOUND. A kind of dog used for hunting the wolf. One breed, now almost extinct, was the old Irish wolfhound. Another formerly abundant in Norway and Sweden is now almost exclusively found in Spain, into which it is supposed to have been introduced by the Goths. It is of large size, with pointed nose, erect ears, long silky hair, and a very bushy tail curled over the back. In color it is mostly white, with large clouds of tawny color or brown. Similar characteristics belong to the Russian wolfhound or borzoi. See GREYHOUND, and Plate of DOGS.

WOLFE, CATHERINE LORILLARD (1828-87). An American philanthropist, born in New York City. After the death of her parents she devoted her life to works of charity and philanthropy, on which she expended about $200,000 annually. She gave large sums to Grace Church and Saint Luke's Hospital, New York City, Union College, and the American School at Athens; founded a home for incurables at Fordham, N. Y., and a newsboys' lodging house in the lower part of New York City; supplied the funds for Dr. Ward's archæological expedition to Asia Minor; and gave to the Metropolitan Museum of Art a valuable collection of paintings, together with an endowment of $200,000 for its preservation and enlargement. For descriptions of this collection, consult *The National Magazine*, vol. xviii. (New York, 1891), and *The Art Journal*, vol. xli.

WOLFE, CHARLES (1791-1823). An Irish clergyman and poet. He was born at Blackhull, County Kildare, Ireland. He was educated at the Abbey High School, Winchester, England, and at the University of Dublin, where he received a scholarship in 1812 and took his degree of bachelor of arts in 1814. During this period he was actively employed as a tutor, and also composed the greater part of his poetry. His celebrated lines on *The Burial of Sir John Moore* were written in 1816, and soon afterwards found their way into the newspapers. Their author was at first unknown. After qualifying himself to take orders in 1817, Wolfe became curate of Ballyclog, in the County of Tyrone, from which he was shortly transferred to the larger parish of Donoughmore. He died of consumption on February 21, 1823. His literary *Remains*, consisting chiefly of sermons and a few poems, were published with a memoir in 1825 by the Rev. John A. Russell.

WOLFE, JAMES (1727-59). A British general, born at Westerham, in Kent, January 2, 1727. He was the son of General Edward Wolfe, an officer of merit and distinction under Marlborough and Prince Eugene. James at an early age evinced a strong inclination for his father's profession of arms. After a brief period of study at a school in Greenwich, he obtained his father's consent to participation in the Cartagena expedition of 1740, but was prevented by sickness from carrying out his intentions. The following year he received a second lieutenant's commission in his father's regiment. His services thereafter were brilliant, and his rise rapid. Ensign in 1741, two years' service in Flanders and Germany, during which he was present at the battle of Dettingen (1743), secured for him first an adjutancy, then a first lieutenancy, and finally, in 1744, a captaincy. He fought against the Young Pretender in 1745-46, sharing both in the defeat of Falkirk and in the victory at Culloden. Returning to Flanders, he took a notable part in the battle of Laffeld, July 2, 1747. He became major in 1749 and lieutenant-colonel in the following year. In the mismanaged expedition against Rochefort in 1757 Wolfe acted in the capacity of quartermaster-general of the force. The attention of Pitt was now first particularly drawn to him as an officer of whom, in any enterprise intrusted to him, great things might be expected. The high opinion thus formed of him was confirmed in the year following, when he was intrusted with the command of a brigade in the expedition against Louisburg, under General Amherst. On June 8th he effected a landing at Freshwater Cove, in the face of a heavy fire from the enemy. The successful siege of Louisburg followed. Wolfe's skill, boldness, and activity were quite clearly understood, and he became popularly known as 'the hero of Louisburg.' Pitt was now organizing his grand scheme for the expulsion of the French from Canada, and the expedition which had for its object the capture of Quebec, the enemy's capital, was confided to the care of Wolfe. On February 17, 1759, Wolfe, advanced to the rank of major-general, set sail from England, and on June 27th landed on the Isle of Orleans, some four miles below Quebec. His forces numbered about 9000 men, including six companies of New England troops, while the French strength comprised a garrison of 2000 men in Quebec and 14,000 men, of whom only a small part were regulars, at Beauport, below the town. From the Isle of Orleans and from Point Levi, on the right bank of the Saint Lawrence, which he occupied on June 30th, Wolfe began the bombardment of Quebec, while part of his forces were sent across to the left bank of the river, where they faced the French across the small stream of the Montmorenci. On July 31st Wolfe delivered a frontal attack on the French intrenchments at Beauport, his grenadiers advancing to the assault in boats, while the forces on the left bank were ordered to cross the Montmorenci and take the enemy in flank. The movement failed and the British were compelled to retire with the loss of 400 men. This setback, combined with his chronic ill health, brought discouragement to Wolfe; he determined to strike a decisive blow. It was then that Wolfe decided upon the desperate expedient of crossing the river and scaling the heights above the town. At 2 o'clock on the morning of September 13th the landing of the British troops began at a point now known as Wolfe's Cove. The French sentinels were surprised, and before the day broke 4500 men with two guns had climbed the steep heights and were drawn up on the Plains of Abraham, about a mile from Quebec. About 10 A.M. they were attacked by Montcalm, who had at his disposal a force equal to the British, but of inferior training. The French lines were shattered by the British fire and broke; Wolfe, as he led the charge, was struck thrice, the last time in the breast. He was compelled to lie down, and while the pursuit was still on he died. Consult: Wright, *Life of Major-General James Wolfe* (London, 1864), the best biography; Bradley, *Wolfe* (London, 1895), in "English Men of Action" series; Allison, *Memoir of Wolfe* (London, 1899), in "Twelve English Soldiers" series; and Parkman, *Montcalm and Wolfe* (Boston, 1892).

WOLFENBÜTTEL, vôl′fen-bụt′el. A town of the Duchy of Brunswick, Germany, on the Ober, 7 miles south of Brunswick (Map: Germany, D 2). The famous seventeenth-century ducal library, with 300,000 volumes and 8000 manuscripts, containing mementos of Luther and of Lessing, once its librarian, has been housed in a spacious building completed in 1886. An old castle with a notable tower, a theatre, the house in which Lessing wrote *Nathan der Weise*, now a museum, a gymnasium, seminary, and normal schools are the other prominent buildings and institutions. Iron and machine manufactures, copper-smelting, yarn-spinning, and preserving constitute the chief industries. Wolfenbüttel dates from 1046. Population, in 1900, 17,873.

WOLFENBÜTTEL FRAGMENTS. See Reimarus.

WOLFF, vōlf, Albert (1814-92). A German sculptor, born at Neustrelitz, Mecklenburg. He studied under Rauch at Berlin, and his work represents the tendencies of that school in an idealistic direction. His chief works include the figures on the terrace of Sanssouci; "Countess Raczynska as Hygeia," for a fountain in Posen; "Minerva Inciting Combatant to a New Contest" (1853), on the palace-bridge, Berlin; the reliefs on the "Warriors' Monument" (1854) in the Invaliden-Park, ib.; the relief of "Return of the Troops in 1871" (1872), on the monument of victory, ib.; the statue of "Peace" (1878) on the Belle-Alliance Platz, ib.; "Fight with a Lion," on the stairway of the New Museum, ib.; a group of "Bacchus with Cupid and a Panther" (1884), in the National Gallery, ib.; the bronze equestrian statue of Frederick William III. in the Lustgarten, ib.; the colossal statue of Frederick William IV. in Königsberg, and a number of allegorical statues decorating the university building in that city.

WOLFF (or **WOLF**), Christian (1679-1754). A German philosopher. He was the successor of Leibnitz in the series of Cartesian philosophers, and did much to complete and develop Leibnitz's system, whence his school is often called the Leibnitz-Wolffian school. He was born at Breslau. He studied at Jena, and from 1703 to 1706 taught mathematics and philosophy at Leipzig. In 1707, on the recommendation of Leibnitz, he became professor of mathematics and natural science in Halle, where he acquired great fame. In 1723 he was banished from Prussia by a Cabinet order, on the ground that his teachings were fatalistic and atheistic. He received an appointment at the University of Marburg; but in 1740 he was restored by Frederick the Great, and was welcomed in Halle with the greatest enthusiasm. From this time he devoted himself to authorship, and produced a long line of voluminous books. He died at Halle. Without special genius or originality, he performed great service as an organizing and systematizing philosopher. He created a distinctly German philosophy. He divided philosophy into ontology, cosmology, psychology, and natural theology. He accepted Leibnitz's theory of morals, though he would not carry the preëstablished harmony to the length of denying a natural interaction of soul and body. He held fast to Leibnitz's optimism and determinism. His great principle was that of the 'sufficient reason.' In theology, he admitted the possibility of revelation and miracles, but so restricted them by rational principles that he substantially denied them. Consult Watcke, *Wolff's eigene Lebensbeschreibung* (Leipzig, 1841). See Philosophy.

WOLFF, Emil (1802-79). A German sculptor, born in Berlin, where he became the pupil of his uncle, Gottfried Schadow, at the age of fifteen. In 1822 he proceeded to Rome, where, barring several visits to Greece and to Berlin, he henceforth remained and yielded entirely to the influence of Thorwaldsen. Having on the death of his cousin, Rudolf Schadow, assumed the responsibility for the latter's unfinished commissions, he executed in marble Rudolf's group of "Achilles and Penthesilea" for the royal palace in Berlin. Of his own compositions, for which he chose the subjects chiefly from Greek mythology and from the ideal genre, the most noteworthy are: "Midas as Judge," relief (1825); "The Fisherman" (1833); "Telephos Nursed by the Hind;" "Hebe and Ganymede" (1834); "Thetis Bringing to Achilles the Arms Forged by Vulcan" (1835); "Cupid with the Club and Lion's Skin of Hercules" (1836); "Prometheus with the Fire in the Reed" (1844); "Victory Teaching the Youth the History of the Heroes" (1846, Palace-bridge, Berlin); "Achilles at the Grave of Patroclus" (1854); "Jephtha and His Daughter" (1858); "Psyche After Cupid's Flight;" "Judith" (1868, National Gallery, Berlin). Among his busts and statues of celebrated persons the best are those of Thorwaldsen, Niebuhr, Bunsen, Winckelmann, and Palestrina.

WOLFF, Julius (1834—). A German poet and novelist, born at Quedlinburg. After studying philosophy and literature in Berlin, he took charge of his father's manufactory at Quedlinburg. Unfavorable circumstances causing his withdrawal from business, he founded, in 1869, the *Harzzeitung.* In 1870-71 he took part in the Franco-German War and then settled in Berlin, devoting himself exclusively to his literary labors. Besides the cycle of war lyrics *Aus dem Felde* (1871, 3d ed. 1896), glorifying the events of 1870-71, he produced a number of lyric and humorous epics and novels, of a clever archaic flavor. His epics and other poems are entitled: *Till Eulenspiegel Redivivus* (1874, 23d ed. 1896); *Der Rottenfänger von Hameln* (1876); *Der wilde Jäger* (1877); *Tannhäuser, ein Minnesang* (1880); *Singuf, Rattenfängerlieder* (1881); *Lurlei*, a romance (1886); *Die Pappenheimer* (1889); *Renata* (1892); *Der fliegende Holländer* (1892); *Assalide. Dichtung aus der Zeit der provenzalischen Troubadours* (1896); and *Der fahrende Schüler* (1900); while his novels include: *Der Sülfmeister* (1883); *Der Raubgraf* (1884); *Das Recht der Hagestolze* (1887); *Das schwarze Weib* (1894); and *Die Hohkönigsburg* (1902). Consult Ruhemann, *Julius Wolff und seine Dichtungen* (Leipzig, 1886).

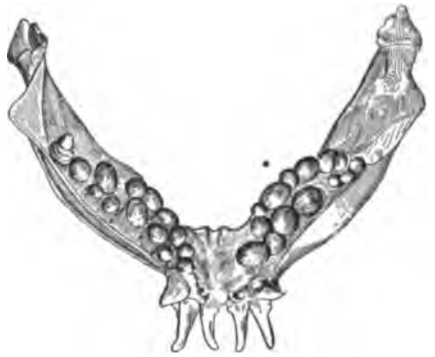
WOLFF, Kaspar Friedrich (1733-94). A German anatomist and physiologist, born in Berlin and educated there and at Halle. During the Seven Years' War he was actively employed in the Silesian hospitals. Unable to establish himself in Germany, in 1766 he accepted an appointment in the Academy of Sciences at Saint Petersburg, making that city his residence for the remainder of his life. Wolff will be remembered for combating, at the age of twenty-six, in his "Theoria Generationis," the preformation (q.v.) views then prevalent. But it was not until after Wolff's death that he obtained proper recognition through the translations of Meckel and the writings of Oken. His chief works are: *Theoria Generationis* (1759; German trans., *Theorie von der Generation*, Berlin, 1764); *De Formationne Intestinorum* (1768; trans. into German by Meckel as *Ueber die Bildung des Darmkanals im bebrüteten Hühnchen*, Halle, 1812). Many of his unpublished writings are preserved as manuscripts in the library of the Saint Petersburg Academy.

WOLFF, Wilhelm (1816-87). A German sculptor and bronze-caster, born at Fehrbellin. At fourteen he began work in the Royal Iron Foundry at Berlin, studying modeling with Professor Wichmann, and was granted a Government stipend to perfect himself in bronze-casting at Paris and Munich. Upon his return to Berlin he established a foundry of his own, which soon became famous for animal figures. Devoting himself exclusively to modeling, he produced a number of animal groups, remarkable for free naturalistic treatment. Among the best known examples are a "Bulldog with Her Young;" the "Dying Lioness," in the Tiergarten, Berlin; and a "Boar attacked by Dogs," at Grunewald, near Berlin.

WOLFFIAN BODY (named in honor of Kaspar Friedrich Wolff). One of the pair of excretory organs that is functional in the adult of many fishes and of Amphibia; the 'mesonephros.' In reptiles, birds, and mammals the Wolffian body is a purely embryonic structure, being replaced in the adult by the permanent kidney of those groups, the 'metanephros.' In the tailed Amphibia, where the organ is typically developed, there are two, one lying on each side of the dorsal part of the body-cavity as elongated structures richly vasculated and having each an efficient (the Wolffian) duct passing back to the cloaca. In the male the ducts leading the sperm from the testes enter the Wolffian body and connect with the Wolffian duct. Consult Field, "Development of the Pronephros and Segmental Duct in Amphibia," in *Bulletin of the Museum of Comparative Zoölogy*, vol. xxi. (Cambridge, Mass., 1891).

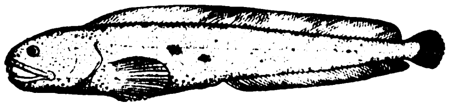
WOLFFIAN BOTTLE. A form of apparatus used for washing gases, that takes its name from the English chemist Peter Wolff. It consists usually of a glass bottle with three separate openings or mouths on the neck. The gas which it is desired to wash enters through a tube, which extends to the bottom of the purifying material and then bubbles up and passes out through another tube, which enters the mouth on the opposite side of the bottle. The opening in the centre, which during the operation is usually kept closed, is used to introduce the liquid required for washing or to regulate the pressure. For manufacturing purposes Wolffian bottles of a large size are employed, and in many operations a number of them are placed side by side.

WOLF-FISH. A large, carnivorous, grayish fish (*Anarrhichas lupus*) of the North Atlantic, of little use as food, but noted for its voracity and ugliness. It reaches a length of four or five feet. The mouth is large, opens obliquely, and is furnished with formidable teeth; the sides of the lower jaw have very strong front teeth, big canines, and tubercle-like molars which shut against coarse molars on the palatines. This dentition is adapted to crushing mollusks and sea-urchins. It bites savagely when caught, and fishermen therefore generally dispatch it as soon as possible by knocking it on the head. It is often very destructive to nets. It is much used in Iceland, both fresh and salted; and a kind of shagreen, used for bags and pouches, is made of its thick skin.



LOWER JAW AND TEETH OF WOLF-FISH.

There are other species of the genus in the North Atlantic and Pacific oceans, one of which (*Anarrhichas lepturus*) is well known in Alaskan waters. Another Pacific coast species is the curious 'wolf-eel' (*Anarrhichthys ocellatus*). These fishes compose the family Anarrhichadidæ, and are closely related to the blennies.



ALASKAN WOLF-FISH.

WÖLFFLIN, vẽlf′lĭn, EDUARD (1831—). A German classical philologist and lexicographer, born at Basel, in Switzerland; professor at the University of Munich since 1880. He is especially known for his contributions to the knowledge of colloquial Latin and for his long-continued and successful efforts to inaugurate a complete scientific lexicon of the Latin language. To further the latter plan, he established in 1880, with the aid of the Bavarian Academy of Science, the *Archiv für lateinische Lexikographie und Grammatik*, and under his direction a collection of lexicographical material was begun. Later the Royal Academies of Berlin, Leipzig, Göttingen, Munich, and Vienna united in support of the plan for a complete thesaurus of the Latin language. A commission was appointed to carry forward the collection of material and later to edit the work, and in 1900 the first part of the work appeared. Wölfflin's publications consist of a large number of articles in various scientific journals, especially in his own *Archiv*. Among his other important works are: *Antiochus von Syrakus und Cœlius Antipater* (1872); *Lateinische und romanische Komparation* (1879); editions of Ampelius, Cæcilius Balbus, Polyænus, Publilius Syrus, etc.

WOLFRAM. A name sometimes applied to the element tungsten (q.v.).

WOLFRAMITE (from Ger. *Wolfram*, from *Wolf*, wolf + *Ram*, *Rahm*, froth, cream, soot). A mineral iron-manganese tungstate crystallized in the monoclinic system. It has a submetallic or resinous lustre, and is red to dark brown or dark gray in color. It occurs associated with tin ores in quartz and with galena, pyrite, and sphalerite. It is found in Saxony, in France, in Cornwall, England; in Bolivia, South America; and in the United States at Monroe and Trumbull, Conn.; Ouray County, Colo.; the Black Hills, S. D.; Lincoln, N. M.; Mecklenburg County, N. C.; and Saint Francis County, Mo. A variety consisting almost entirely of manganese tungstate, known as *hübnerite*, is found in Colorado, Nevada, and Montana. See TUNGSTEN.

WOLFRAM VON ESCHENBACH, vôlf′räm fôn ĕsh′*en*-bäG (c.1165-c.1220). The greatest of Middle High German epic poets. He was born at Eschenbach, near Ansbach, in Bavaria, and passed his life chiefly at the Court of Hermann, Landgrave of Thuringia, where he was associated in friendly rivalry with Walther von der Vogelweide (q.v.) and is supposed to have taken part in the poetical contest of the Wartburg (q.v.). He tells us that he could neither read nor write. This made him an independent thinker and gives him a place between the courtly and the popular poets of his day, with less respect for traditions of vocabulary and syntax and a greater mastery of language and startling metaphor than either. His thought is clear and deep, his humor unfailing, his grasp on life strong. He begins his literary production with *Dawn-Songs* (*Tagelieder*) of love in the Provençal manner, but he soon bade farewell to these exquisite trifles to deal with great spiritual questions in *Parzival* (between 1200 and 1210) and *Willehalm*. The subjects are French, but the treatment is German. *Parzival* (see PERCEVAL), adapted from Chrestien de Troyes, gave to the saga of the Grail its final form and contains much shrewd criticism of chivalry and Court life. On it Richard Wagner based the supreme effort of his musical genius. *Willehalm* is in the main historical and philosophic, with charming scenes of household joys and wedded love. Two fragments of another epic, *Titurel*, are dubiously attributed to Wolfram. No work of the poets of his period is more instinct than his with the ideals and aspirations of chivalry at its best.

Wolfram's *Works* were edited by Lachmann (Berlin, 1833; 5th ed. 1891); *Parzival* and *Titurel* best by Bartsch (2d ed., Leipzig, 1875-77). Of *Parzival* there are modernized versions by Simrock (6th ed., Stuttgart, 1883); San-Marte (Halle, 1886), who has written also a volume of *Parzival-Studien;* Bötticher (2d ed., Berlin, 1893), and Hertz (Stuttgart, 1898). There is also an admirable English version by Jessie Weston (London, 1894). Consult: San-Marte, *Leben und Dichten Wolframs von Eschenbach* (Magdeburg, 1836-41); Bötticher, *Die Wolframlitteratur seit Lachmann* (Berlin, 1880); id., *Das Hohelied vom Rittertum* (ib., 1886); Sattler, *Die religiösen Anschauungen Wolframs von Eschenbach* (Gratz, 1895); Panzer, *Bibliographie zu Wolfram von Eschenbach* (Munich, 1897).

WOLF'S-BANE. See Aconite.

WOLLASTON, wṳl′*as*-ton, William Hyde (1766-1828). An English chemist and physicist. He received his general education and studied medicine at Cambridge. After practicing as a physician at Bury Saint Edmunds, he removed to London; but being beaten by Dr. Pemberton in a competition for the post of physician to Saint George's Hospital, he determined thenceforth never to write a prescription, "were it for his own father," but to devote himself wholly to scientific investigation. His researches were prosecuted over a wide range of sciences, but were preëminently fruitful in chemistry and in optics. Besides important work in connection with the atomic theory, his name is connected with the discovery of palladium and rhodium and with a method of making platinum malleable, which rendered the metal useful as it is. His contributions to optics are not less important. He was the first to observe the dark lines of the solar spectrum, which were later rediscovered independently and explained by Fraunhofer. Wollaston also made many valuable observations on the refraction of light and invented an apparatus for measuring the refractive power of solids. His most valuable inventions were the *camera lucida*, which has since proved perfectly indispensable in microscopic work, and the reflecting goniometer, an apparatus used for determining the geometrical form of crystals. The results of his research work were published, partly in the *Philosophical Transactions*, partly in the *Annals of Philosophy*. Personally Wollaston was reserved and distant, and he carried on his investigations in extreme seclusion.

WOLLASTONITE (named in honor of William Hyde *Wollaston*). A mineral calcium silicate crystallized in the monoclinic system. It has a vitreous lustre, and is white, gray, yellow, red, or brown in color. It occurs in granular limestone and in regions of granite as a contact formation, or in ejected masses in connection with basalt and lava. It is found in Finland, Norway, Sweden, the Harz, Italy, Portugal, Ireland, and in the United States at various localities in New York, Pennsylvania, and Michigan.

WOLLE, Joseph Frederick (1863—). An American organist and conductor, born in Bethlehem, Pa., of an old Moravian family. His first regular position was as organist of Trinity Episcopal Church, Bethlehem, Pa., his position as organist of the Moravian Church having been assumed October 1, 1885. In 1887 he also became organist of the Packer Memorial Church, Lehigh University, South Bethlehem. It was through his work with the Bach Choir (a full account of which will be found under Bethlehem Music Festival) that he became chiefly known, both at home and abroad. The work of his choir and orchestra during the festival of 1902 gained for him, as their teacher and conductor, an international reputation, the general consensus of critical opinion being that the music of Bach had never before been so effectively and artistically rendered.

WOLLSTONECRAFT, wṳl′stŭn-krăft, Mary. See Godwin, Mary Wollstonecraft.

WO′LOF. An African Negro race. See Yolof.

WOLOWSKI, vô-lôf′skê, Louis François Michel Raymond (1810-76). A French political economist and statesman, born in Warsaw. He was educated in France and took part in the Polish revolution of 1830. He then settled in Paris and founded the *Revue de Législation et de Jurisprudence* (1833). In 1839 he became professor of commercial law in the Conservatoire des Arts et Métiers. In 1852 he founded in Paris the first Crédit Foncier bank; in 1864 became professor of political economy in the Conservatoire; and in 1875 was appointed a life Senator. Among his numerous published works are: *Mobilisation du crédit foncier* (1839); *De l'organisation industrielle de la France avant Colbert* (1842); *Le grand dessein de Henri IV.* (1860); *Les finances de la Russie* (1864); *L'or et l'argent* (1870); and *Résultats économiques du paiement de la contribution de guerre en Allemagne et en France* (1875).

WOLSELEY, wṳlz′lĭ, Sir Garnet Joseph, first Viscount (1833—). A British soldier, born in Dublin County, Ireland, June 4, 1833. He entered the army in 1852, and in the Burmese War of 1852-53 received a severe wound. He was twice wounded in the Crimean War. For his bravery in the latter struggle he was given the cross of the Legion of Honor by Napoleon III. He served as captain in the Indian Mutiny, and as lieutenant-colonel in the Chinese expedition of 1860. He then went to Canada, and in 1870, as commander of the Red River expedition, he suppressed the Riel insurrection at Fort Garry. For this service he was made knight of the Order of Saint Michael and of Saint George. As major-general he commanded the British troops in the Ashanti War, 1873-74. For his 'courage, energy, and perseverance' in these campaigns, he received the thanks of Parliament and a grant of £25,000. In 1875 he was dispatched to Natal to superintend the affairs of the colony; next year he was nominated a member of the Indian Council; and in 1878 he was made high commissioner and commander-in-chief in Cyprus, from which post he was recalled in 1879 in order to proceed to the seat of the Zulu War, with supreme civil and military command in Natal, the Transvaal, and adjacent disturbed territories. He arrived just before the power of the Zulu King was broken at Ulundi, and arranged the terms of peace with the enemy. Thereupon he organized the Government in Zululand. In 1882-85 he was adjutant-general. His victory over Arabi Pasha (q.v.) at Tel-el-Kebir, in Egypt, September 13, 1882, raised him to the peerage. Again commander in Egypt, 1884-85, he attempted in vain to relieve Khartum, where Gordon was besieged, the place falling into the hands of the Mahdi just as Wolseley's advance reached the vicinity; nevertheless his able service in the Sudan campaigns won him the rank of viscount. In 1890 he became commander-in-chief of the troops in Ireland, and in 1895 of the British Army. This last position he resigned in 1900 in favor of Lord Roberts. His principal writings are: *Soldier's Pocketbook for Field Service* (1882); "Narrative of the Red River Expedition," in *Travel, Adventure, and Sport* (1889); *Life of John Churchill, Duke of Marlborough* (1894); *The Decline and Fall of Napoleon* (1895). Consult Low, *Memoir of Sir Garnet Joseph Wolseley* (London, 1878).

WOLSEY, wṳl′zĭ, THOMAS (1475?-1530). A famous English cardinal and statesman. He was born at Ipswich, in Suffolk, of parents not very exalted in station, his father having been, according to report, a butcher, though there is evidence of his having possessed some property. He was sent, at the early age then usual, to Oxford, where he entered Magdalen College, and graduated at fifteen. He was selected fellow of his college about 1497, and ordained priest in the spring of the following year. He was appointed master of the college school soon after. In 1500 the Marquis of Dorset, three of whose sons he had educated, presented him to the living of Limington in Somerset. His career from this time was marked by a steady rise. Besides receiving two other benefices, he became chaplain to Archbishop Deane of Canterbury, and afterwards to Sir Richard Nanfan, deputy of Calais, who commended him to Henry VII. As royal chaplain he made many friendships at Court, and acquitted himself so well in special embassies to the King of Scotland and the Emperor that he rose still higher. Just before Henry's death he was made dean of Lincoln, and immediately on the accession of Henry VIII., royal almoner. Other ecclesiastical dignities followed, and he took his seat in the Privy Council toward the end of 1511.

From this time the life of Wolsey is in effect the history of England, of which he was the practical ruler. The influence which he exercised in public affairs was such as has seldom been enjoyed by a subject. After holding for a short time the deaneries of Hereford and York, he was appointed Bishop of Tournay, which had just fallen into the hands of the English, though he never actually obtained possession of the see. In the spring of 1514, however, he became Bishop of Lincoln, and six months later he was translated to the Archbishopric of York. His foreign policy favored the alliance with France, and gradually led the young King away from the Emperor. His position in Europe was recognized by his nomination as Cardinal by Leo X. in September, 1515; and before the year was out he was made Lord Chancellor in Warham's place. The revenues derived from his various offices were of princely magnitude, and they were further enlarged by subsidies from foreign potentates, anxious to conciliate his favor. He did not bear his honors meekly; in his manner of life he affected a sumptuous magnificence, and his bearing was arrogant and imperious. He openly aspired to be Pope; and there seemed more than once ground for supposing that this crowning object of his ambitions was actually within his reach. He became the direct representative of the Papacy in 1518, as legate *a latere* in conjunction with Cardinal Campeggio, and this position was afterwards prolonged indefinitely, with increased powers.

His purpose in cementing the alliance with France was not to commit England exclusively to that country, but to put her in such a position that she should control the fate of Europe. In 1521, accordingly, circumstances having changed, we find him acting as commissioner for the King in negotiating an offensive and defensive alliance with Charles V. against France. He was obliged to side with the war party in the Council, and the measures which he took to raise money caused him to be very unpopular with the nation at large. Such a man, in fact, could not but have many enemies, eager, as occasion might offer, to discredit him with the King; and the occasion came when the King set his heart on divorcing Queen Catharine and marrying Anne Boleyn. Wolsey was definitely hostile to the King's project, and his negotiations with the Pope for securing his consent to the divorce were conducted, it seemed to Henry, in a half-hearted manner. In 1527 he set out for France as the King's ambassador, and concluded a number of treaties with Francis I. at Amiens. But during his absence Henry's displeasure was carefully fanned, and the disgrace of the once powerful Minister was accomplished. In 1529 Wolsey was stripped of all his honors and driven with ignominy from the Court. A bill of attainder was passed against him in the House of Lords, though it was thrown out in the Commons. He retired to Esher, a house belonging to the Bishopric of Winchester which by this time he had acquired, and lived in seclusion until he received orders to go to his diocese of York. He moved slowly toward Yorkshire, but on the way was arrested by the Earl of Northumberland at Cawood on a charge of high treason. Less than a month afterwards (November 29, 1530), as he was being conveyed toward London in custody, he died of dysentery at the Abbey of Leicester.

The faults of Wolsey are obvious; but his pride, ambition, and luxury were counterbalanced by not a few redeeming qualities. He was generous and affable to his dependents, not a few of whom remained faithful to him, at considerable risk, in his misfortunes. Of learning he was a liberal and enlightened patron; the endowment of Christ Church, Oxford, which he had designed to call Cardinal College, is a monument of this. He was a man of large capacity, and on the whole a faithful, conscientious, and salutary counselor to the monarch who so long entirely trusted him. Consult, besides the State papers of the period, which are condensed in Brewer, *Reign of Henry VIII. from His Accession to the Death of Wolsey* (London, 1884), Creighton, *Cardinal Wolsey* (ib., 1888); Gairdner, "The Fall of Cardinal Wolsey," in *Transactions of the Royal Historical Society* (ib., 1899); and Taunton, *Cardinal Wolsey* (London, 1900); and the contemporary *Life* by Cavendish, as edited by H. Morley (3d ed., ib., 1890).

WOLTER, vôl'tẽr, CHARLOTTE (1834-97). A noted German actress, one of the great tragic actresses of modern times. She was born at Cologne and began her career in Budapest. Then she joined a traveling company, played at the Carltheater in Vienna, and from 1859 to 1861 was engaged at the Victoriatheater in Berlin. The sensation created there by her impersonation of Hermione in *A Winter's Tale* led in 1862 to a permanent engagement at the Hofburgtheater in Vienna, of which henceforth she constituted one of the chief ornaments. From the rich repertory at her command may be singled out as her best rôles: Adrienne Lecouvreur, Maria Stuart, Lady Milford, Messalina, Iphigenie, Sappho, Medea, and Lady Macbeth.. In 1874 she married Count O'Sullivan de Grasz (d.1888).

WOLTMANN, vôlt'mân, ALFRED (1841-80). A German art-historian, born at Charlottenburg. After studying in Berlin and Munich, he was appointed professor of art-history, successively at the Polytechnicum in Karlsruhe (1868), and at the universities of Prague (1874) and Strassburg (1878). Besides his principal work, *Holbein und seine Zeit* (2d ed. 1874-76), he wrote *Die deutsche Kunst und die Reformation* (2d ed. 1871), *Die Baugeschichte Berlins* (1872), *Geschichte der deutschen Kunst in Elsass* (1876), *Die deutsche Kunst in Prag* (1877), and *Aus vier Jahrhunderten niederländisch-deutscher Kunstgeschichte* (1878). Conjointly with the author he adapted the fifth volume of Schnaase's *Geschichte der bildenden Künste* for the second edition (1872), and with Woermann began a *Geschichte der Malerei* (1878), completed after his death by his collaborator.

WOLVERHAMPTON, wu̧l'vẽr-hăm'tŭn. A manufacturing town in Staffordshire, England, 13 miles northwest of Birmingham (Map: England, D 4). On the south and east are coal mines, ironstone pits, blast furnaces, forges, rolling mills, and foundries. Its chief manufactures are tin-plate and japanned goods, enameled hollow wares, locks and keys, edge tools, iron braziery and galvanized iron goods, gas and water tubes, cables and railway fastenings, and iron-foundry goods of many kinds. The town possesses an exchange, an agricultural hall for the use of farmers and corn dealers, a spacious cattle market, a market hall, and a commodious and handsome town hall. Saint Peter's Church, built in the fourteenth century and recently restored, is a stately edifice. The municipality owns the water supply, electric lighting plant, tramways, markets, and refuse and sewage disposal works, and maintains free libraries, a school of art, and an art gallery. Originally called Hanton or Hamtune, the town was named Wilfrunahamton after Wilfruna, sister of Ethelred II., who founded a college here in 996. During the Civil War it was for a time the headquarters of Prince Rupert. Population, in 1891, 82,660; in 1901, 94,180.

WOLVERINE (probably French-Canadian, from Eng. *wolf*), or CARCAJOU. The largest of the American fur-bearing animals (q.v.) of the family Mustelidæ, and substantially identical with the glutton (*Gulo luscus*) of the Old World. It is bear-like in form, about 40 inches in total length, less than a quarter of which is taken by the tail, and is short-legged and square-headed. In color it is deep blackish brown, with a pale area on the back, and light spots on the throat or chest; legs, feet, and belly nearly black. It is found throughout Canada, the northern Rocky Mountain region, and thence to the Arctic shores, wherever the country is wooded; and is everywhere regarded by the trappers and Indians as the most powerful, cunning, and diabolical of creatures, because it disturbs and robs their traps and breaks into their caches and lodges. It is no wonder that its qualities were exaggerated into the fanciful tales told of the animal in Europe, as stated under GLUTTON. In reality the wolverine is simply, to use Dr. Coues's phrase, an uncommonly large, clumsy, shaggy marten, of great strength, and displaying great perseverance and sagacity in procuring food where the supply is limited or precarious. It is imperfectly plantigrade, unable to climb trees, lives in dens or burrows, and does not hibernate. It feeds upon carcasses of large animals when it finds them slain, but does not destroy such creatures itself, its ordinary prey being small, a fox heavy with pups, or nursing a litter in her burrow, being about the largest of its victims. It is a notorious thief, not only of stores of meat and fish, or of the baits and captives in traps, but of articles of no positive service to itself; and it exhibits extraordinary cunning in escaping destruction by the various methods designed to kill or capture it. Consult: Coues, *Fur-Bearing Animals* (Washington, 1877). See Plate of FUR-BEARING ANIMALS.

WOLVERINE STATE. Michigan. See STATES, POPULAR NAMES OF.

WOLZOGEN, vôl'tsō'gen, ERNST, Baron (1855—). A German novelist and playwright, born at Breslau. He studied philosophy, German literature, and art-history at Strassburg and Leipzig, and in 1901 established a so-called "Ueberbrettl," a kind of variety show for the performance of lyric and minor dramatic poems, vocal recitals, and pantomimes, partly by the authors and composers themselves. A moderate adherent of the modern realistic tendency in literature, he kept aloof from its pessimistic and erotic perversities, and, endowed with keen power of observation, has proved a humorist in the best sense of the word. A partial list of his writings includes: *Um dreizehn Uhr in der Christnacht* (1879 and often); *Immaculata* (1881); *Heiteres und Weiteres* (1886); *Basilla, ein Thüringer Roman* (1887); *Blau Blut* (1888-91), a cycle of novels; *Erlebtes, Erlauschtes und Erlogenes* (1892); *Die Entgleisten* (1894); *Ecce Ego!* (1895); *Die Erbschleicherinnen* (1895); *Der Kraft-Mayr* (1897); *Das dritte Geschlecht* (1899); several successful comedies; and the critical essays *George Eliot* and *Wilkie Collins* (1885).

WOLZOGEN, HANS, Baron (1848—). A German author, born at Potsdam, brother of the preceding. He studied philosophy and philology and settled in 1878 at Bayreuth as editor of the *Bayreuther Blätter*, founded by Richard Wagner. He wrote: *Der Nibelungenmythos in Sage und Litteratur* (1876); *Poetische Lautsymbolik* (1876); *Ueber Verrottung und Errettung der deutschen Sprache* (3d ed. 1890); *Unsere Zeit und unsere Kunst* (1881); *Die Religion des Mitleidens* (1883); *Die Idealisirung des Theaters*

(1887); *Grossmeister deutscher Musik* (1897 et seq.); and for the promotion of Wagner-lore: *Erläuterungen zu Wagners Nibelungendrama* (4th ed. 1878); *Richard Wagners Tristan und Isolde* (1880); *Die Tragödie in Bayreuth und ihr Satyrspiel* (5th ed. 1881); *Die Sprache in Wagners Dichtungen* (3d ed. 1889); *Was ist Stil? was will Wagner?* (3d ed. 1889); *Richard Wagners Heldengestalten erläutert* (1886); *Erinnerungen an Richard Wagner;* and *Wagneriana* (1890). He also produced Modern High German versions of *Der arme Heinrich* by Hartmann von Aue (1872), of *Beowulf* (1873), and of the *Edda* (1877), and translations of the tragedies of Æschylus.

WOLZOGEN, Karoline von (1763-1847). A German poet and novelist, born (von Sengefeld) at Rudolstadt, a sister of Schiller's wife, Charlotte. Married in 1784 to Councilor von Beulwitz and separated from him in 1794, she contracted in 1796 a second union with Baron Wilhelm von Wolzogen, a Court official at Weimar and a schoolmate and friend of Schiller's. After 1825 she settled at Jena. Her first novel, *Agnes von Lilien* (1798), published anonymously, was by some attributed to Goethe. At Jena she wrote *Erzählungen* (1826-27) and the novel *Cordelia* (1840), but her most important work is *Schillers Leben, verfasst aus den Erinnerungen der Familie, seinen eigenen Briefen und den Nachrichten seines Freundes Körner* (1830; 5th ed. 1876), a faithful portrayal of the poet, based upon personal observation.

WOMAN HATER, The. (1) A burlesque, the earliest known play of Beaumont and Fletcher, printed anonymously in 1607. (2) A novel by Charles Reade (1877) on the unsanitary conditions of English villages.

WOMAN IN WHITE, The. A novel by Wilkie Collins (1860). The plot deals with the complications arising from the resemblance between the heroine and a wandering mad woman, clad in white, whom the villainous Count Fosco confines and finally murders, after having used her as a tool to destroy the prosperity and happiness of the lovers of the story. Count Fosco is finally killed by another member of an Italian secret society to which he has been unfaithful.

WOMAN KILLED WITH KINDNESS. A tragedy by Thomas Heywood, produced in 1603, printed in 1607, on the story of a faithless wife, who dies broken-hearted after the generous treatment of her husband.

WOMAN'S CHRISTIAN TEMPERANCE UNION. A well-known organization which had its origin in the great temperance crusade of 1874. When the force of that remarkable uprising had been spent, and reaction was felt, a call was issued from Chautauqua in August, signed by Mrs. Mattie McClellan Brown, Mrs. Jennie Fowler Willing, Mrs. Emily Huntington Miller, and others, summoning a national convention of temperance women to be held in Cleveland, Ohio, November 17, 1874. Sixteen States were represented at the convention. Now there are State and Territorial organizations in every State and Territory in the United States. (See World's Woman's Christian Temperance Union.) The conditions of membership in the W. C. T. U. are signing the total abstinence pledge, and paying annually into the treasury of the local union a sum of not less than fifty cents. Part of the money is retained for local work, and a part is used for auxiliary fees to State, national, and world's unions. The total paid membership in the United States in 1902 was 160,736. New York State has the largest paid membership, numbering about 25,000, and Pennsylvania stands second. The badge of the society is a bow of white ribbon. The motto is "For God and Home and Native Land." Trysting hour is at noon, when white-ribboners all over the world lift their hearts in prayer that God will bless the temperance cause. Mrs. Annie Wittenmeyer was the first president of the national society. Miss Frances E. Willard (q.v.) succeeded her in 1879. She held the position until her death in 1898. To Miss Willard's leadership and broad conception of the work the Woman's Christian Temperance Union is indebted for its 'Do Everything' policy. The Woman's Christian Temperance Union is the largest society of women in the world, managed and controlled by them. Its work is carried on by means of departments, under six general heads: Organization, preventive, educational, evangelistic, legal, and social. In addition to the departments there are two branches, the Young Woman's Branch and the Loyal Temperance Legion Branch.

Following is a list of the departments, under their proper groupings: (1) Organization: Organizers, Lecturers and Evangelists; Young Woman's Branch; Loyal Temperance Legion Branch; Work Among Foreign Speaking People; Work Among the Colored; Work Among the Indians. (2) Preventive: Health and Heredity; Non-alcoholic Medication. (3) Educational: Scientific Temperance Instruction; Physical Education; Temperance Literature; Presenting Our Cause to Influential Bodies; Temperance and Labor; Parliamentary Usage; W. C. T. U. Institutes; the Press; Anti-Narcotics; School Savings Banks; Kindergarten; Medal Contests. (4) Evangelistic: Evangelistic and Almshouse; Unfermented Wine at Sacrament; Proportionate and Systematic Giving; Penal and Reformatory, including Police Station Work; Work Among Railroad Employees; Work Among Soldiers and Sailors; Work Among Lumbermen; Work Among Miners; Sabbath Observance; Mercy; Purity; Rescue Work; Purity in Literature and Art. (5) Social: Social Meetings and Red Letter Days; Flower Mission; Fairs and Open Air Meetings. (6) Legal: Legislation; Christian Citizenship; Franchise; Peace and International Arbitration.

In pursuance of the 'Do Everything' policy, the Woman's Christian Temperance Union has come to stand not only for total abstinence, but for an equal standard of purity for men and women, or, as Miss Willard put it, for "a white life for two," and for woman's equality in the home, the Church, and the State. Under the leadership of Mrs. Mary H. Hunt, of Boston, every State in the Union has enacted legislation providing for the teaching of physiology and hygiene in the public schools, with especial reference to the effects of alcoholics and narcotics. Similar legislation has been passed by Congress providing for such instruction in the Territories, in all schools under national control, and in all naval and military academies. Laws raising the age of consent have been passed in twenty-seven States as the result of the work of the Woman's Christian Temperance Union. The representative of the National Woman's Christian Temperance Union at Washington, D. C., Mrs. Margaret Dye Ellis, aided by local and State societies, helped greatly in securing the passage of the Anti-canteen Law. Mrs. Ellis was influential also in securing the law prohibiting the sale of liquor and firearms to the native races in the Pacific islands. Quarterly temperance lessons for the Sunday schools, in the international series, have been secured by the Sunday-school department. The headquarters of the National Woman's Christian Temperance Union are at Rest Cottage, the former home of Miss Willard, at Evanston, Ill.

WOMAN'S COLLEGE OF BALTIMORE. An institution for the higher education of women, in Baltimore, Md., founded in 1885 and opened in 1888, under the auspices of the Methodist Episcopal Church. Its courses lead to the degree of Bachelor of Arts, for which work equivalent to fifteen hours a week for four sessions is required. The group system is followed and over half the work is elective. Physical training is required. Two fellowships are conferred annually for the encouragement of university study abroad; two tables are maintained at the United States Biological Laboratory at Woods Hole, Mass., and a table is in part supported at the Naples station. Instruction in art and music is provided, but only for students taking academic work, and these courses are not counted toward the degree. Applicants are accepted on certificate from college preparatory schools and from approved high schools. The student attendance in 1903 was 356, the faculty numbered 24, and the library contained 10,000 volumes. The college has nine buildings, valued with the grounds at $618,000. The total value of property under the control of the college was $1,063,000; its endowment was $445,000, and its income $65,000.

WOMAN'S RELIEF CORPS. A woman's patriotic society organized in July, 1883, and known as an auxiliary to the Grand Army. The society is composed chiefly of the mothers, wives, daughters, and sisters of Union soldiers of the Civil War, although all loyal women, no matter whether they are related to a war veteran or not, are eligible to membership. The organization, like the Grand Army, is divided into departments, of which there are 35, and into smaller divisions called corps, of which there are 3106, with a total membership of 144,387. The society has expended upward of $2,000,000 in the carrying out of its charities among the widows and orphans of Union veterans. It meets simultaneously with the Grand Army. A somewhat similar organization, known as the Ladies of the Grand Army, is composed of the wives, mothers, daughters, sisters, blood-kin nieces, and all lineal descendants of soldiers and sailors of the Civil War; but army nurses may be admitted to membership.

WOMAN'S SUFFRAGE. The movement in favor of granting suffrage to women is one phase of the demand for equal political, industrial, and educational opportunities for women, which was brought into prominence by the economic changes of the nineteenth century.

A few early writers discussed the position of women. Plato in the *Republic* proposed that they should have the same education as men and do the same work, being 'lesser men.' The Christian religion raised woman's position by recognizing individual rights, but it stigmatized her as the sufferer of Eve's sins. Paul's discourses condemned her to silence. Monkish literature symbolized her as man's temptress. Yet even in the Middle Ages equal rights for women were now and then advocated, as by Cornelius Agrippa (1509); Ruscelli (1552); Anthony Gibson (1599); and later Paul Ribera and Count Ségur. In 1696 De Foe suggested an institution for the better education of women. Women themselves have prophesied and written in all ages. In the fourteenth century, Christine of Pisa and Margaret of Angoulême attained distinction. The eighteenth century was especially favorable to women writers, and France developed many talented women. Political theorists, however, did not advocate power for women. Montesquieu would give them freedom in a monarchy, since luxury is desirable, but he thought their freedom dangerous to a republic. Rousseau, inconsistently with his principle of universal suffrage, does not give the ballot to women. Comte teaches the natural subordination of women, and their inferiority in everything except a spontaneous expansion of sympathy and sociality. Schopenhauer describes women as big children, examples of arrested development. An exception to prevailing views was the philosophy of Condorcet, who urged that women should be granted the same rights as men. The French Revolution developed the idea of individual rights, but all petitions from women were ignored. It was in 1790, however, that Mary Wollstonecraft published the *Vindication of the Rights of Women.*

As early as 1647 Margaret Brent, the executor and representative of Lord Baltimore, demanded a seat in the Assembly of Maryland. Abigail Adams, the wife of John Adams, and Mary Otto Warren asked that women should be recognized in the Constitution, and Hannah Lee Corbin protested against taxation without representation. Under the first Constitution of New Jersey, by an inadvertence, women could vote from 1776 to 1807. Various causes led to the discussion of woman's position: (1) interest in the property rights of married women; (2) the lectures of Frances Wright (1820); (3) interest in temperance; and (4) the anti-slavery struggle. At an early date an effort was made to modify property laws. Lucy Stone and Henry Blackwell influenced legislation in Massachusetts from 1845 on. A bill was introduced in New York in 1836, but was not passed until 1848. Anti-slavery associations were disturbed by the 'the woman question.' Attempts were made to silence the Grimké sisters and Abby Kelley, and the American women delegates were refused admission to the World's Convention in 1840. William Lloyd Garrison and Wendell Phillips were always strong supporters of the cause.

The year 1848 was an important date in the woman's suffrage agitation, as in all efforts for political rights. The first woman's suffrage convention was called in Seneca Falls, July 19, 1848. Mrs. Elizabeth Cady Stanton, Lucretia Mott, Martha C. Wright, and Mary A. McClintock were prime movers. A declaration of sentiments and a statement of civil and political disabilities were made. The second convention met at

Salem, Ohio, in April, 1850, the third at Worcester, Mass., in October, 1850, and thereafter a convention was held every year until the Civil War. In 1852 an agitation for dress reform was started, and the wearing of the bloomer costume was a proof of allegiance to the cause. Woman suffragists were ridiculed, and accused of being advocates of free love, easy divorce, and the amalgamation of races; but a few prominent men—Horace Greeley among them—treated the question with respect.

The societies of the Civil War developed women's organizing powers. The Loyal National League got up a mammoth petition to have the Constitution prohibit slavery. No suffragist conventions met during the war, and interest in negro suffrage after the war frequently drew attention from the woman's cause. The Kansas campaign divided the suffragist supporters. In 1869 two national associations were formed. In May, in New York, the National Woman's Suffrage Association, with Susan B. Anthony and Elizabeth Cady Stanton as leaders, was organized. This association met in Washington every winter until 1890. In November, in Cleveland, the American Woman's Suffrage Association was organized with Lucy Stone, Julia Ward Howe, and such men as William Dudley Foulke, George F. Hoar, and Henry B. Blackwell as leaders. The two associations were finally united into the National American Woman's Suffrage Association in 1890. In 1892 Mrs. Stone and Mrs. Stanton were made honorary presidents; Miss Anthony remained as the active president until 1900, when she was succeeded by Mrs. Carrie Chapman Catt.

Methods of Work. The adoption of the Fourteenth Amendment introduced the word 'male' into the Constitution of the United States. In 1869 Francis Minor argued that women were enfranchised by this amendment. A number of women accordingly voted in 1872. Miss Anthony was arrested. Mrs. Virginia L. Minor was refused a vote in Saint Louis. She brought suit and the case was decided against her on March 29, 1875. Up to this time women had demanded a declaratory act from Congress. Since then Congress has been petitioned to submit a sixteenth amendment. The 200 petitions of 1900 represented millions of individuals. The Forty-eighth Congress had a select committee on woman's suffrage. There have been eleven favorable Congressional reports (five from the Senate and six from the House). Committees of women have regularly appeared before the Congressional committees, and in 1902 representative foreign women, who could vote, added their protest.

Beginning with the Democratic convention of 1868, an important work of the association has been to request the indorsement of an amendment by political conventions. Only once have women been permitted to address a Republican convention—in Cincinnati in 1876. The Republican resolutions of 1872 and 1876 expressed mild approval of women's progress. In 1896 a plank favored their entrance into wider spheres. Women delegates from Utah and Wyoming sat in the conventions of 1892 and 1900. Women have twice spoken at Democratic conventions: in Saint Louis (1876) and Cincinnati (1880). In 1900 Mrs. Cohen of Utah, as a delegate, seconded Bryan's nomination. Although women served as delegates and as speakers and were mentioned in the preamble to the platform, the Populists refused to support their cause. Some State and county conventions, however, declared for woman's suffrage. The Prohibition Party always had a suffrage plank until 1896. The Greenback, Labor, and Socialist parties have declared for equal suffrage. Labor organizations, including the Knights of Labor and the American Federation of Labor, have generally been favorable to woman's suffrage.

Within the States efforts are made by legislation, amendments, or in new Constitutions to secure recognition for women, and also to urge laws needed for women. Some of the older States have strong woman suffrage associations and many equal rights and political equality clubs. The Southern States have been organized by woman suffragists only since 1890. Women have secured full suffrage in Wyoming (1869), Colorado (1893), Utah (1870-1887 as Territory; 1895), and Idaho (1896); municipal suffrage in Kansas (1887); school suffrage, varying in extent, in 25 States; suffrage on questions of tax levies in Louisiana (1898); and on bond issues in Iowa (1894). Amendments have been submitted and campaigns fought in Kansas (1869, 1894), Michigan (1874), Nebraska (1882), Oregon (1884, 1900), Rhode Island (1886), Washington (1889, 1898), South Dakota (1890, 1898), and California (1896). The only backward steps have been an adverse decision of the Supreme Court of Washington Territory in 1888, and the taking away of school suffrage from second-class cities in Kentucky.

During the New York campaign of 1894 an Anti-Suffrage Association was organized in Brooklyn. Another followed at Albany, and after a convention a State association was formed. Signatures to negative petitions are secured, claiming that women already have enough responsibilities. A Massachusetts State organization of anti-suffragists was formed in 1895; one in Illinois in 1897; one in Oregon in 1899; and one in Victoria, Australia, in 1900. Massachusetts also had a 'Man's Suffrage Association' in 1895 to protest against women's voting.

Foreign Countries. In England Jeremy Bentham early recognized the injustice of the law toward women, but he considered prejudices too strong to be combated. Bailey, in the *Rationale of Political Representation* (1835), advocated equal rights. In 1850 an article in the *Westminster Review* occasioned much interest. John Stuart Mill's *Subjection of Women* is the most powerful essay on the subject. He himself in Parliament in 1857 advocated the enfranchisement of women; and during the seventies the subject was debated every year. During the eighties, English women organized a number of leagues for coöperation with men: the Primrose League (1883), the Woman's Liberal Federation (1885), and the Woman's Liberal Unionist Association (1888), thus demonstrating their interest in politics. Women in England, Scotland, and Ireland can now vote in all except Parliamentary elections. Property laws were modified in 1882 and 1893. Women have full suffrage in New Zealand, the Isle of Man, Pitcairn Island, South Australia, and West Australia. Under the new Federal Constitution of Australia women may vote. In Canada, Cape Colony, and Tasmania women have municipal suffrage.

Woman suffragists are not active on the Continent, but women possess different degrees of voting power. In France, women teachers vote for members of boards of education, and since 1898 women in commerce vote for judges of tribunals of commerce. The Code Napoléon is not favorable to women. In Sweden women enjoy liberal laws and vote in all elections except those for representatives; indirectly they vote for members of the House of Lords. In Norway women have school suffrage. Russian women, as householders, vote for all elective officers and on local matters. They also manage their own property. In Finland women have voted for election officers. In Siberia women have municipal suffrage. Women property-owners vote by proxy on certain questions in Westphalia, Schleswig-Holstein, Brunswick, and Saxony, and also in Bohemia, Moravia (in municipal matters), and Austria-Hungary. In Croatia and Dalmatia they vote in person at local elections. Widows in Italy with property vote by proxy for members of Parliament. Women taxpayers of Belgium, Luxemburg, and Rumania have municipal suffrage by proxy. The Social-Democrats at the convention of 1890 and 1891 declared for full sex equality, and in 1892 they allowed women to choose delegates, thus recognizing them as integral factors in the party.

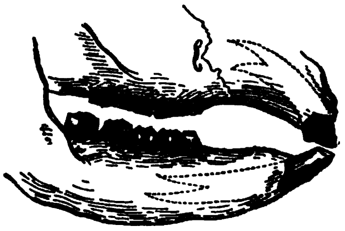
In 1888, at the suggestion of Mrs. Stanton and Miss Anthony, the International Council was called to celebrate the twentieth birthday of the National Woman's Suffrage Association. Delegates came not as individuals, but as members of associations. National councils were formed in different countries, and at the meeting in Chicago in 1893, 17 had been organized, including Persia, Australia, Greece, and Austria. A meeting was held in London in 1899. In foreign countries the movement is tentative.

BIBLIOGRAPHY. *History of Woman's Suffrage*, by Susan B. Anthony et al. (vol. i. 1881; vol. ii. 1882; vol. iii. 1886; vol. iv. 1902); Files of *Woman's Journal;* Elizabeth Cady Stanton, *Eighty Years and More* (New York, 1898); Mary Putnam Jacobi, *Common Sense Applied to Woman's Suffrage* (New York, 1894); Theodore Stanton, *Woman Question in Europe* (ib., 1884); Lecky, *Democracy and Liberty*, ch. x. (ib., 1896); Stopes, *British Free Women* (ib., 1894); Plons and Bartels, *Das Weib* (Leipzig, 1887); Buecher, *Die Frauenfrage im Mittelalter* (Tübingen, 1882).

WOMAN'S VETERAN RELIEF UNION. A patriotic society that admits to membership mothers, wives, widows, sisters, daughters, and granddaughters of soldiers, sailors, or marines of the Union Army who are eligible to the Union Veteran Union (q.v.), of which organization it is an auxiliary society similar to the Woman's Relief Corps.

WOMB. See UTERUS.

WOMBAT (from *womback*, *wombach*, the Australian name). One of the Australian marsupials of the phalanger family and genus Phascolomys, resembling in form a miniature bear or large blunt-nosed woodchuck, the best known species of which is *Phascolomys wombat*. It is two or three feet long, plump, with a thick coat of long, grayish brown, coarse, woolly hair; the head large, flat, broad, with small eyes and ears, the upper lip cleft; the feet plantigrade; the tail very short. The incisors are two in each jaw, long, and chisel-like; they are hollow at the base, and continue to grow as they are worn away; there are no canine teeth; and the molars are five on each side in both jaws; there is a wide gap between the incisors and the molars.



DENTITION OF THE WOMBAT.

It is nocturnal in its habits, slow in its motions; feeds on vegetable substances, and digs up roots with its claws; makes its abode in holes among rocks, or in burrows dug by itself. It produces three or four young at a birth. It is a creature of little intelligence, but gentle, and easily domesticated to a certain extent. Its flesh is preferred to that of any other quadruped of Australia, as it is generally fat, and in flavor resembles pork. The hairy-nosed wombat (*Phascolomys latifrons*) is easily recognized by the silky fur, hairy muffle, and greater curvature of the incisors. The third species (*Phascolomys platyrhinus*) is yellowish brown and the largest of the group. Wombat remains have been found in recent bone-caves in Australia. See Plate of PHALANGERS AND DASYURES.

WOMBWELL, wo͞om′wĕl. A coal-mining town in the West Riding of Yorkshire, 4½ miles southeast of Barnsley (Map: England, E 3). Population, in 1901, 13,252.

WOMEN. In law, women have always enjoyed certain privileges and immunities and been under certain disabilities which are a curious intermingling of the ideas of protection and of subjection to man. Under the common law marriage changed the legal status of a woman completely, but modern statutes generally have abolished most of the disabilities of *coverture.* (See HUSBAND AND WIFE.) To-day, in most States, both married women (*feme covert*) and spinsters enjoy practically equal property rights with men. This is true also of the right to enter into binding obligations or contracts. Women are liable for both their crimes and torts. Statutes sometimes make certain distinctions in their favor, as, for example, women are usually exempt from civil arrest. They have not been generally accorded the privilege of exercising the elective franchise, but enjoy freedom from jury duty and military service. They may sue and be sued in all States. Consult Blackstone's commentaries; Parsons on *Contracts*; HUSBAND AND WIFE, and authorities there referred to.

WOMEN, EDUCATION OF. Among Oriental nations generally little or no attention is paid to the education of women. The Chinese women of the wealthier classes may receive some literary training, but it is given privately. Intellectual ability and learning in women are esteemed, but not commonly striven for. In India, on the contrary, excepting among the Parsis (q.v.), it is thought improper for any except the dancing women to be able to read and write. In general, we find no regular provision for literary education of females until we come to the Occident. The Spartans provided physical exercise for girls in public gymnasiums similar to those prescribed for boys. The Athenian girls received no education outside of the home. The ideal woman was the prudent housewife. In the age of Pericles we find a group of women of literary culture appearing. They were the so-called hetæræ (q.v.) and were typified by Aspasia. As they were not wives and mothers, their ideas of instruction for women cannot be said to have prevailed at Athens. At no time did the schools of Athens provide for female education. Plato, who saw no essential difference between the natures of man and woman, planned the same education for both sexes in his ideal republic. At Rome, however, the education of women was mostly carried on at home or under private tutors. In some cases girls attended the *ludus* or primary schools, but the higher schools were exclusively for boys.

The Christian conception of education as a preparation for the future life implied the necessity of education for women as well as for men. Saint Jerome advocated the ascetic idea of female education and advised women to learn to read the Scriptures. The sister of Saint Benedict, called Sister Scholasticus, established a conventual order that paid much attention to education. The Renaissance gave a decided impulse to women's education. Polite learning became a social accomplishment, and as desirable in women as in men. There was, however, no extensive movement for the establishment of schools for girls. Women were taught by many of the leading masters of the period, and there were many notable women teachers—some even occupying chairs in the universities of Italy and Spain.

Luther urged the elementary education of both girls and boys, and advised the employment in such schools of women as teachers. The German *Volkschule* adopted the first of these ideas, but it was not until the nineteenth century that women were employed to any extent in teaching. A seminary for training women to teach was established at Münster in 1830. To-day in Germany about ten per cent. of the normal schools are for women, and a still larger proportion of the elementary teachers are of that sex. Higher schools for girls began to exist in Germany at the beginning of the nineteenth century. In 1872 the German Association for the Higher Education of Women came into existence. All teaching positions in secondary schools were in 1894 thrown open to women. In 1893 a gymnasium for girls was established in Karlsruhe, duplicating the instruction given in gymnasiums for boys. In 1896 there were in Prussia 116 advanced elementary schools, and 856 middle schools for girls.

The small amount of education given to most girls in France in the seventeenth century is shown in Fénelon's treatise *De l'éducation des filles*. He advocates literary and historical studies for women. Very little progress was made toward establishing girls' schools before the nineteenth century. Since 1833 the French have aimed to give public elementary instruction to both boys and girls. Indeed, national elementary education everywhere in Europe is for both sexes. In 1880 lycées for girls were decreed, and higher normals were soon established to prepare women to teach in them. A great number of secondary schools for girls sprang into existence, and in 1899 there were 20 lycées, 23 communal colleges, and 69 secondary courses maintained by the State for the education of girls.

In England before the nineteenth century girls were educated by tutors or in small private schools, most of which were of an inferior character. The development of the elementary schools has increased the facilities for the education of poor girls. In these schools both women and men were employed as teachers. In 1871 a National Union for Improving the Education of Women of All Classes was formed. It led to the formation in 1872 of the Girls' Public Day School Company. In 1900 this society conducted 30 schools for secondary instruction.

In the English colonies in America no provision was made for the secondary education of women outside the home. Girls were given instruction in elementary schools and women often taught them. In the nineteenth century, however, in the United States, the opportunities for female education rapidly developed until to-day the State schools provide equally well for both sexes. The first girls' high school was established in 1826. It failed, but was reëstablished in 1852. In the early part of the century an important movement for the establishment of girls' seminaries sprang up.

For the higher education of women, consult the articles on COLLEGIATE EDUCATION FOR WOMEN, and CO-EDUCATION. See also NATIONAL EDUCATION, SYSTEMS OF. Consult: Thomas, "Education of Women," in Butler, *Education in the United States* (Albany, 1900); Lange, *Higher Education of Women* (New York, 1898); Brenner, *Education of Girls and Women* (London, 1897); *Reports of United States Commissioner of Education* (1894-95).

WOMEN IN INDUSTRY. In primitive society men were fishers, fighters, hunters, while women fashioned the hut, gathered and stored the seeds, roots, and fruits, tamed young animals, prepared the meat and skins from the animals slain by men, and made garments and utensils. When the pastoral stage followed immediately on the hunting stage, women's former varied activities were narrowed until only certain duties—those of indoor life and preparing products for home use—remained. Woman was looked upon as the rearer of children, the minister to men's comfort and pleasure, and the producer of domestic necessities, and was made economically dependent. It is of special interest that among savage tribes where women were as efficient food producers as men they held respected positions.

Woman's work through historic times has, however, been dependent upon the class to which she belonged. The principal wives of chiefs were the first to be relieved of all labor. The middle class show more clearly the changes of the centuries. In the lowest class even in the twentieth century, among barbarians as well as among European peasants, women undertake heavy manual labor. As long as a large portion of necessary articles were made by men in the homes or on a small scale, women supplemented household duties by aiding in weaving, sewing, and dairying. The factory system and the improvements of the nineteenth century have changed the household from a centre of production to one merely for consumption. These changes have had a momentous effect on woman's economic position. Women have now two important economic functions in the industrial world: (1) as buyers and (2) as producers. The invasion of the domestic sphere by factory-made products has made every woman a buyer. The importance of this function has only recently been recognized. Many women have also entered the field of production, and their number continues to increase. In 1835 only seven industries were open to women besides domestic service in the United States. The census of 1900 makes a return of 303 separate occupations, in only eight of which are there no women workers.

The introduction of machinery created a demand for the cheap labor of women. In 1816 there were 66,000 women spinning; in 1860, 65 per cent. of those employed in textile work were women. American and English women of the lower classes, both married and unmarried, entered factories. A large number filled positions as domestic servants, more servants being required as the country grew richer. This work soon fell into the hands of foreigners—Irish, Germans, Swedes, who in turn filled the factories. The steps have been from the kitchen to the factory, and then to shops. Women of the middle class were also forced into industrial life. The rising standard of living made it impossible for men to support so many idle women; the same reason made the prospect of marriage uncertain, especially in England and Eastern America, where women are in excess; and above all, by the new methods, women at home were deprived of their occupations. These women became dressmakers, teachers, and clerks. The Civil War was an important agent in determining the future of many women, as it left them dependent upon themselves. Among the well-to-do one class, stimulated by the spirit of the age, has made demands to enter business and the professions. From these women arose the cry for equal rights, equal education, and equal opportunities. The members of the other class, as the result of freedom from labor, have either become economic parasites, or they are using their freedom to improve social conditions.

Prejudice has met the efforts of women to enter the professions and higher positions; but the development of business from 1880 to 1900 has opened many positions in the clerical forces necessary for large establishments. The extension of the factory system to food, clothing, and laundry has increased the demand for women workers.

The extent to which women are employed in productive pursuits is shown by the census of 1900, when there were 5.329,807 engaged in gainful occupations (to 23,956,115 males), distributed as follows: 2,099,165 in domestic service; 980,025 in agriculture, of whom 665,791 are agricultural laborers; 1,315,890 in manufacture; 503,574 in trade and transportation; and 431,153 in the professions. There were 344,948 dressmakers; 335,711 laundresses; 277.972 textile workers; 149,256 saleswomen; 86.158 stenographers; 34,132 retail dealers; 74,186 bookkeepers and accountants; 85,269 clerks; and 22,556 telephone and telegraph operators. In higher positions were found 253 bankers; 45 brokers; 1271 officers of banks; 2883 manufacturers and officials of companies; 153 builders and contractors; and 261 wholesale dealers. Some of the unusual employments of women were: 154 boatmen and sailors; 879 watchmen, policemen, and detectives; 85 bootblacks; 1320 hunters; 2 motormen; 13 street car conductors; 31 brakemen; 7 steam car conductors; 2 roofers; 126 plumbers; 45 plasterers; 167 brick and stone masons; 241 paper hangers; 1759 painters; 545 carpenters; 41 mechanics; 193 blacksmiths; 571 machinists; 3370 workers in iron and steel; 800 brass workers; 1775 workers in tin; 100 lumbermen; 113 wood-choppers; 373 sawmill employees; 440 bartenders; 2086 saloon-keepers; 906 draymen; 324 undertakers; 177 stationary engineers and firemen; 1947 stock-raisers; 409 electricians; 84 civil engineers; 3 mining engineers; 11 surveyors; 248 chemists; 21 stevedores; 78 longshoremen; and 5582 barbers.

The objections to women in industrial life are: (1) theoretical—the proper place for a woman is in a home, supported by a man; (2) their willingness to accept low pay; (3) the bad conditions under which they are frequently forced to work, with the resulting injury to health; (4) injury to morals, from working with men, subordination to men, and temptations accompanying freedom; (5) competition with men, depriving men of their occupations, lessening their respect for women, and frequently making them dependent upon women; and (6) demoralization of the home when married women with young children are employed. The advantages urged are the training resulting from industrial life under social rather than personal relations; the development of technical skill and the utilization of special abilities; the breadth of view obtained from contact with men; the moral training of self-support; and the importance of economic independence. Among the reasons for woman's low wages are: her position as a new economic factor; her low standard of living; her frequent partial support; the insufficiency of her equipment, often due to the expectation of marriage; the restricted field of employment and the exclusion from gainful occupations; her anomalous political position; her lack of trade organization; protective factory legislation, limiting her when in competition with men; her loss of time through illness; and her traditional inferiority.

In England and on the Continent many women are employed in factories, domestic service, low-grade teaching positions, and low-paid Government positions in the post-office, telegraph offices, and as clerks. In England and Belgium agricultural courses are being provided. In Austria and other parts of Europe many women are day laborers. In France women assist their husbands and many have been successful in commerce. In Germany and Denmark women are being organized.

Congresses have been held to consider women's work.

BIBLIOGRAPHY. Mason, *Woman's Share in Primitive Industry* (New York, 1900); Veblen, *Theory of the Leisure Classes* (New York, 1899); Stetson, *Women and Economics* (New York, 1898); Campbell, *Women Wage Earners' Bibliography* (Boston, 1893); *Eleventh Annual Report of the United States Commissioner*

of Labor; Massachusetts Labor Bulletins; International Congress of Women (1899); "Women in Industrial Life," *Chautauquan* (October, 1897); *Political Science Quarterly*, xv.; *Economic Journal*, i. England: *Reports of Royal Commissions* (1832, 1863); Collet, *Educated Working Women* (London, 1902). See Domestic Service; Industrial Revolution; Labor Problems.

WOMEN'S CLUBS. Organizations of women which originated after the Civil War as an outcome of the new demand for coöperation and popular education, and which from 1880 to 1900 became a characteristic feature of woman's activity. Previous to the nineteenth century associations of women were practically unknown. The first in the United States were for religious and charitable purposes, such as the Female Society for the Relief and Employment of the Poor (1798), church societies auxiliary to men's associations, female Bible societies, the American Female Guardian Society (1834), and the Daughters of Temperance (1840-50). The organizations which arose during the Civil War—the Sanitary Commission, the Woman's Loyal League, the Freedmen's Bureau—showed women what they could do. After the war, economic changes long at work had freed the energies of a large class of women for new work. In 1868 Mrs. Croly founded Sorosis (q.v.). This gave the impulse for other clubs. The Woman's Club of Brooklyn was organized in 1869-70. The Association for the Advancement of Women, organized in New York in 1873, decided to stimulate the formation of clubs. Simultaneously with Sorosis the New England Woman's Club was started by Mrs. C. M. Severance, but with the coöperation of men. A horticultural school for girls, a coöperative building association, and a registry for higher employment were undertaken in addition to literary programmes. Mrs. Julia Ward Howe and Mrs. Ednah D. Cheney were prominent members. A correspondence with other clubs was started in 1888. Even older than these large clubs was the pioneer of the reading circle type—the Friends in Council of Quincy, Ill. (1866). Many clubs have grown out of reading circles and classes.

Women's clubs usually are incorporated, and are self-governing and self-supporting. Fees are low in comparison with men's clubs, and the aim is to be democratic. The work of clubs may be summed up as: (1) *Educational;* through classes in history, art, economics, literature; readings, preparation for travel, lectures, and preparation of papers; (2) *Social:* teas and receptions for prominent men and women, and at homes; (3) *Practical:* (a) originating and aiding all kinds of philanthropic movements; (b) civic betterment, sanitary, artistic, and political; (c) educational, for fostering schools, libraries, art galleries, kindergartens, vacation schools, and scholarships for women; (d) legislation, the promoting of laws for the benefit of women and children—factory inspection, child labor, age of consent, police matrons, tenement houses and parks. Women's clubs have started special associations—Housekeepers' Alliance, Legal Aid Societies, Free Bath and Sanitary Leagues; and they have worked with religious associations to aid public schools. An interesting development in Western cities—notably Chippewa Falls, Wis., and Albert Lea, Minn.—is the establishment of town rest rooms for farmers' wives.

There was no effort to unite the various clubs until 1889, when delegates from sixty-one clubs met in New York in response to an invitation from Sorosis, which wished to observe its twenty-first anniversary. At a convention in 1890 the General Federation of Women's Clubs was formed. The Federation began with 63 clubs in seventeen States. The *Woman's Cycle*, which was started in September, 1889, published a directory of clubs. Many club women were interested in the Woman's Department at the World's Fair, in club exhibits, and in the management of different congresses. Out of 5977 speakers at the Fair 1447 were women. The Woman's Congress of Representative Women and the Federation met at the Fair. Biennial meetings of the Federation are held in large cities. Until 1894 the Federation was composed of individual clubs. At that time the State Federation appeared. There were in 1903 4 district federations, 39 State federations, and 763 clubs representing 211,763 women. The question of admitting colored women's clubs has arisen.

Foreign Clubs. In England the club arose out of the emancipation movement. The provision of smoking rooms is typical of the adaptation of men's club life to English women's associations. The Albemarle Club was started in 1874 for both men and women. In 1878 the Somerville Club provided a reading room, library, and lectures for women journalists. Later clubs are the Alexandra (1884), a social centre for 900 women who must be eligible to attend the Queen's drawing-room; the University Club (1887), limited to 300 college graduates; the Pioneer Club (1892) for professional women; the Writers' Club (1892); the Victoria (1894), providing a town home for country members; the Sesame (1895); and various social clubs: the Green Park, Empress, New Victoria, Ilchester, and Sandringham. Many clubs have been started since 1894, the most important of which is Grosvenor Crescent (1896), which is a centre for women's work. Women's clubs exist in Dublin, Bath, Liverpool, and Manchester. The club movement has not progressed on the Continent. East Africa, South America, West Australia, England, and India are represented in the General Federation. Among the clubs are the Girls' Literary Society of Adelaide; the Karra Katta Club of Perth, West Australia; the Eclectic Alumnæ Club of Santiago, Chile, and a club of missionaries at Silendon, East Africa. In India Dr. Emma Brainerd Ryder started several clubs. The first was the Bombay Sorosis, organized in 1889. A Woman's Literary and Scientific Club was started in Mexico in 1897.

Working Girls' Clubs. These were the outcome of the spirit of helpfulness which became manifest in the last twenty years of the nineteenth century. While learning much from women's clubs, these clubs were less spontaneous, more the result of outside influence. In London, the Soho Club and House of 1880, the Club and Working Girls' House, and the Saint Giles Evening Club for Working Girls were among the earliest. Libraries and evening classes, musical drill, safe pleasures, country visits and excursions, are provided, and the Girls' Club Union publishes a magazine. In America the movement began in 1879 with Miss Eliza Turner's New Century Guild in Philadelphia, and Miss Grace H. Dodge's Thirty-eighth Street Club in New York. Some clubs have well-appointed rooms; some are only lunch clubs with resting rooms; some have rooms provided for them in factories; and some have country houses, as for instance, that of the Auxiliary Society of Working Girls' Societies of New York at Miller's Place, Long Island, and others at Saybrook, Conn., and Princeton, Mass. Some clubs, such as the Good Will Club of Amsterdam, N. Y., the Myrtle Club and Progress Club of Baltimore, and the Working Girls' Circle of Jersey City Heights, were started at the initiative of the girls. As a rule, however, the clubs are organized and often officered by women. The Cleo Club, of Durango, Colo., sends traveling libraries and magazines to miners' camps. Junior clubs are sometimes allowed the use of rooms. The New York Association of Clubs maintains a mutual benefit fund for illness and death, other associations have small funds, and all encourage the penny provident stations.

The first convention of girls' clubs held in New York in 1890, was a revelation to the public. Conventions have since been held in Boston in 1894, Philadelphia in 1897, and at the Pan-American Exposition in 1901. In 1897 the National League of Women Workers was formed. There are also five State leagues. A few clubs belong individually to the General Federation of Women's Clubs. The League organ is the *Club Worker*, started in October, 1898. Prominent clubs are: the Clover Club, of Boston; the Fall River Club, of Fall River, Mass; the Far and Near Club, and Ivy Club, of New York City; the Working Girls' Club, of Jersey City Heights; Saint James Guild, Philadelphia; and the Lend a Hand Club, of Germantown.

BIBLIOGRAPHY. List of books and articles in *Chautauquan*, No. 31; current notes on work of clubs in *Harper's Bazar* and New York *Evening Post; Municipal Affairs*, 1898; Croly (Mrs. J. C.); *The History of the Woman's Club Movement in America* (New York, 1898); Miller (Olive Thorne), *The Woman's Club* (United States Department of Labor, Bulletins Nos. 15 and 23); Stanley (Maude), *Clubs for Working Girls* (New York, 1890); *Nineteenth Century*, lxvii. (for American clubs); *Nineteenth Century*, lxv. (English); *Westminster Review*, cliii. (English).

WONDER-BOOK, THE. A series of tales for children by Nathaniel Hawthorne (1851), founded on the most famous myths of classic mythology. The stories are supposed to be narrated by Eustace Bright, and were followed by a second series, the *Tanglewood Tales* (q.v.).

WONDERFUL PARLIAMENT. In English history, a name given to the Parliament which assembled in February, 1388; also called the Merciless Parliament.

WŎNSAN, wŭn'sän' (Sinico-Korean; in Chinese, *Yuen-san;* in Japanese, *Gensan*). A dirty, poorly built, but important town of Korea; situated at the head of the southern arm of Broughton Bay, near the middle of the east coast (Map: China, G 4). The harbor is large, having an area of nearly 40 square miles, and is both deep and well sheltered. The town was opened by treaty to Japanese residence and trade in 1880, and two and one-half years later to other treaty nations. The foreign settlements are on the west shore. Regular steam communication with Vladivostok, Japan, and Shanghai is maintained, and a telegraph line connects the town with Seoul. Population, about 20,000, including foreigners, of whom 2000 are Japanese.

WOOD (AS. *wudu*, *widu*, OHG. *witu*, wood; connected with OIr. *fid*, Welsh *guid*, *gwydd*, Corn *guiden*, Bret. *gwezenn*, wood, tree). Popularly considered, the aggregated tougher portions of the vascular bundles of seed and fern plants. Only the seed-plants yield wood which is of any value as lumber, and among them nearly all the wood of commerce is produced by the conifers and the dicotyledons, the monocotyledons producing comparatively little. In the latter group only the larger bamboos and a few of the palms yield important timber. In the monocotyledons the bundles are not arranged in concentric cylinders, but are scattered through the pith in such a way that there is no 'grain.' In a typical dicotyledon or conifer a transverse section of the stem a short distance below the growing point shows a well-differentiated epidermis and a zone of vascular bundles surrounding the pith, the bundles being separated from each other by plates of parenchyma (pith rays or medullary rays). A section a little farther from the growing point shows the cambium, consisting of actively dividing cells between the wood and bast of the bundles, and also stretching from one bundle to another, so that there is a complete circle of cambium. With the establishment of this circle of cambium, the outer cells of which become differentiated into bast and the inner into wood, the zone of wood or mechanical tissue (q.v.) becomes nearly complete, being interrupted only by the narrow secondary medullary rays.

The wood cells formed in the spring are of larger calibre and often have thinner walls than those formed later in the season, and the larger ducts of many dicotyledons occur in the spring wood. The small-celled tissue of the autumn wood abutting against the larger-celled tissue of the spring wood results in the distinct appearance of the growth rings. In the great majority of cases only one ring is found each year, but if a long Indian summer succeeds a period of rather cool weather a second ring may be formed, just as a second flowering may occur in fruit trees under similar conditions, so that the number of growth rings ('annual rings') may not always indicate the age of the tree. As trees grow older the inner portion of the wood (heart wood or duramen) assumes a characteristic color, as white in holly, yellowish in many pines, brown in walnut, black in ebony, etc. The youngest few years' growth, surrounding the heart-wood and usually lighter in color, is called sap-wood or alburnum.

WOOD, ANTONY, or ANTONY Á WOOD (1632-95). An English antiquary. He was born at Oxford, where the greater part of his life was spent. He studied at Merton College, and devoted his life to the collection of materials for the history of the city and University of Oxford. His first important published work was *Historia et Antiquitates Universitatis Oxoniensis* (1674), which Dr. Fell caused to be put into Latin for publication. The work was so mutilated by the translators that Wood rewrote it in English, but it was not published in this form until one hundred years after his death, by John Gutch, in five volumes under three separate titles—*The History and Antiquities of the Colleges and Halls*, in the University of Oxford (1786); *Fasti Oxonienses, or a Commentary on the Supreme Magistrates of the University* (1790), printed as appendix to the foregoing; and *The History and Antiquities of the University of Oxford* (1792-96). These volumes formed the standard treatise on the subject until very recent years. Hardly less important is Wood's *Athenæ Oxonienses*, a history of notable Oxford graduates from 1500 to 1690 (2 vols., London, 1691-92). A second edition was published in 1721. The Rev. Andrew Clark published *The Life and Times of Antony Wood* (Oxford Historical Society, 5 vols. 1891—; vol. iv. in 1895), containing Wood's autobiography (first published in 1730), and diaries for the years 1657-95. These give the facts of his life in remarkable fullness. The greater part of his books and manuscripts are now to be found in the Bodleian Library.

WOOD, De Volson (1832-97). An American engineer, physicist, and teacher. He was born at Smyrna, N. Y., and was educated at the State Normal School at Albany and at the Rensselaer Polytechnic Institute at Troy, graduating from the latter institution in 1857 with the degree of civil engineer. He taught mathematics in the Normal School, 1854-55, was professor of civil engineering in the University of Michigan, 1857-72, held the chair of mathematics in the Stevens Institute of Technology, at Hoboken, N. J., until 1885, and of mechanical engineering in the same institution until his death. Among his works were: *The Resistance of Materials* (1871); *Bridges and Roofs* (1873); *Elements of Analytical Mechanics* (1876); *Coordinate Geometry* (1879); and *Reaction Motors*. He invented a rock-drill, an air compressor, and a steam pump.

WOOD, Edward Stickney (1846—). An American chemist, born at Cambridge, Mass. He graduated at Harvard in 1867; received the degree M.D. in 1871; and studied physiology and medical chemistry in the universities of Berlin and Vienna in 1872. He was assistant professor of chemistry in the Harvard Medical School during 1871-76, and professor of chemistry after that time. In 1873 he became chemist of the Massachusetts General Hospital, and he also made himself an authority on arsenic and other poisons.

WOOD, Ellen (Price), better known as Mrs. Henry Wood (1814-87). An English novelist, born at Worcester, England. In 1836 she married Henry Wood (d. 1866), a banker and merchant, with whom she lived for twenty years in France. There she began contributing largely to *Bentley's Miscellany* and the *New Monthly Magazine*. In 1867 she became the editor of the *Argosy*, in which appeared her later novels. Her first great success was *East Lynne* (1861), which was followed by about forty long novels and many tales, including *Mrs. Halliburton's Troubles* (1862); *The Channings* (1862); *The Shadow of Ashlydyat* (1863); *Lord Oakburn's Daughters* (1864); *Roland Yorke* (1869); *Within the Maze* (1872); and *Edina* (1876). These novels represent the range of Mrs. Wood's powers from exciting melodrama to the portrayal of every-day life. Consult the *Memorials* by her son, C. W. Wood (London, 1894). Some of these novels had very large sales, particularly *East Lynne*, which also in various dramatized versions was widely successful on the stage in both England and America.

WOOD, Fernando (1812-81). An American politician, born in Philadelphia, Pa., of Quaker parentage. He removed to New York in 1820, received a good education, and engaged in the shipping business, in which he was so successful that he retired with a large fortune in 1850. As a young man he took an active part in politics, and was widely known as a campaign speaker and writer. In 1840 he was elected to Congress and served one term. After his retirement from active business in 1850 he turned his attention to municipal politics, and within a few years his genius for political management and organization was made evident by his complete control of the Tammany Hall machine. In that year (1850) he was the candidate of Tammany for Mayor, but was defeated by a combination of Whig and Know-Nothing votes. In 1854 he was again the Tammany candidate, and was elected, and was reëlected in 1856, but internal strife in the Tammany organization forced him out of its membership, and he gathered his personal followers into a rival organization known as Mozart Hall. As the candidate of Mozart Hall he was defeated in 1858, but in 1860 was elected Mayor for a third term over both the Tammany and Republican candidates. During his last term in office he attracted wide criticism and ridicule by suggesting the secession of New York City at the outbreak of the Civil War and its establishment as a 'free city.' Subsequently he gave his support to the Administration's war policy. He was elected to Congress as a Democrat in 1862, serving continuously until 1877, except for the years 1865-67, which he spent in Europe. He was one of the shrewdest and most ingenious of New York's political bosses.

WOOD, George Bacon (1797-1879). An American physician, botanist, and author. He was born in Greenwich, N. J. After studying in New York City, he graduated at the University of Pennsylvania in 1815, and from its medical school in 1818. He held the chair of medicine at the Philadelphia College of Pharmacy, 1822-31, and of materia medica at the same institution, 1831-35. He was professor of materia medica at the University of Pennsylvania, 1835-50, and of the theory and practice of medicine, 1850-60. He was a successful teacher and a man of large parts and high ideals; and he did much to advance the prestige of the university with which he was connected. After having served as president of the College of Physicians, Philadelphia, for many years, Wood endowed an auxiliary faculty of medicine in the University of Pennsylvania. Among his works are: *A*

Treatise on the Practice of Medicine (1847; 6th ed. 1866); and *A Treatise on Therapeutics and Pharmacology or Materia Medica* (1856). With Franklin Bache he prepared and published *The Dispensatory of the United States* (1833; 17th ed. 1894).

WOOD, Sir Henry Evelyn (1838—). An English general, born at Cressing, Essex. He entered the navy at fourteen years of age, and was present at the siege of Sebastopol, where he served with great distinction. He subsequently entered the British Army as ensign; in 1860 won the Victoria Cross, and in 1862 became major. He fought with great note during the Ashanti War of 1873-74, and received the brevet rank of colonel. In 1874 he was called to the bar in the Middle Temple. He served through the Zulu War of 1879, and commanded in the Transvaal War (1880-81), and served in the expedition to Egypt (1882), receiving the thanks of Parliament. From 1882 to 1887 he was Sirdar or Commander-in-Chief of the Egyptian Army. He was appointed a quartermaster-general to the forces (1893-97), and adjutant-general (1897-1901). He wrote *The Crimea in 1854* (1894) and *Cavalry at Waterloo* (1896).

WOOD, Henry James (1870—). An English orchestral conductor and composer. He received his musical education entirely at the Royal Academy of Music. After 1895 he won for himself a European reputation as the conductor of the Queen's Hall Symphony, and of the Promenade Concerts. He succeeded in bringing his orchestra to a rank with the best organizations of Great Britain. His compositions include: the oratorio *Saint Dorothea* (1889); the comic opera *Daisy* (1890); the operettas *Returning the Compliment* (1890) and *A Hundred Years Ago* (1891); and many songs and instrumental numbers.

WOOD, Horatio Curtis (1841—). An American physician, born in Philadelphia, and graduated in medicine at the University of Pennsylvania in 1862. In 1865 he became established in the practice of his profession as a specialist in therapeutics and nervous diseases. He was professor of botany in the auxiliary faculty of the university, 1866-76; and clinical professor of nervous diseases and professor of therapeutics since 1876. Besides many monographs on acetic ether, nitrite of amyl, ergot, quinine, etc., he has published *Thermic Fever* (1872); *A Treatise on Therapeutics, Materia Medica, and Toxicology* (1874; 7th ed. 1890); *Brainwork and Overwork* (1880); *Fever* (1880); *Nervous Diseases and Their Diagnosis* (1887); and *Syphilis of the Nervous System* (1889). He was the editor of *New Remedies* (New York, 1871-73) and of *Philadelphia Medical Times* (1876-83).

WOOD, James Rushmore (1816-82). An American surgeon, born at Mamaroneck, N. Y. He graduated at the Castleton Medical College in 1834, served there for a short time as demonstrator of anatomy, and then removed to New York City, where after three years he became a member of the medical board of Bellevue Hospital, the administration of which he thoroughly reformed. In 1856 he presented the Wood Museum to the city, and in 1861 he was one of the prime movers in founding Bellevue Hospital Medical College, in which he became professor of operative surgery and surgical pathology. In 1868 he was made professor emeritus. Among his contributions to surgical knowledge was the demonstration of the second growth of bone. He performed several new operations and wrote a number of papers on surgery, including *Strangulated Hernia* (1845), and *Ligature of the External Iliac Artery Followed by Secondary Hemorrhage* (1856).

WOOD, John George (1827-89). An English writer on natural history, born in London. After graduating from Merton College, Oxford (1848), he was employed in the anatomical museum. He was ordained priest in the English Church (1854). From 1869 to 1875 he was precentor to the Canterbury Diocesan Choral Union, whose festivals he conducted with great ability. Widely known for his numerous popular books in natural history, he took up lecturing in 1879. He visited the United States in 1883-84, where he delivered the Lowell lectures at Boston. Among his sixty distinct publications, most of which have little scientific value, are *The Illustrated Natural History* (1851); *Sketches and Anecdotes of Ainmal Life* (1852); *Bees: Their Habits and Management* (1853); *My Feathered Friends* (1856); *The Common Objects of the Country* (1858); *The Natural History of Man* (1868-70); and *Man and Beast* (1874). Consult the *Memoir* by his son, Rev. T. Wood (London, 1890).

WOOD, Leonard (1860—). An American soldier and administrator, born in Winchester County, Vt. He graduated at the Harvard Medical School in 1884, and in 1885 became a contract surgeon in the Regular Army. In the following year he served in the campaign against Geronimo's Apaches. Upon the outbreak of the Spanish-American War he and Theodore Roosevelt organized the regiment of 'Rough Riders,' with Wood as colonel and Roosevelt as lieutenant-colonel. Wood commanded the regiment at Las Guasimas, and afterwards was in charge of one of the brigades of General Wheeler's division in the battle of San Juan Hill. On July 8, 1898, he was commissioned a brigadier-general of volunteers; on the 8th of the following December was promoted to the rank of major-general of volunteers; and on February 4, 1901, he was commisioned brigadier-general in the Regular Army. After the surrender of Santiago (July, 1898) he was put in command of the city, and in the following October was assigned to the command of the Department of Santiago. In the following year he was chosen to succeed General Brooke as Governor-General of the entire island of Cuba. He held that position until the United States formally withdrew from the island. In 1903 he was put in command of a division of the army in the Philippines, and in the same year he was nominated for the rank of major-general in the Regular Army. An account of his administration in Cuba down to January 1, 1901, is contained in *Cuba: Civil Report of General Wood* (Washington, 1901).

WOOD, Thomas John (1823—). An American soldier, born at Munfordville, Ky. He graduated at West Point in 1845; served under General Taylor in the Mexican War, and became captain in the First Cavalry in March, 1855. When the Civil War began he took the side of the Union.

He was made a brigadier-general of volunteers in October, 1861, and commanded a division at Shiloh, in the advance on Corinth, at Perryville, and in the battle of Stone River, where he was severely wounded. Later he commanded a division at Chickamauga, Missionary Ridge, the relief of Knoxville, at Dalton, Kenesaw Mountain, the siege of Atlanta, and Lovejoy's Station, where he was again severely wounded. He commanded the Fourth Corps in the battles of Franklin and Nashville, and in the pursuit of Hood. He was brevetted major-general, United States Army, in March, 1865, and retired from the service in June, 1868.

WOOD, Thomas Waterman (1823—). An American genre painter, born at Montpelier, Vermont. He received an academic education and studied art in Boston under Chester Harding and for several years in Europe. In 1867 he settled in New York and was received as an Academician in 1871. From 1878 to 1887 he was president of the American Water Color Society, and was elected vice-president of the Academy in 1878 and president in 1889. Of his paintings the Metropolitan Museum in New York possesses "The Contraband," "The Recruit," and "The Veteran."

WOOD, William (1580-1639). An English colonist in America. He was born and educated in England. He emigrated to America in 1629, remained in New England several years, and in 1633 returned to England. There he published *New England's Prospect* (1634). This work, containing several curious maps, was the first published account of Massachusetts. It was reissued in Boston in 1764 and 1865, in the latter year by the Prince Society. On his return to America, Wood settled in Lynn, which town he represented in the General Court in 1636. In 1637 he removed to Sandwich, where he was town clerk until his death.

WOOD, Sir William Page, Baron Hatherly. See Hatherly.

WOOD ALCOHOL. See Methyl Alcohol.

WOOD-ANT. The English name of the 'red' or 'hill' ant (*Formica rufa*). It was formerly supposed to occur in the United States, but the American 'red' ant is another species (*Formica exsectoides*). The wood-ant forms large mounds of small sticks and straws and bits of leaves, so arranged as to leave many spaces and contain galleries which penetrate the mounds and the earth below. Paths extend in all directions from the mounds, usually straight toward the object aimed at. Frequently these objects are oak-trees infested by Aphides, for which the ants are constantly in search. Another ant of the family Myrmicidæ (*Myrmica lævinodes*) sometimes lives in perfect harmony with the wood-ant, together with several inquilines (q.v.). The workers have at least two different forms, the large workers carrying the building materials, and the smaller workers searching for honeydew. The mounds are frequently of great age, perhaps a century or more. See Ant.

WOODBERRY, George Edward (1855—). An American poet, critic, and educator, born in Beverly, Mass. He graduated at Harvard in 1877, and became professor of English at the University of Nebraska. In 1878-79 he was on the staff of the New York *Nation* and the following two years was again at the University of Nebraska. Until 1891 he lived at Beverly, engaged in literary work. He was a contributor to the *Atlantic Monthly*, and literary editor of the Boston *Post*. Then he was appointed professor of literature at Columbia University, and in 1899 became professor of comparative literature at the same institution, which position he resigned in January, 1904. His first book was *A History of Wood-Engraving* (1883). This was followed by an authoritative *Life* of Edgar Allan Poe in the "American Men of Letters" series (1885); *The North Shore Watch, and Other Poems* (1890); *Studies in Letters and Life* (1890); *Heart of Man* (1899); *Wild Eden* (1899); *Makers of Literature* (1900); *Nathaniel Hawthorne*, in "American Men of Letters" series (1902); *Collected Poems* (1903); *America in Literature* (1903); and several books privately printed. He also edited *The Complete Poetical Works of Percy Bysshe Shelley* (1892); *Lamb's Essays of Elia* (1892); *The Works of Edgar Allan Poe* (1894), with E. C. Stedman; and *Select Poems of Aubrey de Vere* (1894), besides the "National Studies in American Letters," a series of volumes now in progress, several English classics, and *The Journal of Comparative Literature*.

WOOD BETONY. See Stachys.

WOODBINE (AS. *wudubind*, from *wudu*, *widu*, wood + *bindan*, to bind). A popular name for one of the European honeysuckles (*Lonicera Perichymenum*), and by extension for various other kinds of honeysuckle (q.v.); in America, the Virginia creeper (*Ampelopsis quinquefolia*). See Ampelopsis.

WOOD'BRIDGE, William (1780-1861). An American political leader and Governor of the State of Michigan. He was born at Norwich, Conn.; moved with his father to Marietta, Ohio, in 1791; was admitted to the Ohio bar in 1806; and was elected to the Assembly in the following year. From 1808 till 1814 he was prosecuting attorney of his county, and a State Senator, and was then appointed Secretary of Michigan Territory. In 1819-20 he was Territorial Delegate to Congress; was judge of the Superior Court from 1828 till 1832; was elected State Senator in 1837; was Governor of the State from 1839 till 1841; and was a United States Senator from 1841 till 1847. Consult the *Life* by Lanman (Washington, 1867).

WOOD'BURN, James Albert (1856—). An American educator and historian, born at Bloomington, Ind. He graduated at the Indiana State University in 1876, and from 1878 until 1886 taught in the preparatory department of Indiana University. He was a fellow in Johns Hopkins University in 1889-90; and in 1890 became professor of American history and politics in Indiana University. He lectured at Chautauqua in 1889-91, and at Bay View, Mich., in 1892-94. He wrote *The Causes of the American Revolution* (1891), one of the "Johns Hopkins University Studies;" "The Historical Significance of the Missouri Compromise," in *American Historical Association Reports* for 1893; "Party Politics in Indiana During the Civil War," in the *American Historical Association Papers* for 1902; *The American Republic and Its Govern-*

ment (1903); and *Political Parties and Party Problems in the United States* (1903).

WOOD'BURY. The county-seat of Gloucester County, N. J., eight miles south of Philadelphia, Pa., on the West Jersey and Seashore Railroad (Map: New Jersey, B 4). The principal manufactures are pianos, patent medicines, and glass, including cut glass. The Deptford Institute Free Library here has more than 5000 volumes. The water-works are owned by the municipality. Population, in 1890, 3911; in 1900, 4087.

WOODBURY, Daniel Phineas (1812-64). An American soldier, born at New London, N. H. He graduated at West Point in 1836, entered the artillery, and until 1840 served as assistant engineer in building the Cumberland Road (q.v.). From 1847 to 1850 he was superintending engineer of the construction of Forts Kearny and Laramie, but in 1851 he was recalled to the East. In 1861 he was promoted to be major of engineers and lieutenant-colonel on the staff. He fought at the first battle of Bull Run, and after the retreat of the Federal forces was engaged until March, 1862, upon the defenses of Washington. He then commanded the Engineer Brigade during the Peninsular campaign. From December, 1862, to March, 1863, he participated in the Rappahannock campaign, and at the battle of Fredericksburg he earned the brevet of brigadier-general in the Regular Army. In March, 1863, he was appointed commandant of the district of Key West and the Tortugas, where he died of yellow fever on August 15, 1864. He published works on *Sustaining Walls* (1845) and the *Theory of the Arch* (1858).

WOODBURY, Levi (1789-1851). An American jurist, born at Francestown, N. H. He graduated at Dartmouth College in 1809, and was admitted to the bar in 1812. In 1816 he was elected clerk of the State Senate, and near the close of the year he became judge of the State Superior Court. He was elected Governor of New Hampshire in 1823, and in 1825 was Speaker of the Lower House of the State Legislature. In the same year he was elected to the United States Senate, and soon became closely allied politically with Andrew Jackson. From 1831 to 1834 he was Secretary of the Navy in Jackson's Cabinet, and from 1834 to 1841 was Secretary of the Treasury, being retained in that office by President Van Buren. In 1841 he was again elected to the United States Senate, but resigned in 1845 to become an associate justice of the United States Supreme Court as the successor of Joseph Story (q.v.). His *Political, Judicial, and Literary Writings* were edited by N. Capen (Boston, 1852).

WOODBURY PROCESS. See Photography.

WOOD-CARVING. A very early form of sculpture. While practically unknown in the Babylonian, Assyrian, Persian, and other styles of Western Asia, it was fairly common in very early Egyptian sculpture. Some of the most realistic portrait and genre statues of the Ancient Empire were carved in wood, such as the so-called "Sheikh-el-Beled" and his wife, and a number in the Bulak Museum (now removed to Ghizeh). Wood was a convenient ground for the polychromatic decoration so popular with Egyptian artists.

It was from Egypt that primitive Greek sculpture doubtless derived its first incentive to carve wood, which was probably the earliest form of archaic sculpture. The Dædalian and kindred schools used wood; and its connection with early sacred images led to the preservation of worship of many early wooden statues. The later Greeks and the Romans used it comparatively little, but one of the most remarkable works of early Christian sculpture are the carved wooden doors of Santa Sabina, Rome.

When wood-carving was revived in the eleventh century it was practiced especially in the North of Europe (Scandinavia, Germany, and part of France). The material was not only used in its native simplicity, but was covered with canvas or cloth, stuccoed and painted. Among the earliest Romanesque pieces are colossal wooden crucifixions in the Cluny and Louvre museums. Church furniture employed wood, and in Flanders and Germany especially altar-pieces, triptychs, station reliefs, passion crosses, and other monumental works were multiplied to such an extent that wood-carvings formed the most important part of German sculpture during the fifteenth and sixteenth centuries, and stone sculpture was influenced by it. It came to delight in most wonderfully intricate or realistic details of handling. The art had its great masters, like Wohlgemuth, Veit Stoss, Hans Brüggemann, and Jan Borman, and its centres were Flanders, the Rhine region, and Franconia (especially Nuremberg). In the modern wood-carvers of primitive German districts, such as Tyrol, we find survivals of these old schools.

The Italian Renaissance used wood-carving in very different fashion. Its masterpieces were the elaborate choir stalls, in such superb examples as those at San Pietro, Perugia, at the Cathedral of Orvieto, and at Santa Giustina in Padua. In France it was also the choir stalls and screens that were the masterpieces of the art, as at Rouen, supplemented by carved doors. In Italy, also, minor works of industrial art, such as carved wedding chests, were raised to quite a high artistic level. Occasionally in North Italy (Lombardy and Piedmont) carved wood altarpieces occur, but not often enough to show any general movement in figured carving corresponding to that farther north. One of the specialties in Italy was the carving of elaborate ceilings, such as that of the halls in the Palazzo Vecchio and that of the Laurentian Library at Florence. The carved lecterns of this time are very beautiful as completing the choir decoration.

Consult: Williams, *History of the Art of Sculpture in Wood* (London, 1835); Rogers, *Art of Wood-Carving* (ib., 1867); Hefner-Alteneck, *Ornamente der Holzskulptur* (Frankfort, 1881-82); Lessing, *Holzschnitzereien des 15. und 16. Jahrhundert* (Berlin, 1882); Stockbauer, *Die Holzschnitzerei* (Liepzig, 1887); Bode, *Geschichte der deutschen Plastik* (Berlin, 1887); Metzger, *Handbuch der Holzbildhauerei* (Weimar, 1892); and De Lostalot, *Les arts du bois* (Paris, 1893).

WOOD-CHAT. An African shrike (*Lanius rufus*), frequently seen in Southern Europe.

WOODCHUCK (corruption of *wejack*, *weejack*, from Cree Indian *otchock;* influenced by popular etymology with Eng. *wood*), or Ground-hog. A species of marmot (*Arctomys monax*) inhabiting North America, from Hudson Bay to

South Carolina and west to Nebraska. It is from 15 to 18 inches long, blackish or grizzled above, chestnut-red below; the form thick, the head broad and flat, the legs short and thick, the tail bushy. The hair is rather soft, the whiskers long and stout. This animal digs deep holes in fields, on the sides of hills, or under rocks in woods; its burrow slants upward, so that water may not enter, and within are several compartments. It passes the winter in the burrow, in a lethargic state, going to its hibernation in late September, and often coming out in March, before the snow and cold have ceased, when many starve or freeze to death. The food of the woodchuck is vegetable, and it is particularly destructive to crops of red clover and alfalfa, and to early garden crops. It is easily tamed, and may be fed on bread, milk, and vegetables. Its flesh is usually well flavored and that of young individuals is very good. Consult Stone and Cram, *American Animals* (New York, 1902). See Plate of GOPHERS, ETC.

WOODCOCK (AS. *wuducoc*, from *wudu*, wood + *coc*, cock). The popular name of certain birds closely related to the snipes (q.v.), but of more bulky form and having shorter and stronger legs. The common woodcock of the Old World (*Scolopax rusticola*), well known as a game-bird in Great Britain, and highly esteemed as a delicacy for the table, is found also in all parts of Europe and the north of Asia, and in Japan. Its summer haunts are chiefly the northern pine-forests, and in winter it is chiefly to be found in moist woods and swamps, seeking for worms, snails, and slugs as food, boring with its long bill in the soft ground. The quantity of food which it devours is very great; a single woodcock has been known to consume in a night more earth-worms than half filled a garden pot of moderate size. The woodcock is about 13 inches in length; the upper parts varied with ruddy, yellowish, and ash color, finely intermingled, and marked by large black spots, the lower parts yellowish red, with zigzag lines; the quill-feathers striped with red and black on the edge; the tail-feathers tipped with gray above and white below. The female is rather stouter and larger than the male, and sometimes attains a weight of 14 or 15 ounces. The woodcock makes its nest in warm, dry situations, on the ground, of dead leaves loosely laid together. It lays only three or four eggs of a pale yellowish or reddish brown color.

The American woodcock (*Philohela minor*) is a smaller bird than the woodcock of Europe, being only about 11 inches long, but is very similar in plumage and habits. Three transverse black bands mark the hinder part of the head. It is found in all parts of North America, east of Colorado, and, though migratory in the north, is resident in the south. The eggs differ from those of the European species in being spotted. This is by many regarded as the foremost game bird of America. Its flight is erratic and very swift, so that woodcock-shooting requires much skill; and the flesh is in high repute. The result is that in many parts of the country it has become very scarce. See Plate of BEACH BIRDS.

WOOD'COURT, ALLAN. Esther Summerson's lover in Dickens's *Bleak House*.

WOOD-DOVE. A rather indefinite name applied to many pigeons, as the European turtle dove or the American mourning dove.

WOOD-DUCK, or SUMMER DUCK. An American fresh-water duck (*Aix sponsa*). It is of medium size, and the male is exceedingly handsome. The back is greenish brown, the head green with purplish reflections and marked with considerable white, the breast purplish chestnut, spotted with white, the sides yellowish, finely barred with black, and the belly white. The bill is pinkish and red, the feet orange. There is a crest on the head, and the upper tail coverts and some feathers of the back and sides are elongated to add to the beauty of his appearance. The female is more plainly attired, but is very handsome. In summer these ducks are scattered numerously all over the country, breeding along every stream or pond, and often a long distance from water. The nest is made in a hollow stump or tree, often more than 50 feet above the ground, and the young sometimes jump down, and sometimes are carried in the bills or on the backs of the mother. See Colored Plate of DUCKS.

WOOD-ENGRAVING (XYLOGRAPHY). The most important form of engraving *in relief*, that is to say, with the lines, the figures, or the pattern left in projection, while the background is cut away or 'lowered.' The ink by which the figure or pattern is printed off upon paper or other material is applied to these projecting lines and surfaces and taken thence by the paper; whereas in line engraving, etching, and the like the ink fills the incised lines and is cleared off from the polished surface, except as described in connection with the retroussage. (See DRY POINT; ENGRAVING; ETCHING; LINE ENGRAVING.) The process of engraving in relief is of peculiar importance in connection with printing from movable types, stereotype plates, and the like, because the ink is applied and transferred in exactly the same way. An engraved wood block, or the electrotype made from it, is of precisely the same character as a surface for the printer as is the surface of a page of type, or the stereotype or electrotype plate made from it. Woodcuts can be printed, therefore, with type, the whole page together; whereas when it is desired to print an impression from a line engraving or an etching on the same page with the letterpress, the sheet of paper must pass through two separate presses and undergo two operations.

EARLY WOODCUTS. The origin of wood-engraving is a matter of much controversy. Woodcuts, in various forms, were used to print or stamp in remotest antiquity; by the Babylonians and Egyptians to indent bricks; by the Romans to print letters and grotesques; during the Middle Ages to stamp monograms, and to print color designs on linens, leathers, satins, and silks—a custom practiced in the Orient from time immemorial. But wood-engraving, in the modern sense, postdates the introduction into Europe of paper during the twelfth century; for it was not practicable to print on papyrus, vellum, or the materials previously used. From most ancient times the Chinese printed both letters and illustrations from wooden blocks; but the hypothesis that wood-engraving was introduced into Europe by the commerce of Venice with them lacks confirmation. In Europe it was of independent origin, having been probably practiced as early as the fourteenth century. At the beginning of the fifteenth prints from woodcuts were common in Southern Germany, and perhaps in the Netherlands. They are the merest rude outlines, intended to be colored, and represent saints and similar subjects (whence the name *Helgen*), which were distributed by the clergy for purposes of religious instruction. The earliest dated example is the well-known print of "Saint Christopher" (1423); the date assigned to the far finer "Madonna with the Child and Angels" (1413, Brussels Library) not being certain. Although playing cards were printed at this and even at an earlier date, there is not sufficient reason to find in them, as has been done, the origin of wood-engraving.

Both *Helgen* and playing cards antedated considerably the 'block books,' in which illustrations, with an appropriate printed text, were cut upon the same block of wood, before the invention of movable type. The origin of block books is a matter of dispute, being variously assigned to the Netherlands and to Germany. Among the oldest surviving example the *Apocalypse* is of German origin, probably from Cologne. Other celebrated works are the *Canticum Canticorum*, the *Biblia Pauperum* (q.v.), which survives in the most numerous examples, and the *Ars Moriendi*—all from the Netherlands, where, indeed, the most beautiful block books were made.

The invention of printing from movable types, which was perfected in 1454, gave a new impetus to wood-engraving. Illustrations were required for the books which now became common, and the printing press furnished a better means of taking an impression than the former process of rubbing or printing from a roller. The first printed book from movable types with woodcut illustrations was a book of fables, *Liber Similitudinis*, printed by Pfister at Bamberg in 1461; a very superior artistic stage is represented in illustrations of the *Speculum Humanæ Vitæ*, a Netherlandish work often erroneously considered a block book. The centres of the art shifted to the cities of Germany, where printing presses were established—like Cologne, Nuremberg, Augsburg, and Basel. Very widely circulated and imitated were the illustrations of the *Cologne Bible* (1475), remarkable for their vigor and realism, and of the *Augsburg Bible* (1475). Of great importance, too, were the different city chronicles, the best of which was Schedel's *Liber Chronicarum* (Nuremberg, 1493). Its illustrations, designed by Wohlgemuth and Pleydenwurff, the Nuremberg artists, were remarkable as being the first in which the mere outlines were replaced by a system of light and shade. From Basel and Nuremberg wood-engraving was introduced to Lyons, where the first engravings date from 1476. Somewhat later it was practiced in Paris, which city soon became famous for the *Livres des heures* of its celebrated printers, executed with great elegance in imitation of the illuminated manuscripts of the day. The *manière criblée* (q.v.), in which we find a number of French fourteenth-century prints, was probably not a wood, but a metal process; a similar process of wood-engraving is now used for astronomical illustrations.

Wood-engraving was introduced into Italy by German printers, the earliest illustrated book being printed at Rome in 1467; but the centre of the art was Venice. Italian wood-engraving speedily differentiated itself from the German, by a superior skill in the arts of design. Simplicity of line and idealism of form and conception are the chief characteristics; its spirit is manifest in such works as *Æsop's Fables* (Verona, 1481), and in the charming *Epistles of Saint Jerome* (Ferrara, 1497). The delightful *Hypnerotomachia Poliphili* (Venice, 1499) embodies, as does no other illustrated work, the joyous youthful spirit of the Italian Renaissance. Though variously assigned to Bellini, Raphael, and others, it is probably the work of Benedetto Montagna.

During the fifteenth century woodcuts had been, for the most part, outline drawings, relying upon tinting for the final effect. They were cut with an instrument not unlike a penknife from the designs drawn upon blocks of apple or pear wood sawed lengthwise. In the very earliest engravings designer and engraver were usually the same person; but as the art progressed artists of importance designed for woodcuts. Wood-engraving was an essentially democratic art. It occupied, in the early sixteenth century, a position analogous to that of the half-tone process in the nineteenth. For this reason its products are of highest interest as embodying the thoughts of the teachers and entertainers of the common people.

SIXTEENTH CENTURY. The last years of the fifteenth and the first half of the sixteenth century saw wood-engraving attain its highest development in Germany, where the motive for its practice, the need for popular religious instruction, was most intense. Albrecht Dürer, the greatest master of ancient woodcut, transformed the art. By the skillful introduction of light and dark he replaced the old outlines with some of the effect of color, putting an end to the need of tinting, while his narrative power and the grandeur of his design excelled anything hitherto done. According to the best research he did not himself use the knife; but he was intimately associated with a number of highly trained engravers, whose work he minutely directed, chief among whom was Hieronymus Andreæ. His *Apocalypse* (1498), *Life of the Virgin* (1504-05), *Greater Passion* (1510-11), and *Lesser Passion* (1509-10) were all epoch-making in the art. An important factor in the development of wood-engraving was the commissions given by the Emperor Maximilian: the *Triumphal Arch*, nearly ten feet in height and breadth, composed of 93 plates by Dürer and his pupils; the *Triumphal Procession* and *Weisskunig*, by Hans Burckmair of Augsburg; and the *Adventures of Sir Theuerdank* by Hans Schäuffelein. Second only to Dürer as a designer for woodcuts, Holbein reveals his mastery of woodcut in the celebrated *Dance of Death*, and to some extent in his *Bible*, both published at Lyons (1538), though designed earlier. He had the good fortune to have as an engraver Hans Lützelburger, whose work represents the highest possible effects with the knife. The third great representative German designer for woodcut, Lucas Cranach (1472-1553), though inferior to the others in design, is important as the chief champion of the Reformation. The "Little Masters," who followed Dürer, were so called because of the small size of their designs. Among the best were Albrecht

Altdorfer (1488-1538) of Ratisbon, Hans Sebald Beham, and Heinrich Aldegrever; of especial importance was Hans Baldung at Strassburg. During the latter half of the sixteenth century wood-engraving declined in Germany, partly owing to the competition of line engraving, which caused disastrous changes in the art. It was lost in the general decay of the arts resulting upon the Thirty Years' War.

Outside of Germany there was important activity in the Netherlands, where Lucas van Leyden did especially good work, in rivalry with Dürer. The chief artists in the later sixteenth century were Hendrick Goltzius and Christopher Sichem, and in the seventeenth Christopher Jegher did some excellent work after Rubens. In France the chief masters of the sixteenth century were Jean Cousin, whose ascribed designs are in the true spirit of the Renaissance, and Bernard Salomon (c.1550), the leading designer of Lyons. In the seventeenth and eighteenth centuries the most important engravers belonged to the families Lesueur and Papillon. Jean Michel Papillon is an example of the careful minuteness of technique that characterized the declining art. He was the first to use the tougher boxwood in place of apple and pear, and wrote the first important *Treatise on Engraving* (1766). In Italy great masters of the Renaissance occasionally drew for woodcuts; as Titian, whose designs were engraved by Boldrini and others at Venice, and Leonardo, who illustrated Paccioli's *De Proportione Divina* (1509). But the art never became thoroughly acclimated, nor was there the same need for popular instruction by this means.

Chiaroscuro. A variety of wood-engraving which achieved fine results was the so-called chiaroscuro, which is derived from two or more printings of identical blocks in different shades of the same grave color, such as sepia or a soft warm gray. It owes less to the engraver than to the printer, upon whose work it chiefly depends for its effects of light and shade and gradations of tint. The designing may be done with a pen or brush and the effect resembles that of a wash drawing. Chiaroscuro engraving was probably invented at the beginning of the sixteenth century by Jost de Negker at Augsburg. Excellent work was done in Germany by Hans Baldung and other artists, and the art was introduced into Italy by Ugo da Carpi, who practiced at Venice, his first print being dated 1518. It was a favorite means for the reproduction of masterpieces in painting, and attained the highest proficiency in Italy. The chief master in the latter half of the sixteenth century was Andrea Andreani, whose masterpiece was Mantegna's "Triumph of Cæsar." The last good chiaroscurist in Italy was Coriolani in the seventeenth century. In France the art was practiced with success by Nicholas Lesueur (1691-1764), some of whose work is most admirable in delicacy of execution, and in England by John Baptist Jackson (1701-80), who did very effective work, especially after the great Venetian painters.

Modern Wood-Engraving. The great difference between early and modern wood-engravings is that the latter is done on the end of the grain on the wood, which is sawed crosswise, instead of the side of the wood sawed lengthwise. The surface being therefore much harder, it is done with a graver instead of a knife. Boxwood, the hardest variety of wood and most regular in grain, is generally used instead of the ancient pear or apple. It is not certain by whom these new methods were invented, but they were first used with greatest success in England by Thomas Bewick (1753-1828), who is the real founder of modern wood-engraving. The most characteristic feature of his work, which is indeed the essential feature of modern engraving, is the uniform use of the white line—the design being formed of the part cut away from the block, instead of the part left standing, as formerly. This practice was made feasible by the substitution of the graver for the knife, and was not invented by Bewick, as is commonly supposed. He possessed, moreover, a very remarkable originality of design, and his works possess a pathetic intensity which renders them singularly attractive, quite aside from their high technical merit. His best productions are the illustrations to *British Quadrupeds* (1790), *British Birds* (1797), and a large engraving, the "Chillingham Bull." Contemporary with Bewick, William Blake produced an original and an artistic set of illustrations, though defective in technique, for Thornton's edition of Vergil's *Pastorals* (1820).

In the hands of Bewick's pupils the woodcut became a serious rival of line engraving in the illustration of important literary works. Charlton Nesbit and Luke Clennell practiced it with great merit, the former excelling in line, the latter in artistic feeling. Robert Branston, on the other hand, founded a school which imitated copper engraving, relying upon the black line rather than the white. John Thompson engraved, though with independence, after the designs of the line engraver John Thurston, and in the works of Orrin Smith and William Harvey wood-engraving lost its distinctive qualities. The illustrated newspapers and magazines, bringing the need of rapid production, caused a still further decline of the art. The engraver became a mere artisan. In vain did W. J. Linton endeavor to introduce the practice of rendering artists' drawings by lines conceived and arranged by the engraver himself. The influence of the American school (see below) failed to revive it, but finally led to a complete preference on the part of the public of the more accurate photographic processes.

The revival of wood-engraving in Germany begins at the end of the eighteenth century with the two Ungers, father and son, professors in the Berlin Academy, whose work, however, was still done with the knife, and especially with their successors, Gubitz and Unzelmann. Of very great influence were the blocks designed by Adolf Menzel for the illustration of different works on Frederick the Great, engraved by the brothers Vogel, Eduard Ketschmar, and others. Other prominent wood-engravers of the nineteenth century were Blasius Hofel in Vienna; Allgaier and Siegle, who engraved Kaulbach's *Reynard the Fox* (1863); Bürker and Gabner, the engravers of Ludwig Richter's designs; and especially, at the present time, Max Klinkicht in Freiburg. German wood-engraving is precise and careful in execution, but rather harsh in color. The colored prints from woodcuts now so extensively produced in Germany are not an artistic success.

The founders of the modern French school were Charles Thompson, a pupil of John Thompson, and the Frenchmen Best and Brevière. During the reign of Louis Philippe important masters designed for woodcuts, such as Grandville, Gavarni, and Tony Johannot, and of very great influence upon its development was Gustav Doré (q.v.), whose illustrations occupied a number of engravers, among the best of whom were Pannemaker (fils), Ligny, and Tricon. Representative engravers of the present day are Lepère, Baude, Jonnard, and Jules Huyot, not to mention Florian (d.1900), who achieved remarkable effects of tone. The chief living master is probably Stéphan Pannemaker, whose style is as brilliant as it is grand and robust. Artistic dash, intelligent use of the graver, and the achievement of tone are in fact the strongest points of the French school, which at present enjoys a higher perfection than any other in Europe.

THE AMERICAN SCHOOL. The earliest American work consisted almost entirely in the reproduction of English book illustrations for American reprints. The first artist of importance was Alexander Anderson (1775-1870), who engraved blocks after Holbein's *Dance of Death*, Bewick's *British Quadrupeds*, and other English works. He adopted the manner of Bewick, and his original blocks were the best engraved at that time outside of his master's immediate circle. The best wood-engraving of the first half of the nineteenth century was by Joseph Alexander Adams, whose original designs rank with the best English contemporaries. The Civil War interfered for a time with the new magazines which now offered chief employment to the engravers. The best work of the period before 1860 is to be found in the refined, delicate cuts of A. V. R. Anthony, the detailed, careful illustrations of Henry Marsh, as in Harris's *Insects Harmful to Vegetation* (1862), and, especially, in the engravings of William James Linton (d. 1899), who came from England to America in 1868. In his writings, as well as his masterly work, ranking with the best ever done, he was the champion of the methods of Bewick against the manipulative methods of the new school.

The last and most characteristic phase of the American development began in the years following 1870, in connection with the popular magazines, whose enormous circulation depended to a large extent upon their illustrations. The public demand being for the nearest possible reproduction of the originals, a school of engravers arose who accomplished this to a very remarkable extent—rendering the brush work and impasto of painting, the technical effects of etching, chalk drawing, and the like. This was rendered possible by photographing directly on the block the original, which was retained by the artist as a guide. The technical mastery acquired by the new school was soon employed in original work of a high order, especially in landscapes engraved from nature directly upon the block, and in portrait heads of great brilliancy and power. The recent perfection of photographic processes (see PHOTO-ENGRAVING) has, to some extent, removed the raison d'être of wood-engraving of the new school, and the great American engravers have returned to a more legitimate practice of the art.

The head of the American school, and probably its most remarkable technician, is Timothy Cole. Another important exponent of modern methods was the late Frederick Juengling. Elbridge Kingsley is known for his fine landscapes directly from nature, while Gustav Kruell follows the methods of Linton. Other important names are W. B. Closson, who has done good work from nature; F. S. King, who imitated copper engraving with great success; and Frank French, known by his New England scenes.

The technical processes of wood-engraving have in recent years been much improved both as regards the tools used in cutting the wood, such as the graver, chisels, etc., and the printing presses, the most perfect of which are in America. The process of electrotyping, by coating the woodcut with a thin film of metal, enables the printer to make an indefinite number of impressions, or by reproducing the block in metal to secure facsimiles for commercial purposes. For the important development of wood-engraving and color printing in Japan, which lies outside of the sphere of the Western evolution, see JAPANESE ART.

BIBLIOGRAPHY. Early treatises are those of Papillon (Paris, 1766), Heinecken (Leipzig, 1771), and Jansen (Paris, 1808); but really critical treatment began in the historical works of Heller (Bamberg, 1822), Ottley (London, 1846), and Chatto (ib., 1861). Among good modern histories are those of Delaborde (Paris, 1882), Woodbury (London, 1883), and Wessely, in his *Geschichte der graphischen Künste* (Leipzig, 1890); and especially *Masters of Engraving*, by W. J. Linton (London and New Haven, 1882), who united to a remarkable extent the qualities of scholarship with practical engraving. For the works of the old German school, consult Von Lützow, *Geschichte des deutschen Kupferstichs und Holzschnitts* (Berlin, 1889); Muther, *Die deutsche Bücherillustration der Gothik und der Frührenaissance* (Munich, 1884). For the American school, see Baker, *American Engravers and Their Work* (Philadelphia, 1875); Linton, *History of Wood Engraving in America* (ib., 1884). See also Hering, *Anleitung zur Holzschneidekunst* (Leipzig, 1873), and De Lostalot, *Les procédes de la gravure* (Paris, 1882).

WOODEN HORSE, THE. The treacherous device by which, according to the legend, the Greeks were introduced into Troy and captured the city.

WOOD'FALL, HENRY SAMPSON (1739-1805). An English journalist and printer, born in Little Britain, London, and educated at Saint Paul's School. In 1758 he was made editor of the *Public Advertiser*, which the letters of Junius (q.v.), published in its columns between 1767 and 1772, brought into widespread notice. Woodfall declared that he had no personal acquaintance with the author of the letters and also, according to the statement of his son, that Sir Philip Francis was certainly not responsible for them. He published them in book form in 1772 and profited largely by their sale, although he was prosecuted by the Crown for libel on account of them. In 1793 he sold the *Public Advertiser* and passed the rest of his days in Chelsea, where he died. His son, GEORGE (1767-1844), also a printer, was born in London and was trained by his father, whose partner he was till the latter's retirement. He then set up in business for himself, and in 1840 admitted his son, Henry Dick, as partner. He was regarded as one of the most eminent printers of his day, and published many works of great importance, the best known being the 1812 edition of *Junius's Letters*.

WOOD'FORD. A town in Essex, England, 8 miles northeast of Saint Paul's, London (Map: London, C 9). It lies in the picturesque Epping Forest district. Population, in 1901, 13,806.

WOODFORD, Stewart Lyndon (1835—). An American lawyer and diplomat, born in New York City. He graduated at Columbia College in 1854; was admitted to the bar in 1857; served in the Federal Army from 1862 until 1865; was chief of staff for a time to Gen. Quincy A. Gilmore, in the Department of the South; and then was military commandant of Charleston and Savannah, and for his services received the brevet of brigadier-general of volunteers. In 1868-70 he was Lieutenant-Governor of New York; in 1780 was an unsuccessful candidate for the Governorship on the Republican ticket against John T. Hoffman; and in 1873-75 was a member of the National House of Representatives. From 1877 until 1883 he was United States District Attorney for the Southern District of New York; then engaged in private practice, and in 1897 was sent as Minister to Spain. Upon the outbreak of the Spanish-American War (q.v.) in 1898 he returned to the United States.

WOOD'GREEN. A municipal suburb of London, in Middlesex, 6½ miles north of Saint Paul's Cathedral (Map: London, C 7). Population, in 1891, 25,831; in 1901, 34,183.

WOOD'HEAD, German Sims (1855—). An English pathologist, born at Huddersfield. He studied in Huddersfield College, Edinburgh University, and in Berlin and Vienna. From 1879 till 1890 he was engaged in teaching first anatomy and then pathology, and in carrying on original investigations in the Minto House School of Medicine, Edinburgh University, the Edinburgh Royal Infirmary, and the Royal College of Physicians. In 1899 he was made professor of pathology in Cambridge University. His works include: *Practical Pathology* (1883); *Pathological Mycology* (with A. W. Hare, 1885); *Bacteria and Their Products* (1891); and *Report to the Royal Commission on Tuberculosis* (1895).

WOOD-HEN. The weka (q.v.).

WOOD'HOUSE, Robert (1773-1827). An English mathematician and astronomer, born at Norwich. He studied at Caius College, Cambridge, where he received a fellowship in 1798. He became Lucasian professor of mathematics in 1820, Plumian professor of astronomy and experimental philosophy in 1822, and director of the observatory in 1824. His chief service to mathematical teaching was in clarifying the Continental methods of the infinitesimal calculus, in advocating the use of its notation, and in showing its application to physical problems. Among his works are: *Plane and Spherical Trigonometry* (1809; 5th ed. 1827); *A Treatise on Isoperimetrical Problems and the Calculus of Variations* (1810); *A Treatise on Astronomy* (1812); *Physical Astronomy* (1818); and *Principles of Analytical Calculation* (1803).

WOOD'HULL, Nathaniel (1722-76). An American soldier, born in New York. He accompanied General Abercromby (q.v.), as major, on the disastrous Ticonderoga expedition of 1758, served under Bradstreet at Fort Frontenac, and in 1760 took part, as colonel, in General Amherst's campaign against Montreal. Subsequently he was president of the New York Provincial Congress in 1775-76; was appointed brigadier-general of militia in August, 1775; and in August, 1776, was fatally wounded at Brooklyn, L. I., after he had surrendered. A *Journal* kept by him during the Montreal expedition of 1760 was printed in the *Historical Magazine* for September, 1861. Consult: Luther R. Marsh, *General Woodhull and His Monument* (New York, 1848), and Henry Onderdonk, Jr., *Narrative of Woodhull's Capture and Death* (New York, 1848).

WOOD-IBIS. See Ibis; Stork.

WOOD-LARK. See Skylark.

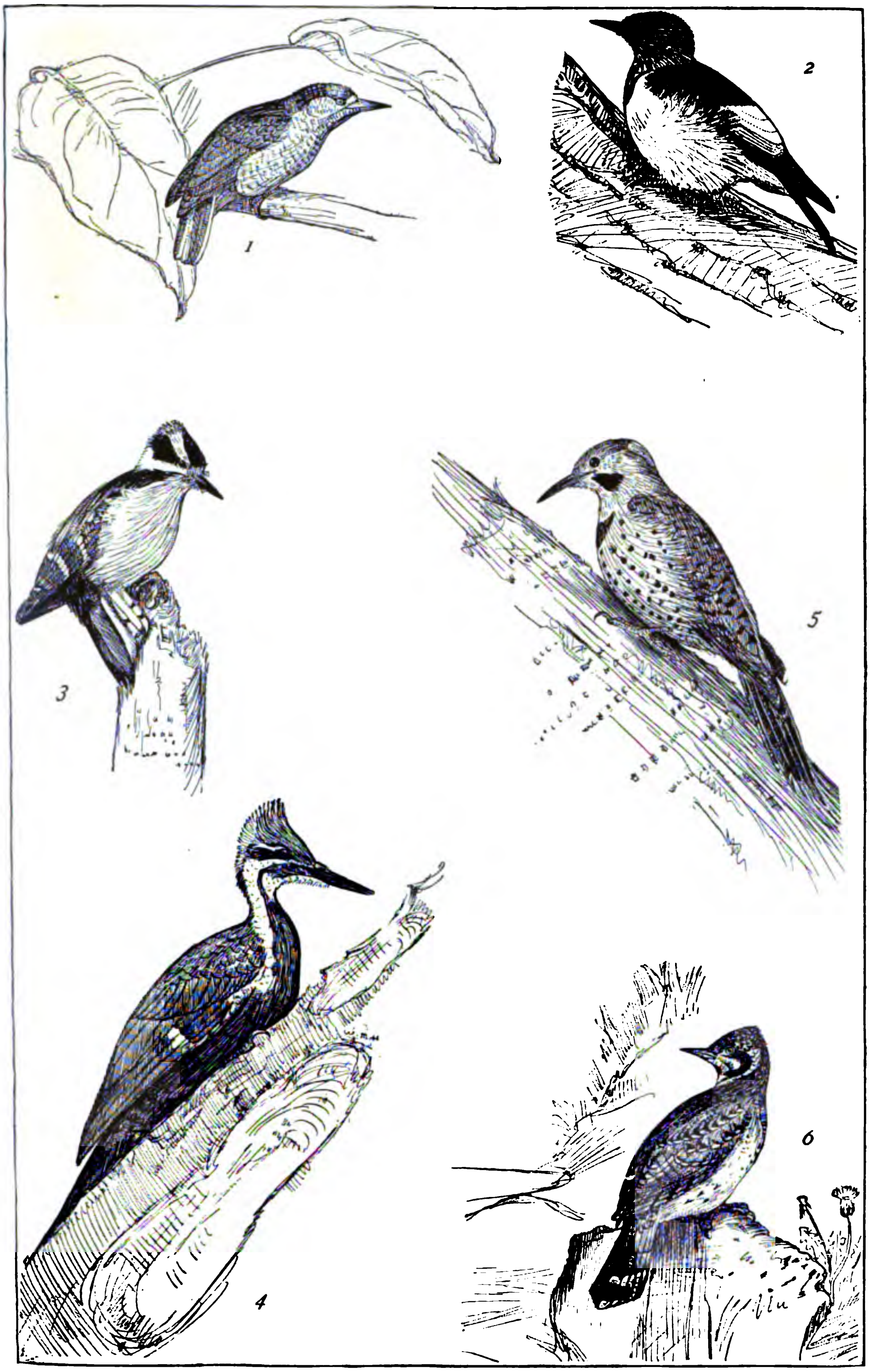
WOOD-LOUSE. An isopod crustacean of the family Oniscidæ. The abdomen is very short, but is composed of six segments. Wood-lice are terrestrial, and the respiratory organs are completely infolded by perforated plates. They feed on decaying animal and vegetable matter. They roll themselves up into a ball, so as to exhibit only the plates of the back. Other popular names are 'pill-bug' (owing to the spherical form they assume when alarmed), 'sow-bug,' and 'armadillo.' See Isopoda.

WOODMEN OF AMERICA, Modern. A fraternal and insurance order formed at Lyons, Iowa, in 1883, and chartered under the laws of Illinois in 1884. Divisions or branches are known as camps. The membership grew from 600 in 1884 to 210,000 in 1896. In 1902 it had 10,785 local camps and a total membership of 701,655. The order operates in Illinois, Minnesota, Nebraska, Wisconsin, Michigan, Kansas, North Dakota, South Dakota, Missouri, Indiana, and Ohio, but excludes from its operations the cities of Chicago, Detroit, Milwaukee, Saint Louis, and Cincinnati. The total disbursements to members from the date of organization to January 1, 1903, were $27,508,384.

WOODMEN OF THE WORLD, The. A fraternal and insurance order founded in 1890 at Omaha, Neb. The governing body is the Sovereign Camp of the World, the branches being known as local camps. White men alone are eligible. There is a Woman's Circle, which is in affiliation with the order, but of which Woodmen may become members. Women's circles meet in groves and all the circles and groves are governed by the Supreme Forest. Woodmen joining between 16 and 33 become life members in 30 years. The order has one sovereign camp, three head camps, and 5733 subordinate camps. The total membership in 1903 was 292,600.

WOOD-NYMPH. Any of several small, beautiful noctuid moths of the genus Euthisanotia (or Eudryas), common in various parts of the United States, and noted as enemies of the grapevine. The beautiful wood-nymph (*Euthisanotia grata*) has creamy white front wings, with a glassy surface and with a wide brownish-purple stripe along the outer margin, which expand about 1¾ inches. The hind wings are clear, pale, ochre-yellow, with a brown band on the outer margin. The moth, which appears during midsummer, lays its eggs upon the leaves of grape and Virginia creeper, upon which evidently

WOODPECKERS



1. BRAZILIAN PICULET (Picumnus lepidotus).
2. RED-HEADED WOODPECKER (Melanerpes erythrocephalus).
3. DOWNY WOODPECKER (Dryobates pubescens).
4. LOG-COCK (Ceophlœus pileatus).
5. FLICKER (Colaptes auratus).
6. WRYNECK (Yunx torquilla).

two broods of pale-bluish caterpillars, striped with orange and black lines, feed from May to September. The insects hibernate as naked chrysalises. The pearly wood-nymph (*Euthisanotia unio*) much resembles the former species, but is smaller and the outer border of the front wings is paler and tawny. It forms a simple earthen cocoon, or frequently bores into a piece of old wood, and changes to a chrysalis, in which stage it passes the winter. (See Colored Plate of MOTHS.) A California species (*Euthisanotia brevipennis*) is similar to both of the above in color and habits. Spraying the vines with an arsenical solution is recommended as a preventive of damage by these insects.

WOOD OIL. See GURJUN BALSAMS.

WOODPECKER. A forest bird of the family Picidæ, adapted to clinging to the trunks of trees and digging holes in the wood with its beak. The toes are in pairs, two before and two behind, armed with sharp strong claws; in Picoides and some other genera one of the two hind toes is wanting, and these forms are therefore called three-toed woodpeckers. The bill is rather long, straight, and wedge-shaped, with a hard tip, the end and sides compressed; the tail is usually lengthened and rigid, and the shafts of the feathers terminate in hard spines, which the birds press against the surface upon which they rest, and so aid in supporting their weight. The last of the caudal vertebræ is very large, with a long ridge-like spinous process; the whole structure adapting these birds to run and climb with the greatest facility on the stems and branches of trees, and to seek their food, which consists chiefly of insects and their larvæ, by digging into the bark and wood of trees with their bill. The tongue is fitted to this service, as the branches of the hyoid bone are greatly elongated backward, and in front move as in a sheath; and muscles enable these birds to extend the tongue far beyond the bill. The tip of the tongue is horny and has barbed filaments, while its surface is covered with a glutinous saliva, secreted by two large glands. The keel of the breast-bone is small, and the powers of flight are moderate.

Woodpeckers are diffused over almost all parts of the globe, but abound chiefly in warm countries. They are wanting in the Australian region and in Madagascar. The species are very numerous, probably 350 in all. They are mostly solitary in their habits, and live in forests. Some species feed in part on fruits and seeds, but much of their time is spent in pursuit of insects, and they may be heard at a long distance tapping the wood of trees with their bills, to discover the place where an insect is lodged, or getting at it when discovered by vigorous pickaxe-like strokes of the bill. They do more good by preventing the ravages of insects than harm by their pecking. They nest in a hole cut into the trunk of a tree for a short distance and then excavated downward six to twelve inches, according to the size of the bird, where it is somewhat enlarged. No bedding is needed, the eggs, invariably glossy white (see Plate of EGGS OF SONG BIRDS), lying on the floor of the chamber. These holes are never used a second time, but old ones are frequently utilized by other birds.

The plumage of woodpeckers is generally of strongly contrasted colors, black and white, or green and yellow, with red marks about the head. There are several well-marked groups in the family, differing in form, plumage, habits, and geographic distribution.

The American species of woodpecker are numerous and well known. The finest of the race, the great ivory-bill (q.v.), is now extinct. Another very large species, the logcock (*Ceophlœus pileatus*), is about 17 inches long, greenish black, with stripes from the eyes along the neck and sides, and the top of the head red. It is widely distributed, but stays in forests and is nowhere numerous. Common and familiar in orchards and along roadsides is a small black and white species, the downy woodpecker (*Dryobates pubescens*); and a larger counterpart, the 'hairy' (*Dryobates villosus*), is often seen. Both peck holes in the bark of apple-trees, maples, and the like, but these scars most often mark the work of the 'sapsucker' (q.v.). Various species belong to Canada or to the Pacific Slope.

The red-headed woodpecker (*Melanerpes erythrocephalus*) is common in most parts of North America west of the Alleghanies, and feeds much upon fruits and upon young heads of Indian corn, so that it is not an unmixed blessing. But its superb coloration (head crimson, back, wings, and tail glossy blue-black, secondaries and rump pure white) makes it a handsome ornament and atones in some degree for the mischief it does. It is ten inches long. An extraordinary species of California (*Melanerpes formicivorus*), related to the redhead, is remarkable for its habit of storing acorns, each hammered into a hole in a tree-trunk dug to receive it. The Eastern redhead also stores acorns irregularly in bark crevices. Lastly, the golden-winged woodpecker or flicker (q.v.) should be mentioned.

Of the European woodpeckers, the 'great black' species (*Dryocopus martius*), much like the American logcock, is rare. The 'greater spotted' and 'lesser spotted' are closely related and similar to the 'downy' and 'hairy' woodpeckers. The most distinctive and numerous of British species is the green woodpecker (*Picus viridis*), also common on the Continent of Europe. It is about thirteen inches in length, and is mostly of a dark-green color, picturesquely ornamented about the head with black and scarlet.

One group of foreign woodpeckers demands a few words because of the peculiar tail, which is not at all woodpecker-like. This is the subfamily Picumninæ, of which about 25 species are known, sometimes called piculets (q.v.).

Consult general works cited under BIRDS; and Eckstorm, *The Woodpeckers* (Boston, 1901); Beal, *Food of Woodpeckers* (Washington, 1895). See Plate of WOODPECKERS.

WOOD-PEWEE. See PEWEE.

WOOD-PRESERVING. Several processes have been employed for the purpose of preventing the decay of wood from dampness, atmospheric action, or the destructive operations of animals and parasitic plants. The principle in all has been the same—viz. the injection into the vessels of the wood of some mineral material, which, by combining with the albumen of the woody tissue, prevents its decomposition, or gives it a poisonous character. The chief of the methods in use are: 'kyanizing' with bichloride of mercury; 'creosoting,' in which the preserving material is the creosote of coal-tar; and 'burnettizing' with zinc sulphate. While the tree is still growing the head of the tree is cut off, and the top of the bare stem is hollowed into the form of a bowl, which is then filled with the solution, which is afterwards supplied as required. The liquid penetrates downward, killing the tree as it goes, but giving to the wood a most remarkable degree of durability. In 'creosoting' the wood may be simply steeped in creosote oil. Melted naphthaline, too, has been employed as a preservative for timber.

WOOD-QUAIL. See ROULROUL.

WOOD-RAT. A large American forest rat, several species of which form the group Neotominæ. Some have round nearly naked tails and others bushy tails. They are most numerous in the Southern and Western States, and are noted for the large 'houses' they build of sticks, pieces of bark, leaves, etc., over the entrances of their extensive underground burrows. A well-known species is the bluish-gray *Neotoma Floridana* of the South Atlantic and Gulf States. The yellowish brown bushy-tailed species widely distributed from Utah to the interior of British Columbia is *Neotoma cinerea.*

WOOD-ROBIN. A singing bird of forest-keeping habits. In the United States this name is sometimes applied to the wood-thrush (q.v.); in Australia, to a warbler (*Erythrydryas rosea*), resembling the European robin redbreast.

WOODRUFF (AS. *wudurofe, wuderofe,* from *wudu, widu,* wood + **rofe,* of uncertain meaning, possibly ruff), *Asperula.* A genus of about 75 annual and perennial herbs of the natural order Rubiaceæ. The sweet woodruff (*Asperula odorata*) is common in shady woods in all parts of Europe. The plant when dried has an agreeable fragrance, similar to that of dried vernal grass. It forms an agreeable herb tea, and enters into the composition of the popular May drink of the Germans. Dyer's woodruff (*Asperula tinctoria*), a native of Europe and of Siberia, is a perennial whose root is used in Dalmatia and elsewhere instead of madder, but is less productive.

WOOD'RUFF, WILFORD (1807-98). A president of the Mormon Church. (See MORMONS.) He was born on March 1, 1807, in Avon, Hartford County, Conn. He joined the Mormon Church in 1833 in Oswego County, N. Y. He met the Prophet Joseph Smith, Jr. (q.v.), at Kirtland, Ohio, and then removed to Clay County, Mo., whence he made missionary trips to the Southwestern States. In 1837 he became a member of the first quorum of Seventies and in 1839 of the quorum of Twelve. In 1839, 1840, and 1844 he was a missionary in England, and in 1848 in the Eastern States. He was one of the pioneers to Salt Lake. While at Nauvoo he asserted that he was opposed to the plural marriage system. However, as one of the Twelve Apostles, he refused to take the test oath against polygamy. In 1900, as newly elected president of the Church, Woodruff issued a proclamation in which he said, in order to anticipate the provisions of the Cullom bill, "I publicly declare that my advice to the Latter Day Saints is to refrain from any marriage forbidden by the law of the land." He died September 2, 1898.

WOOD-RUSH. See LUZULA.

WOODS, CHARLES ROBERT (1827-85). An American soldier, born at Newark, Ohio. He graduated at West Point in 1852, and became first lieutenant in the Ninth Infantry in October, 1855. Just before the Civil War began he commanded the troops on the steamer *Star of the West* in the unsuccessful attempt to reënforce Fort Sumter (q.v.). In October, 1861, he became colonel of the Seventy-sixth Ohio; fought under General Grant at Fort Donelson and Shiloh; commanded a brigade in the advance on Corinth, the land forces in the expedition to Milliken's Bend, a regiment in the Chickasaw Bluff Expedition and the capture of Arkansas Post, and a brigade in the operations against Vicksburg; and was made a brigadier-general of volunteers in August, 1863. He participated in the operations about Chattanooga; fought under Sherman in the advance on Atlanta and in the march to the sea; and in March, 1865, was brevetted major-general of volunteers for services at the battle of Bentonville. He became lieutenant-colonel of the Thirty-third Infantry in July, 1866; was promoted to be colonel of the Second Infantry in March, 1874; and retired in the following December.

SWEET WOODRUFF.

WOODS, LEONARD (1774-1854). A Congregational theologian. He was born at Princeton, Mass., graduated at Harvard College (1796); and became pastor at West Newbury, Mass. (1798). He was professor of theology at Andover from the foundation of the seminary in 1807 till 1846, when he resigned, but continued to live in Andover till his death. He first came into notice by his controversial papers on the Hopkinsian side in the *Massachusetts Missionary Magazine* (see HOPKINS, SAMUEL), and later (1805) as joint editor of the *Panoplist.* He was prominent in the formation of the American Tract Society, American Education Society, American Temperance Society, and the American Board of Commissioners for Foreign Missions. It is as a teacher that he is mentioned to-day. He was also an admired preacher. His collected works appeared in five volumes (Boston, 1849-50), and his *History of Andover Seminary* in 1885. One of his most useful services was his *Life of Mrs. Harriet Newell* (1814), which profoundly influenced the foreign missionary cause. He also published: *Letters to Unitarians* (1820); *Letters to Rev. N. W. Taylor* (1830); *Lectures on Church Government* (1844); and *Theology of the Puritans* (1851). Consult Williston Walker, *Ten New England Leaders* (New York, 1901).

WOODS, LEONARD (1807-78). An American theologian and scholar, born in Newbury, Mass., the son of Leonard Woods (1774-1854). He graduated at Union College (1827) and at Andover Theological Seminary (1830) and edited in New

York *The Literary and Theological Review* (1834-37. He was chosen professor of sacred literature in Bangor Seminary (1836-39) and president of Bowdoin College (1839-66). His valuable investigations in the early history of Maine are contained in the *Proceedings* of the Maine Historical Society (1877). He translated, among other works, G. C. Knapp's *Christian Theology* (2 vols., 1831-33).

WOODS, William Burnham (1824-87). An American jurist and soldier, born in Newark, Licking County, Ohio. He graduated at Yale in 1845 and was admitted to the Ohio bar in 1847; was Mayor of Newark in 1856-57; then was elected to the Legislature and chosen Speaker. In September, 1861, he became lieutenant-colonel of the Seventy-sixth Ohio Regiment, and served throughout the war under General Grant and General Sherman. He commanded a division in Sherman's march to the sea. At the close of the war he was brevetted major-general of volunteers. He then settled in Alabama; in 1869 was appointed judge of the Fifth United States Circuit Court; and in 1880 associate justice of the United States Supreme Court, to succeed Justice Strong.

WOOD-SAGE. See Germander.

WOOD'S HALFPENCE. The name given to the halfpence issued for Ireland by William Wood, an English ironmaster, in 1723-25. According to a well-established custom, George I. in 1722 gave the Duchess of Kendall, his favorite mistress, the right to coin copper halfpence for Ireland to the value of £108,000. She in turn sold the contract to Wood, who proceeded to "pour the coin down the throats of the people." Though the new coins were intrinsically worth more than the old, all classes in Ireland united in the most vehement opposition. Dean Swift led the attack in his celebrated *Drapier's Letters*, and the opposition became so formidable that the Government revoked the patent in 1725 and granted Wood a compensation for his loss.

WOODS HOLE. A village in the town of Falmouth, Mass. See Falmouth.

WOOD-SHRIKE. An Oriental shrike of the subfamily Prionopinæ, of which the familiar magpie-lark of Australia is a fair example.

WOOD-SLAVE. A familiar and active little skink-like lizard (*Mabouia agilis*) of Jamaica.

WOOD-SNAKE, or Sipo. An arboreal colubrine snake (*Herpetodryas carinatus*) of the Amazon region, often seven feet long, and remarkable for its beautiful colors. The upper parts are bright verditer or olive green, and the under parts greenish or bright yellow. It is amazingly swift in its movements.

WOOD-SNIPE. A sportsman's name in parts of the United States for the woodcock (q.v.), and in Bermuda for a curlew. See Curlew.

WOOD SPIRIT, or Wood Alcohol. See Methyl Alcohol.

WOOD'STOCK. A town in Oxfordshire, England, 8 miles northwest of Oxford (Map: England, E 5). It is celebrated as the former seat of the manor of Woodstock, or Old Woodstock, a residence of the early English kings, granted to the great Duke of Marlborough, whose magnificent residence, Blenheim Palace, built for him by the nation, is in the immediate vicinity. Edward, the Black Prince, was born here; Elizabeth was here held prisoner by her sister Mary; and Chaucer resided in the place for some time. Woodstock is also famous in connection with Fair Rosamond, the celebrated mistress of Henry II. Population, 1700. Consult Marshall, *Early History of Woodstock Manor* (1873-74).

WOODSTOCK. A port and capital of Oxford County, Ontario, Canada, on the Thames River, Cedar Creek, and the Grand Trunk and the Canadian Pacific railroads; 30 miles east-northeast of London (Map: Ontario, C 4). It has a large trade, good water power, and manufactures of woolen goods. Population, in 1901, 8833.

WOODSTOCK. A novel by Walter Scott (1826). The scene of the story is laid in the royal lodge of Woodstock in 1651.

WOOD-THRUSH, Wood-Robin or Song-Thrush. Names of one of the most familiar, beautiful, and melodious of North American thrushes (*Turdus mustelinus*). See Thrush.

WOOD-TORTOISE. An American terrestrial turtle (*Clemmys insculptus*) to be recognized by the concentric markings or striæ on each plate of the carapace. It occurs in the United States east of Ohio, and is common in many localities. See Turtle.

WOOD-WARBLER. A book name for the American warblers of the family Mniotiltidæ. See Warbler.

WOOD'WARD, Bernard Bolingbroke (1816-69). An English writer. He was a son of Samuel Woodward, a geologist and antiquary living at Norwich. As a young man he copied armorial bearings for his father. In 1834 he became a tutor in a Norfolk school, then a banking clerk, and eventually he turned to the Congregational ministry, for which he was educated at the Highbury College, London. In 1843 he became pastor of a Congregational church in Norfolk, but resigned five years later and settled in London to devote himself to literature. In 1860 he was appointed librarian to the Queen at Windsor Castle. Among his numerous works are: *The History of Wales* (1850-53); *The History of the United States of America* (1855-56); *First Lessons on the English Reformation* (1857); *First Lessons in Astronomy* (1857); *First Lessons in the Evidences of Christianity* (1858-59); and, in conjunction with W. L. R. Cates, *Encyclopædia of Chronology* (1872). He also edited Barclay's *Complete Dictionary of the English Language* (1851) and Maunder's *Treasury of Knowledge* (1859).

WOODWARD, Henry (1832—). An English geologist, born at Norwich, and educated at the Royal Agricultural College at Cirencester. He was keeper of the geological department of the British Museum from 1880 till 1901, in 1865 became editor of the *Geographical Magazine*, and in 1896 was chosen president of the Palæontographical Society. His works include a monograph on the *British Fossil Crustacea Belonging to the Merostomata* (1866-78); one on the *Carboniferous Trilobites* (1883-84); and one on the *British Palæozoic Phyllopoda* (1888-99).

WOODWARD, Joseph Janvier (1833-84). An American surgeon, born in Philadelphia. He graduated from the medical school of the University of Pennsylvania in 1853, and practiced in Philadelphia and taught in the University of Pennsylvania until 1861. He then became assistant surgeon in the United States Army, and served throughout the war, receiving the brevets of captain, major, and lieutenant-colonel. In July, 1866, he was commissioned captain and assistant surgeon in the Regular Army, and in 1876 was promoted surgeon with the rank of major. He did much to develop medical microscopy. His inventions include an instrument for detecting myopia or other abnormal conditions of the eye. He published works on photographic micrometry; *Outline of the Chief Camp Diseases of the United States Armies* (1863); and *The Medical and Surgical History of the War of the Rebellion* (2 vols., 1870-79).

WOODWARD, Robert Simpson (1849—). An American physicist and mathematician, born at Rochester, Mich. He graduated at the University of Michigan in 1872 and was appointed assistant engineer on the United States Lake Survey. In 1882 he became assistant astronomer to the United States Transit of Venus Commission, serving with Professor Asaph Hall at the San Antonio, Texas, station. In 1884 he resigned to become astronomer to the United States Geological Survey, serving until 1888, when he became assistant in the United States Coast and Geodetic Survey. In 1893 he was called to Columbia University as professor of mechanics and subsequently became professor of mathematical physics as well. In 1895 Dr. Woodward was made dean of the faculty of pure science, a position he at present holds, and he also became president of the New York Academy of Sciences, of the American Mathematical Society, and of the American Association for the Advancement of Science. He carried on researches and published papers in many departments of astronomy, geodesy, and mechanics. He edited the first report of the United States Lake Survey and was the author of several important chapters in this large volume. In the course of his work with the United States Coast and Geodetic Survey he devised and constructed the 'iced bar and long tape base apparatus,' which enables a base line to be measured with greater accuracy and with less expense than by methods previously employed. Professor Woodward's work on the composition and structure of the earth and the variation of latitude has found expression in a number of valuable papers. In 1894 a volume of *Geographical Tables*, which had been prepared by Professor Woodward, was published by the Smithsonian Institution.

WOODWARD, Samuel Pickworth (1821-65). An English naturalist, born at Norwich. He served for a time as curator to the Geological Society of London, and in 1845 was appointed professor of geology and natural history in the Royal Agricultural College at Cirencester. In 1848 he became assistant in geology and mineralogy in the British Museum. He made a special study of invertebrate paleontology, contributing numerous papers on this subject to geological magazines. His best known work, *Manual of the Mollusca; or Rudimentary Treatise of Recent and Fossil Shells* (1851-56), has passed through several editions.

WOOD-WORKING MACHINERY. Under this head may be embraced the various machines by means of which lumber as cut in the forest is reduced to standard dimensions and then made into pieces ready for immediate use, such as boards, trim, doors, sashes, boxes, etc. As the lumber advances through consecutive operations the machinery employed becomes more and more specialized, and many ingenious and involved machines such as those for making barrels, wheels, chairs, and other similar objects are required. A general division of wood-working tools may be made into those operating (a) by scission or cleaving, such as saws of various kinds; (b) by paring, as the planers, surfacers, matchers, etc.; (c) by combining the two foregoing principles, as in the case of lathes, boring machines, mortisers, and gaining machines; (d) by abrading or grinding, as sandpapering and similar finishing machines.

Considering now a few essential forms of wood-working machines more specifically, we have first the *saws*, which are discussed under that head, but which may briefly be considered here. Rather than have the forest lumber cut by the log saws, it is preferable, for reasons of economy, to have it squared and then resawed at the mill. For this purpose vertical reciprocating saws, circular resaws, and band resaws are employed. The latter saws are finer than the log saws and consequently avoid unnecessary waste. They cut the lumber into large planks or boards. To reduce the lumber to the desired dimensions circular, ripping, and cross-cut saws are used. The former have fewer and larger teeth, which cut upon their front edges, while the latter cut upon their sides. In using the ripping saw the boards have to be fed to the saw, but with the cross-cut saw it is possible to move the saw to the work. Many forms of circular saws are devised by varying the arrangement of the carriage, and shingles, clapboards, and other products, more or less irregular in form, can be prepared.

For curved and scroll sawing a narrow band-saw is employed, though there are reciprocating jig-saws suitable for this purpose.

After the wood comes from the saws with its rough surface it must next be surfaced, or smoothed and planed, to the required dimensions. In the *surfacer* this is done by a series of revolving cutters. These cutters pare off shavings, leaving the board or beam quite smooth. In many of the surfacers all four sides of the board are operated on at once, in some cases the tongue and groove being cut in the edges. The number of knives in each cutter may vary from three to nine, and the machines are fitted for handling various sizes of stock. Instead of plane surfacers machines may be devised for cutting curved surfaces to a given pattern, as in the case of molding, while there are numerous cutting machines which carry cutting tools on a vertical spindle, enabling scrollwork, carving, paneling, etc., to be done. Of considerable importance are the dovetailing machines, which may consist of either a gang of chisels or of a cutter similar to that of the carving machine, which cuts out the tongues and spaces, automatically spacing them, so that an exact fit is assured.

Lathes are an important and much used class of tools. In them a piece of wood is rapidly revolved while a chisel or other tool is held against it, with the result that the wood is removed by a combined action which involves both the severing of the fibres and paring. Many forms of simple wood-turning lathe exist, and the machine, when operated by a skillful mechanic, is capable of a wide range of work. By using various automatic attachments, however, the output of the lathe can be greatly increased, especially where a number of similar pieces are to be constructed. In the simplest of these processes the cutting tool follows a pattern, which regulates the depth of cut and consequently the radius of the turned object. Then there is also the Blanchard lathe, with its many modifications, where the blank and a pattern are revolved and rotary cutters carve out of the former an exact facsimile.

There are also *tenoning machines* to make tenon joints, and *gaining machines*, which cut grooves across the surface of timber, while to make mortises to receive the tenons there are machines, some of which have rotary cutters and other reciprocating chisels. Of *boring machines* there are numerous designs, arranged specifically for a given class of work.

Abrasive machines include sandpapering machines, where an endless belt, on which sand or emery has been fixed, is in contact with the work, and drum machines, where the work is a large flat surface.

With such tools as those outlined many varieties of work can be performed, and where a large number of pieces of a particular class of work are desired, a special machine is constructed which turns them out more or less automatically. It is in this direction that the greatest improvements in wood-working machines are being made. Their efficiency, as well as their capability for rapid work, is also being constantly augmented. See BUILDING; BORING MACHINERY; SAW; SAWMILL.

WOOD'WORTH, SAMUEL (1785-1842). An American journalist and poet, born at Scituate, Mass. After an apprenticeship in a printing office, he edited and printed a paper at New Haven, Conn., in 1807, and in 1809 removed to New York, where he conducted *The War* (1813-14), a weekly paper, during the War of 1812. He aided George P. Morris in 1823 in founding the New York *Mirror*. During his life he published a good deal of verse, as well as operettas and a curious romance of the War of 1812, *Champions of Freedom* (1816). His complete poetical works were edited (2 vols., 1861) by his son, with a *Memoir* by George P. Morris. He is remembered almost wholly for his song "The Old Oaken Bucket" (1817).

WOODY NIGHTSHADE. See BITTERSWEET.

WOOL (AS. *wull*, *wul*, Goth. *wulla*, OHG. *wolla*, Ger. *Wolle*, wool; connected with Lat. *villus*, *vellus*, OChurch Slav. *vlŭna*, Lith. *vilna*, Skt. *ūrnā*, wool, from *var*, to cover). The soft hairy covering of sheep and several allied animals, next to cotton the most extensively used of all fibres. Its history dates back to the earliest times of which we have any record, and as civilization has progressed its uses and applications have steadily increased.

WOOL PRODUCTION AND CONSUMPTION. The chief wool-producing countries of the world are: Argentina, Uruguay, and other South American countries; Australia and New Zealand; the United States; Russia, Great Britain and Ireland, France, Spain; South Africa; and India. The world's clip for 1900 was estimated by the National Association of Wool Manufacturers at 2,685,000,000 pounds. The consumpton of wool in the United States has always been relatively large. Prior to the beginning of the factory era it did not average more than three pounds per capita of population annually, and in the middle of the last century it amounted to four pounds, but as wealth increased and the uses of wool enlarged, the consumption increased to about eight pounds per capita in 1900. In that year the wool clip of the United States was estimated at 290,000,000 pounds, the product of 40,000,000 sheep. About two-thirds of the wool then used by American mills was supplied by domestic flocks. The imported wools largely used for blankets and carpets are mostly of lower quality. The principal wool-producing States are Montana, New Mexico, Ohio, Texas, Wyoming, Colorado, Oregon, Idaho, California, Utah, Michigan, and Arizona.

Sheep-raising has preceded civilization in nearly all parts of the world. Before agriculture was practiced to any extent, it was almost universal. With the progress of civilization, the use of wool for making cloth led to the improvement of the fleece by selection and breeding. The Romans greatly increased the fineness of the fleece, and after the Roman conquest of the Iberian Peninsula Roman sheep were introduced into Spain, where they so greatly improved the native flocks that even during Roman supremacy Spanish wool led in the world's markets, a prestige held for many centuries. Through judicious crossing of the fine-wooled Merino with high-grade long-wooled breeds, the highest type of wool fibre has been developed, combining suppleness, fineness, and other desirable qualities with lustre and length of staple. It is suitable for combing as well as carding.

Wool may be considered a product of cultivation, or domestication, as no wild animals are known which resemble the wool-bearing sheep; and few natural products have been more modified and diversified by man to meet his various needs. This is very strikingly shown by a comparison of the coarse heavy covering of the argali or musmon (the supposed progenitors of the sheep), with the fine wool of the Merino or the long, lustrous fleece of the Leicester. These animals are covered with coarse hair or fur, among which close to the skin was a softer hair or wool. Under the influence of good care and feed, and protection from the inclemencies of the weather, the longer coarse hair largely disappeared, and only the softer, shorter hair or wool remained, a phenomenon said to be observed when the argali is brought under domestication.

CHARACTERISTICS AND PROPERTIES OF WOOL. Wool is a living appendage of the skin, produced by increased epidermal cells. The difference between wool and hair is one of degree rather than of kind, because all wool-bearing animals have the tendency when neglected to produce hair rather than wool, and because numerous intermediate structural stages exist between the two extremes. While wool is commonly characterized by its fine, soft, curly nature, the true distinction between it and hair lies in its covering of pointed scales or plates, attached to the filament at their bases and overlapping much like fish-scales. This structure, which is readily seen with a microscope, is perceptible to the touch by its harsh, rough feeling when the fibre is drawn through the fingers from the tip to the root. The number of these scales bears a fairly direct relation to fineness of the fibre. The curliness of wool is due to a spiral structure of the filaments, and although all wool is not curly or wavy, curliness is one of its recognized and important characteristics. There also appears to be a relation between fineness and curliness. Owing to the relation which these three characteristics bear to each other, curliness, or the number of waves to the inch, which can be seen with the naked eye, is one of the factors noted in judging of wool. The waviness and scaliness are utilized in making felt (q.v.) and also in thread-making. A pound of the finest wool will yield nearly 100 miles of thread. In spinning, the filaments interlock by their scales, and the curl of the fibre prevents the threads untwisting and helps to hold them together. These valuable qualities vary greatly in different wools, some being adapted to carding for cloth, and others to combing for worsteds. It is upon minute points of difference that the value of various grades of wool chiefly depends. The lustre also differs greatly and to a certain extent is a breed characteristic, the wool of the Lincoln and the best Leicester sheep being much more lustrous than that of the shorter wools or the fine Merino fleece. The length of staple, which is made a basis of general classification, is largely a constitutional or breed characteristic, the staple being from one to two inches long in the finest Merinos, eight inches or more in the Lincolns, and reaching twelve and even fifteen inches in some combing wools, the length of staple suggesting the grouping of sheep into short-wools, middle-wools, and long-wools. The fine felting wools have a short staple, as a rule, and are used for carding or yarn purposes, while the longer, more lustrous, and less wavy ones are better suited to combing and worsteds.

Another valuable characteristic of wool is its elasticity, which gives it a softness to the touch which is retained in the manufactured goods. Closely related to this is the strength of fibre; a dead or inferior wool will break instead of stretching when strained. Delicate machines have been constructed for testing the strength and elasticity of fibre, for both practical and scientific purposes. Bowman found that wool fibre is fully one-fourth stronger than cotton, the strength being proportional to the diameter. Great variation, however, exists in the strength of fibres from different wools of the same class of sheep.

All wool in its natural state contains fatty or greasy matter called *yolk* or *suint*, secreted by the skin and covering the individual hairs. This serves to lubricate the fibres and prevent their matting together, and also protects the fleece from injury. It differs in quantity and exact character with various breeds and is believed to render the wool soft and pliable. The fats and the potash salts which the yolk contains form a sort of natural soap. For manufacturing purposes the yolk, which is partly soluble in water, must be removed so as to increase the felting tendency and the ability of the wool to take dye. White is the most common color of cleaned sheep wool, and is generally preferred for manufacturing; but the black, fawn, cream, and gray shades produced by various breeds are utilized in their natural colors for certain kinds of clothing.

Variation in Properties. The wool from different parts of the same animal differs greatly in length of fibre, fineness, and structure. As a rule, the best is obtained from the shoulders and sides. That from the fore part is irregular and likely to be filled with burrs, while the loin wool is shorter and coarser, that on the hind quarters still more, and that from the under side of the throat and the belly is likely to be short, worn, and dirty. As the wool is finer on the shoulders, it is likewise superior in soundness of fibre, softness, curl, and evenness of length. Purity of blood, good general management, and uniform feeding tend toward greater uniformity of the fibre grown on different parts of the body, whereas a period of insufficient feeding or of ill health leaves a weaker and less healthy fibre at the point represented by it. Such wool is usually noticeably deficient in yolk. The importance of breeding, climate, and feeding is evidenced by the changes which occur in the wool when sheep of a given breed are removed from one region or district to another quite different. Coleman states that wool in certain districts of Yorkshire brings a higher price than that of other localities, the advantage being probably due to favorable conditions of soil and climate. On the other hand, the ability of man to counteract unfavorable conditions of a particular section is testified to by Lastereye (as quoted by Darwin), who cites the preservation of the Spanish Merino sheep in their utmost purity under such varying conditions as are found at the Cape of Good Hope, in the marshes of Holland, and under the rigorous climate of Sweden, and contends that "fine-wool sheep may be kept wherever industrious men and intelligent breeders exist."

Kinds and Grades of Wool. The wool clipped from lambs, called in England 'hog wool,' differs from the wether wool, or subsequent clippings, in the staple being somewhat pointed, softer, and more wavy or curly. Lamb's wool is more valuable than wether's wool, and can be used for purposes to which the later clippings are not suited. Fleece wool, or that clipped from the live animals, is marketed as (1) 'unwashed' or 'in the grease,' i.e. as shorn from the sheep with the yolk and dirt adhering to it; (2) 'washed,' i.e. washed on the sheep in cold water, which removes a part of the yolk and dirt; and (3) 'scoured' or cleaned ready for manufacture. 'Tub washed' includes fleeces broken and washed more or less by hand or machinery; 'unmerchantable' is applied to wool partially washed on the sheep's back but not sufficiently to be classed as 'washed.' By far the larger part of the wool produced in the United States, and especially west of the Mississippi River, is marketed 'unwashed,' which is generally preferred by wool-buyers. 'Skirted' is a term applied to certain fleeces imported into the United States, from which the head, belly, and breech wool (the inferior parts) have been removed, to avoid the full effect of the tariff. 'Pulled wool,' also called 'skin wool,' generally an inferior grade, comes from the pelts of sheep which have been slaughtered or have died from disease or exposure. The wool is loosened by application of a thin lime paste to the back of the skin, or by sweating the wet skins in piles.

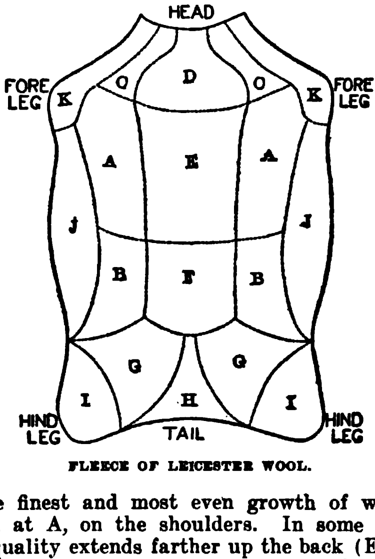
The three main classes of wool on the basis of the staple are: (1) carding or clothing wools, or those of the Merino type, in which felting qualities are desired; (2) combing wools, in which length of staple is required and felting qualities not desired, used for hard-spun nonfelting worsteds; and (3) miscellaneous, sometimes called carpet or blanket wools, long, strong, coarse wools, used for carpets, blankets, and coarse clothing. The clothing wools are commonly classified as picklock XXX, XX, X, picklock being an extremely fine fibre. The mass of high-grade clothing is made of the XX and X grades. The combing wools, often called Delaines, were formerly derived from the English mutton breeds, but machinery has been adapted for combing the Merino carding or felting wools, which have been lengthened by breeding and selection. The clothing wool used in the United States, aside from home production, is derived mainly from Australia, South America, and South Africa. The imported combing wool comes mainly from Great Britain, although much comes from New Zealand, Argentina, and Canada. The coarse carpet wools are the product of neglected flocks and unskilled breeding throughout the world.

In judging wool on the sheep's back, account is taken of strength of fibre, fineness, curl, thickness, and closure of the fleece. When the yolk is deficient the fibres become dry and brittle, and the fleece is likely to be injured otherwise. The waves of the curl should be uniform and numerous throughout the length of the fibre. The thickness of the fleece, depending upon the closeness of the fibres upon the skin, varies greatly with the breed, and also with the individual to some extent. A fairly thick and well-closed fleece is desirable. The closure is caused by the matting together of the ends of the fibres by the yolk. This gathers dust and forms a dirty coating, rendering the fleece impervious to dust and dirt, which would be injurious.

As a result of the tendency toward combing wools, both fine and coarse, Merino and English worsted wools now largely predominate in the domestic supply. Since all the improved breeds of the world have been introduced and acclimated in the United States, the range of grades of wool which have been successfully produced is very great. Breeding, care, and feeding have more than doubled the average weight of the fleece, the present average for all classes being about six pounds. Among well-tended flocks of mutton breeds, which produce a heavier fleece than the fine-wooled breeds, the yield amounts to 8, 10, and more pounds per head, in individual cases reaching 15 or even 20 pounds. In most parts of the United States shearing is done in the spring; in Texas, New Mexico, Arizona, and southern California, where climatic conditions interfere to prevent evenness of fibre, it is done twice, the winter fleece being stronger and of greater value than that grown in summer. Since these clips do not work well together, their mixture reduces both qualities to a low level.

DEFECTS OF WOOL. The most common defect of wool is 'break,' which is due to exposure, insufficient feeding, etc. In this the fibre contains weak spots which cause it to break when stretched. It destroys the value of wool for combing purposes. 'Stripy' wool is inelastic, harsh, and lacking in curl, and is used only to make inferior goods. It affects the fleece in the most valuable part—the sides and shoulders. 'Toppiness' is a sort of uneven felting of the fibres at the top of the fleece, so that the closure is not perfect. It is usually the result of uneven growth, and causes waste in carding. Felted wool is deficient in yolk, and as a result becomes matted together in bunches, causing loss in combing and carding. It is attributed usually to poor health. Broad-topped wool is a serious defect, in which the fibres split down from the top, interlace and mat so as to appear even on the surface, which is divided into broad masses called 'tops.' These cannot be parted without tearing. 'Hemp' or 'kemp' consists of a mixture of short, coarse white hairs and wool fibres, occurring chiefly on the parts where the wool is lightest and shortest, but may occur all through the fleece if the sheep has a tendency to produce hemp. Since the hairs do not take dye and cannot be sorted out, they lessen the value of the fleece fully one-half for the manufacture of fine grades of goods. In cloudy wool the fibres adhere throughout their length, but not so much as to be felty. This injures the wool for combing, causing waste, but is not so objectionable in carding wools.

WOOL-SORTING. The differences in the quality of wool, and especially that from different parts of the fleece, render sorting a necessity. In shearing, the fleece from each sheep sticks together as a mat, and is tied up separately. In sorting, the different parts of the fleece representing separate qualities are torn off by hand. An idea of the location of the various qualities of wool is given by the accompanying diagram of a Leicester lamb's fleece, taken from Bowman's *Structure of Wool Fibre*. The same relative positions hold good in all kinds of fleeces.



FLEECE OF LEICESTER WOOL.

The finest and most even growth of wool is found at A, on the shoulders. In some fleeces this quality extends farther up the back (E) and toward the tail (B and F) than in others, and the quality of the wool at B is not very much inferior, although rather shorter and coarser.

These two qualities would be graded in the woolen trade as picklock and prime or choice, while the wool from the portion indicated by C is frequently finer but shorter than A or B and apt to contain more irregular or colored hairs. When free from these defects C is graded as super in quality. The portions D and E shade into those on each side of them, and as they form the top of the neck and shoulder, the fibre is not as deep or close as at A or C. The portion over the loin (F) resembles B, into which it shades, and for many purposes, especially for spinning down, A, B, E, and F are frequently used together as one quality. Back of F, on the flanks, the wool becomes long and coarse, the best being found in the portions marked G. The wool at H and I is the coarsest part of the fleece, growing in large locks with long coarse hairs. It is often termed 'breach' wool and can only be used for very coarse yarns spinning low numbers. Beyond the extremities of I there is often a still lower quality called 'tail' or 'cow-tail,' which is coarse and hairy and can only be used for the very lowest numbers. The differences in quality of fibre from the same fleece are so great that a large number of sortings can be made, depending upon the character of the fleece and the purposes for which the wool is to be used. The names applied to the different qualities of wool vary in different localities, and even among different manufacturers, and this lack of uniform nomenclature is a source of no little confusion.

OTHER WOOLS. Although the typical wool is produced by sheep, and it is from that animal that much the larger part of the wool supply is obtained, there are several other animals which produce so-called wool for industrial purposes. Among these are several species of goats whose hair can be greatly improved by breeding and management, furnishing a long, fine, silky material from which beautiful textile fabrics are made. No cultivation, however, has yet prevented the growth of the outer hair on goats, as has been done in the case of sheep, or changed the undergrowth of fine hair into true wool. The alpaca goat, closely related to or a variety of the llama of South America, yields a fibre known as alpaca (q.v.). The Angora goat (see GOAT), which yields mohair (q.v.), marks a distinct step toward true wool. The scales are less numerous than in the alpaca, but are more decided and exhibit a more definite edge. The fibres are very fine and wavy, lustrous, pure transparent white, and often 12 inches long, in some cases 18 or 20 inches. The diameter varies from $\frac{1}{850}$ to $\frac{1}{1500}$ of an inch. The annual product of mohair in the United States is estimated at over 1,000,000 pounds. Closely allied to mohair is the fine cashmere wool of India, which is the product of the Cashmere goat, common in the Himalayan Mountains about Tibet. The hair is even longer than that of the Angora goat, but is not as curly. The surface of the fibres is not as brilliant as mohair, and the scales are more numerous but less distinct. Only the finest parts of the fleece are used, the yield from a single goat being rarely more than 3 or 4 ounces. Cashmere wool is said to be the most costly of all the wools. The fine soft hair of the camel approximates true wool in its structure, and should be mentioned in this connection.

Consult: Bowman, *Structure of Wool Fibre* (Manchester, 1885); Dodge, *Sheep and Wool: A Review of the Progress of American Sheep Husbandry*, United States Department of Agriculture, Report No. 66 (1900); Report of Bureau of Animal Industry, 1889-90; Rushworth, *The Sheep* (Buffalo, 1889); Mumford, *The Production and Marketing of Wool*, Michigan Agricultural Experiment Station, Bulletin 178 (1900); Stewart, *Domestic Sheep: Its Culture and General Management* (Chicago, 1898). See SHEEP; SHODDY.

WOOL, MINERAL, MINERAL COTTON, SILICATE COTTON, or SLAG WOOL. A vitreous material resembling wool, made by subjecting slag, when in a molten condition, to a strong blast. It was originally made in Wales in 1840, but the process was found injurious to the workmen, and so the manufacture was abandoned until about thirty years later, when it was taken up in Germany. As now made, a jet of steam is made to strike upon a flowing mass of molten slag as it falls from the spout into the slag-carriers. The steam scatters the slag into globules, and as each globule leaves the molten stream it turns into a fine thread. The threads are sucked into a large tub by a current of air caused by steam jets and are discharged into a large chamber. The product is generally white, but the presence of manganese or potassium produces a green color, while mineral wool from some slags has a pink tinge. As it is fireproof and insect-proof, it has been used generally by architects and builders as a packing for walls. It also possesses value as a non-conductor of sound and is therefore valuable in school buildings and music halls.

WOOL, JOHN ELLIS (1788-1869). An American soldier, born at Newburgh, N. Y. He began the study of law, but on the outbreak of the War of 1812 entered the United States Army, and in April, 1812, became captain in the Thirteenth United States Infantry. He was badly wounded in the battle of Queenstown Heights, and as a reward for his gallantry was in April, 1813, promoted major of the Twenty-ninth Infantry. At Plattsburg in September, 1814, he again distinguished himself, and in December was promoted to the rank of lieutenant-colonel. In 1821 he became inspector-general of the army with the rank of colonel. In 1841 he became a brigadier-general. When the Mexican War began he prepared troops for the field and sent thither about 12,000. He led the Army of the Centre into Chihuahua; then joined General Taylor, and at Buena Vista, as second in command, selected the American position. For his services he was brevetted major-general. By his timely measures he secured Fortress Monroe, and as commander of the Department of Virginia, he occupied Norfolk and Portsmouth in May, 1862. In the same month he was made a major-general in the Regular Army, and retired in August of the following year.

WOOL AND WORSTED MANUFACTURES. The development of the art of spinning and weaving took place so early in the history of civilization that no records of its beginning are preserved, and which of the textile fibres was used first for this purpose is unknown. But certainly the art of producing woven woolen fabrics was practiced by many different peoples at a very early period. At the time of Alexander's expedition to India the natives of that region wore shawls of great beauty. The Greeks learned many processes of woolen manufacture from the Egyptians; the Romans from the Greeks; and from the Romans the knowledge generally passed to the Occidental world. Among the ancients, the method of manufacture was, after thoroughly cleansing the wool, to sort, card, and spin the material by hand. The loom for the weaving was remarkably simple, even crude, but under the delicate manipulation of dexterous fingers, skilled operators produced fabrics that have never been excelled in fineness of texture or delicacy of construction, even at this later day. (See WEAVING and LOOMS.) Woolen garments were worn by the Romans at a very early period. It is probable that the early lessons the ancient Britons received in the art were derived immediately after the Roman conquest, and woolen manufacture as carried on in England was at the outset but a repetition, and afterwards an elaboration and improvement on the methods previously known. It is generally supposed that certain Flemish weavers went to England in the time of William the Conqueror, and obtaining the royal patronage, established the first manufactories of woolen goods. At various periods in the reigns of succeeding monarchs, other Flemish weavers were imported, and established at different points in the kingdom. Henry II. established guilds of weavers in his reign, and the exclusive privilege of exporting woolen cloth was by him granted to the city of London. In the thirteenth century Spain produced her own cloth, and the beauty of her fabrics was celebrated far and wide. Italy followed, and for a time employed processes apparently superior to any others in use.

For many centuries the manufacture of wool was carried on as a household industry, although in occasional instances a large number of looms were gathered together under one roof and their products controlled by a single individual, as in the modern factory. The fulling of the woven fabrics was at an early date developed into a separate business, and here and there on convenient water powers fulling mills sprang up. The use of the teazel-burr for raising the nap on the fulled fabric was of early origin. The distinction between ordinary woolen fabrics and worsteds made from combed wool is mentioned in the earliest records of European wool manufacture. The combing of the wool was done by hand till well into the nineteenth century and the wool-combers formed an important industrial class, but it was not till the latter half of the nineteenth century that all the processes connected with the production of a woolen or worsted thread were grouped together in one establishment.

HISTORY OF THE WOOL INDUSTRY IN THE UNITED STATES. In the United States, as in Europe, the development of the textile mill began with the introduction of the neighborhood fulling mill. Next came the public carding mill, where the wool was converted into rolls ready for the spinning wheel. Previous to its introduction carding had been done by a couple of hand cards, which were small, oblong boards, covered with leather filled with points of fine wire. By manipulating the wool between these teeth the fibre was opened up. (See CARDING.) The first wool-carding machine was put in operation in Pittsfield, Mass., in 1790. The same year, at Newbury, Mass., the first successful woolen mill was put in operation. By 1810 several woolen mills were in operation and the amount of homespun was appreciably lessening, and the value of woolen cloth annually produced as a household industry declined so rapidly that not enough cloth was produced in the factories to make up the deficiency, and large quantities were imported. The value of the factory output from 1820 to 1850 was as follows: In 1820, $4,413,068; in 1830, $14,528,166; in 1840, $20,696,999; in 1850, $49,636,881. The value of imported woolen goods was: in 1821, $7,238,954; in 1831, $13,197,364; in 1840, $10,808,485; in 1850, $19,620,619. By the close of the first half of the nineteenth century all the great improvements which had been invented in textile machinery had been adapted to the woolen industry, and during the last half of the century the development of the industry except as disturbed by war or other political condition, was more steady and natural. The invention of the Crompton loom in 1837 and its successive improvements were of immense importance to the woolen industry. In 1873 the open shed fancy cassimere loom of L. J. Knowles enlarged still more the field of weaving possibilities and facilitated the manufacture of many refractory patterns. Since 1865 automatic wool-scouring machines have been introduced, taking the place of hand washing, and during the same period the carbonizing process of freeing wool from vegetable fibre and mixed shoddy from cotton has come into use. The art of dyeing also advanced. In the United States the woolen industry has been subject to great fluctuations, due to political events, such as the Civil War, which suddenly created an enormous demand for a certain class of woolen goods, and to tariff legislation. Statistics showing the present status of the industry are given at the close of the article.

STRUCTURE OF THE WOOL FIBRE. The wool of the sheep differs from all other fibres, animal or vegetable, on account of its great felting power. (See WOOL.) This is due to its corrugated structure, which makes the individual hairs, when brought in contact at an angle, tend to mat together. Another striking characteristic of wool is the curliness of the fibre. The transformation of wool into cloth is divided into two distinct branches: the manufacture of woolens and the manufacture of worsteds. In making woolen fabrics or cloths the natural characteristics of the fibre—its curliness and felting power—are developed by the manufacturing processes and produce a soft cloth with a nap and with the fibres so matted together that the weave is but slightly visible. In worsted manufacture, the aim is to produce a smooth, wiry yarn, more like that of the other textile fibres, and to this end the fibres are straightened, twisted hard, and the shorter projecting ones which would form a nap combed out. This produces a cloth in which the weave is evident and great variety of design in weaving is possible.

After being sorted, the wool is subjected to a process of beating, not only for the purpose of eliminating the dust and other impurities, but the procedure has the effect of disposing the staple to open and thus render the material softer and less resisting when washed and worked over in the various machines. The wool must be thoroughly dry, else many difficulties will be encountered. If the beating process be well carried out, it will not only dispose of many impurities, but will invariably treble and quadruple the volume of the fibre.

SCOURING. The washing received by the live sheep before the removal of the fleece is not enough for the purposes of the manufacturer. There is a subsequent cleansing which could by no possibility be given while the material was a part of the animal. The necessity of thorough scouring is due not only to the dirt adhering to the wool, but also to the natural fatty secretion, called *yolk* or *suint*, which is in the wool. This oily substance is sometimes reclaimed from the wash-water and sold under the commercial name of *degras*. Soft water is required for washing, because the insoluble lime soap formed in dissolving soap in hard water is deposited on the wool fibre and becomes inextricably entangled. Wool washed with hard water is always harsh to the touch; it takes on dyes unevenly and is not readily cleansed. The washing is performed in a series of rake-scouring machines, the wool being immersed in a cleansing solution and passed back and forth by the automatic machinery, which squeezes out the dirty water and breaks up the grease. The wool is passed from one tub to another, in each of which the cleansing operation is carried a step further until it emerges from the last tub, clean. The wool is then dried in automatic driers, having been first dyed or bleached as required.

The wool having been dried is still found to retain many objectionable features that are not disposed of in the previous manipulations. These are bunches, matted locks, dust, sand, and other impurities, all of which must be removed before the article can go toward final manufacture. The process of removing these objectionable features is termed *willowing* or *willeying* (the latter term being given in honor of the inventor, Willey). It is accomplished by a machine consisting of a large drum and three small cylinders mounted on an inclosed frame. Powerful hooked teeth are geared on a drum which rotates with great rapidity, and the matted sections of wool, being fed into the drum, pass on to the spikes of the lesser cylinders; the matted locks are gently torn asunder, and the whole wool is delivered in a light, free, and disentangled condition. In various of the South American products there is a difficulty which requires additional care. There are little burrs and small adherent seeds which insist on remaining in the wool, no matter what the processes previously described may have accomplished. One method of eliminating them is chemical; another mechanical. In the chemical process, technically known as *carbonization*, the organic matter in the wool is decomposed by the use of chloride of aluminum, chloride of magnesium, strong salt solutions, or acid vapor, after which it is subjected to a baking process. The wool is now cooled and the carbon dusted out. Finally it is washed in a strong soda solution to remove the acids. This process is now used not only to remove the vegetable matter from new wool, but also the cotton from the 'union' shoddy. The operation of burring is sometimes performed by mechanical burr-pickers which crush the brittle burrs under powerful, closely set rollers, without injury to the more elastic and flexible wool. The pieces are then shaken out.

MIXING. This is an operation of great importance designed to secure uniform quality of yarn. It is accomplished by spreading the wool from different lots or from two or more qualities or colors into as many thin layers as possible, one on top of another. The greater the amount of wool mixed and the more thorough the mixing, the better will be the quality of the cloth produced. If other materials are to be added to the wool, as silk, cotton, or shoddy, the blending of these with the wool is performed at this stage.

OILING. The wool having been thoroughly cleansed is more or less harsh and wiry to the touch, owing to the removal of its natural lubricant, the yolk. To restore its natural pliancy it is, while being mixed, slightly oiled, either by hand or machine. Oiling also imparts a certain adhesiveness to the fibres, useful in the subsequent operations. The lubricant usually employed is oleine, olive oil, or lard oil.

DIFFERENCE BETWEEN WOOLEN AND WORSTED PROCESS. The preliminary operations thus far described are common to all manufactures. But at this point the two branches of wool manufactures separate. In making woolen yarn the wool is simply carded and loosely spun; in making worsted thread the wool is combed and the thread is twisted until it becomes very hard. In making woolen goods a short-stapled wool may be used and a fibre having good felting qualities is preferred. The opposite characteristics are sought in wool to be used in the manufacture of worsted. During the process of combing, described later on, the short fibres, known as *noils*, are pulled out and cast aside to be utilized in the woolen mill.

Returning to the process of woolen as distinguished from worsted manufacture, the wool, now oiled and thoroughly mixed, is next passed through a wool-picker, the object of which is to loosen up the fibres. The wool is then passed through a series of carding machines similar to those used in the manufacture of cotton. See COTTON and SPINNING.

CARDING. This process produces a thread whose fibres lie loosely projecting from the main thread in little ends which form the nap of the finished cloth. The condensing machine is attached to the cards, and its object, as the name implies, is to condense or reduce into compact slivers the sheet of fibres delivered by the last main cylinder of the carding engine. The condensed fibre is simultaneously wound on spools, and is ready to be passed on to the spinning department, where it is converted into a finished thread ready to be woven into cloth. See SPINNING.

WORSTED MANUFACTURE. In making a worsted thread, if a comparatively short or medium staple fibre is used, the wool is first carded as in woolen manufacture. But if a very long staple wool is used, having a fibre five inches or more long, the wool is not carded at all, because the fibre would be broken by the cylinder engaging it before it was released from the preceding cylinder. There is still a third class of worsted yarns, such as are required for carpet-weaving, where a soft open thread is desired, which are not combed at all, but are carded, drawn, and spun. With the exception of this third class of worsted yarns, the first distinctive operation, after the wool has received the preliminary treatment already described, is *gilling*. The object of gilling is to level the fibres and make them parallel. The machine by which this is accomplished consists of a pair of rollers which catch the wool, and of a second pair of rollers, which draw it forward over heavy steel bars, called *fallers*, covered with projecting steel pins. The machines are generally used in sets, each successive machine having the pins on the rollers finer and more closely set than the preceding. The wool is fed to the rollers; it is caught by the rows of steel pins which rise in close and constant succession and penetrate the wool presented to them, traveling forward with it to the second pair of rollers, which in their turn catch the fibre and draw it away. The *fallers* are so called because when they accomplish their journey, they, by the aid of the agency of an endless screw mechanism, fall down, and by the action of other endless screws are returned to their original position. There is thus a continuous line of fallers traveling between the feed-rollers and the back-rollers, and there is a steady and constant drawing of wool away from the front rollers and through the teeth of the fallers. Five or six of these machines usually constitute a set. They are all constructed on the same principle, but with the pins finer and more closely studded as the fibre travels onward. In the first three machines it is usual to have the wool delivered in the form of a broad *lap*, but in the later machines, or *gill-boxes*, as they are called, the product is condensed into a *sliver* and is received in large cylindrical cans. Six of these cans are brought to the front of the next gilling machine, and the six slivers are fed in, and passing through are drawn into and delivered as one. The operation is repeated three or four times, and the fibres are brought even with each other and a very level and uniform thread produced.

After the worsted has been gilled and combed it is put through drawing machines, much like those used in cotton-spinning. It is then spun, the worsted thread being twisted much harder in spinning than woolen thread. The spun yarn is now reeled, warped, beamed, sized, and otherwise prepared for weaving.

For the process of weaving, the articles on WEAVING and LOOMS should be consulted. The woven fabric requires several supplementary operations. The character and appearance of woolen fabrics is more altered by these finishing operations than any other material. Indeed, different fabrics may owe their distinctive peculiarities wholly to their finish, the process of manipulation up to this point being exactly identical. In woolen goods, owing to the nap and its felting power, patterning is much less effective than in the weaving of worsted, but a greater variety of effects due to the character of the finish is possible. Among the principal varieties of finish of woolen goods are the dress-faced or doeskin finish, the velvet or erect pile finish, the Scotch or Melton finish, and the bare-faced finish. In the *dress-face finish* the nap is raised and spread in one direction over the face of the cloth so as to hide completely the warp and weft threads. To this class belong broadcloths, beavers, and the other woolen fabrics having a nap. The *velvet* finish is another form of finish with a heavy nap. In overcoatings and similar materials the nap is formed in little curls on the outer surface of the goods. In other goods it is left standing out like velvet. In the *bare-face finish* the nap is sheared off completely. While the process of finishing the woven fabric differs according to the character of the desired finish, the general method is the same. The first step is known as *fulling* or *milling*. The operation of fulling, or milling, is to saturate the cloth with hot soap and water, when it is worked either by the fulling stocks or the fulling machine, or pressed and rubbed between rollers in the more modern milling machine. The more the cloth is soaked and beaten, the more it will shrink, and the operation can be carried on till the cloth is reduced to half its original length and breadth. The degree of fulling is a distinctive feature of many varieties of goods. In broadcloths, and all kinds of nap-finished goods, the milling is carried on until the fibres become densely matted, and the appearance of weaving is entirely obliterated. Venetian cloths and diagonals, to which no pile-finish is given, are fulled or milled only enough to give them solidity and strength. Tweeds have still less. The proper stage of beating or rolling having been reached, the soapsuds is gradually supplanted with pure water, tepid at first, but each new supply being cooler, until the fabric is finally worked in thoroughly pure and cold water.

On being taken from the machine the cloth is stretched uniformly in all directions by hooks on a frame, that it may dry without wrinkle or curl. At this stage the operation of *teasling* is entered upon. This is the raising of the *pile* or *nap* by the agency of the cone-like spike-head of the teasel, a plant of the genus Dipsacus. The head is covered with imbricated scales which end in sharp recurved hooks of great elasticity, but stiff enough to do the work required. The work was formerly done by hand manipulation, but is now accomplished by the *gigging machine*, or *gig mill*, where the teasels are arranged on the face of revolving cylinders before which the fabric is made to pass. By this operation the loose ends of the wool are drawn to the surface, thereby forming the nap. Wire teasels are sometimes used, but nature's creation of the vegetable teasel is regarded as having never been improved upon.

The pile is now trimmed to produce uniform surface. Formerly the work was done by hand with huge shears, but now a machine containing a cylinder armed with a series of helical knives, and made to revolve with great rapidity, is employed. The machine was invented by Leonardo da Vinci, but not brought into practical use until 400 years later.

The final process is the brushing of the cloth, winding it tightly around a huge drum, and immersing it in hot water. It remains in that condition for three or four hours, when it is unwound, the ends reversed and rewound, and again the cloth is subjected to the hot-water process. The closing act in its manufacture is the pressing in a hydraulic press, during which time steam is forced through it, this last proceeding adding to the solidity and smoothness of the cloth, and developing the lustre characteristic of a well-finished fabric.

UTILIZATION OF WASTES. *Shoddy* is wool recovered from woolen fabrics that are not heavily felted or milled. *Mungo* is made from fragments of felted or milled cloth, and the fibre is therefore shorter. These two terms, however, are often used with different meanings and are sometimes interchangeable. (See SHODDY; MUNGO.) *Extract wool* is wool produced from goods which are part wool and part cotton, the wool being extracted by the process of carbonization already described. In 1900 71,496,508 pounds of shoddy were used in wool manufacture in the United

WOOL PRODUCED AND IMPORTED, DOMESTIC EXPORTS AND ANNUAL SUPPLY OF THE UNITED STATES, 1881 TO 1900, INCLUSIVE

YEARS	Domestic production (Department of Agriculture), pounds	Imports entered for consumption year ending June 30, pounds	Total production and imports, pounds	Domestic exports year ending June 30, pounds	Net supply, pounds	Per cent. of imports to supply
1881	240,000,000	67,416,967	307,416,967	71,455	307,345,512	21.9
1882	272,000,000	63,016,769	335,016,769	116,179	334,900,590	18.8
1883	290,000,000	53,049,967	343,049,967	64,474	342,985,493	15.5
1884	300,000,000	87,703,931	387,703,931	10,393	387,693,538	22.6
1885	308,000,000	68,146,652	376,146,652	88,006	376,058,646	18.1
1886	302,000,000	107,910,549	409,910,549	147,023	409,763,526	26.3
1887	285,000,000	114,404,173	399,404,173	257,940	399,146,233	28.7
1888	269,000,000	97,231,267	366,231,267	22,164	366,209,103	26.6
1889	265,000,000	126,181,273	391,181,273	141,576	391,039,697	32.3
1890	276,000,000	109,902,105	385,902,105	231,042	385,671,063	28.5
1891	285,000,000	119,390,280	404,390,280	291,922	404,098,358	29.5
1892	294,000,000	134,622,366	428,622,366	202,456	428,419,910	31.4
1893	303,153,000	175,636,042	478,789,042	91,858	478,697,184	36.7
1894	298,057,384	45,726,056	343,783,440	520,247	343,263,193	13.3
1895	*309,748,000	265,726,348	575,474,348	4,279,109	571,195,239	46.5
1896	*272,474,708	228,647,543	501,122,251	6,945,981	494,176,270	46.3
1897	*259,153,251	350,250,028	609,403,279	5,271,535	604,131,744	58.0
1898	*266,720,684	70,334,897	337,055,581	121,139	336 934,442	20.9
1899	*272,191,330	77,388,192	349,579,522	1,683,419	347,896,103	22.2
1900	†309,991,812	128,250,945	438,242,757	2,200,309	436,042,448	29.4

* Estimate of the National Association of Wool Manufacturers.
† Census of 1900.

THE WORLD'S PRODUCTION OF WOOL IN 1900

Of the World's wool production 2,092,389,013 pounds are of classes one and two, washed and unwashed, and 592,716,000 pounds of class three of the American tariff classification.

COUNTRIES	Pounds
North America:	
United States†	288,636,621
British Provinces	12,000,000
Mexico	5,000,000
Total	305,636,621
Central America and West Indies	5,000,000
South America:	
Argentina	370,000,000
Brazil	1,500,000
Chile	7,500,000
Uruguay	96,000,000
Venezuela	15,000,000
All other South America	20,000,000
Total	510,000,000
Europe:	
Great Britain and Ireland*	140,232,392
France	103,610,000
Spain	102,600,000
Portugal	13,410,000
Germany	49,590,000
Italy *	21,451,000
Austria-Hungary	64,300,000
Russia, inc. Poland	361,100,000
Sweden and Norway	8,200,000
Turkey and Balkan Peninsula	67,500,000
All other Europe	14,000,000
Total	945,993,392
Asia:	
Russia	60,000,000
Central Asia	46,000,000
British India	85,000,000
Asia—*Continued*:	
Asiatic Turkey	33,000,000
China	35,000,000
All other Asia	15,000,000
Total	274,000,000
Africa:	
Algeria and Tunis	30,425,000
Cape Colony, Natal, Orange Free State	100,000,000
Egypt	3,000,000
All other Africa	1,000,000
Total	134,425,000
Australasia	510,000,000
Oceanica	50,000
Grand total	2,685,105,013

* Fleece washed. Great Britain and Ireland, product of 1899. † Washed and unwashed,

THE WORLD'S WOOL SUPPLY SINCE 1860

COUNTRIES	1860, pounds	1870, pounds	1880, pounds	1890, pounds	1900, pounds
United Kingdom	140,000,000	150,000,000	149,000,000	*138,392,215	*140,232,392
Continent of Europe	500,000,000	485,000,000	450,000,000	805,761,000	805,761,000
North America	110,000,000	176,000,000	270,000,000	289,191,330	305,636,621
Australasia	60,000,000	175,000,000	308,000,000	520,000,000	510,000,000
Cape Good Hope	26,000,000	43,000,000	60,000,000	105,000,000	100,000,000
River Plate	43,000,000	197,000,000	256,000,000	460,000,000	466,000,000
Other countries	76,000,000	69,000,000	133,000,000	363,475,000	357,475,000
Grand totals	955,000,000	1,295,000,000	1,626,000,000	2,681,819,545	2,685,105,013

* Returns of the United Kingdom are for the preceding year.

States. In other words, of the total raw material 76.9 per cent. was new wool and 23.1 per cent. shoddy. These second-hand or recovered wools are reduced to fibre in grinding machines, from which they emerge in a flossy wool-like state.

Flocks are soft fluffy fibres which are cast out of the machines during the various processes of cloth manufacture. *Noils* are simply the shorter and more curly fibres which are pulled out during the process of wool-combing for worsted manufacture. Both of these wastes are used in woolen manufactures.

Sophistication. The practice of weighting woolen and worsted fabrics prevails, as does the sophistication of silk. The goods are soaked in mineral salts, such as sulphates of alum, lead, zinc, and magnesium, which increases their weight from 15 per cent. up.

Statistics. According to the Twelfth Census of the United States there were in 1900 2653 establishments in the country devoted to various branches of wool manufacture, which put forth an annual product of $392,473,050. Of the 2653 establishments, 1035 were woolen mills, 186 worsted mills, 133 carpet factories, 36 felt goods factories, 24 wool hat mills, 921 hosiery and knit goods factories, 171 fur hat factories, 105 shoddy mills, 25 wool-scouring plants, also 17 penal or other institutions whose inmates are engaged in some branch of wool manufacture. Deducting the last named class and also factories for hosiery and knit goods, shoddy mills, and wool-scouring establishments, the number of woolen mills in 1900 was 1414, as against 1675 in 1850. These figures, however, simply show to what extent the industry has been concentrated in large establishments, for the capital invested in 1900 was $310,179,749, and in 1850 only $31,971,631, and the value of products in 1900 was $296,990,484 and in 1850 only $48,608,779. During 1900 48 new woolen mills were constructed, as against 49 in 1899, 25 in 1898, 53 in 1897, and 31 in 1896.

The unit of calculation for the productive capacity of a woolen mill is the set of carding machines necessary to prepare the wool for spinning. The corresponding unit for a worsted mill is the combing machine, which, in its productive capacity, is taken to be equivalent to 2½ sets of cards for the same fineness and quality of work.

Consult: Beaumont, *Woolen and Worsted Cloth Manufacture* (London, 1890); Posselt, *Textile Fibres and Fabrics* (Philadelphia, 1891); Losters, *Manufacture of Wool and Worsted* (London, 1900); Sadtler, *Industrial Organic Chemistry* (Philadelphia, 1900); Vickerman, *Woolen Spinning* (London, 1894).

WOOL'LETT, William (1735-85). An English draughtsman and line engraver. He was born at Maidstone, and studied under John Tinney at London and in Saint Martin's Lane Academy. His earlier plates were topographical, but with his "Temple of Apollo" (1760), after Claude Lorraine, and his "Niobe," after Richard Wilson, he attained the rank of principal engraver in England. He engraved other landscapes after Wilson before attempting his most celebrated work, the "Death of General Wolfe" (1776), after Benjamin West, which brought him the title of "Historical Engraver to His Majesty;" it was followed by the "Battle of La Hogue," also after West, of almost equal celebrity. His plates aggregate about a hundred. In landscape he made great progress upon his predecessors in perspective, light, and atmosphere, and his figure subjects are especially good in line.

WOOL'LEY, John Granville (1850—). An American prohibitionist. He was born at Collinsville, Ohio; graduated at the Ohio Wesleyan University in 1871; was admitted to the bar of the Illinois Supreme Court in 1873 and of the United States Supreme Court in 1885; was city attorney of Paris, Ill., in 1876-77, and was State attorney in Minneapolis in 1884-86. After about 1890 he devoted himself largely to writing and lecturing against intemperance, to which he himself had formerly been addicted, and spoke frequently before large audiences both in the United States and in England. In August, 1899, he became editor of *The New Voice*, and in 1900 was the candidate of the Prohibition Party for President of the United States, receiving a popular vote of 208,914.

WOOLLY APHIS, or Plant-Louse. The woolly root-louse of the apple (*Schizoneura lanigera*), which, like many other aphides, secretes a greater or less quantity of wax in the form of wool-like fibres. This is a cosmopolitan species, probably of American origin, known in the English colonies as 'American blight' and in Germany as 'Blut laus.' It is a small plant-louse which has an abundant secretion of waxy fibres, and occurs both upon the roots of the apple under ground and upon the rough portions of the stems as well as about the young shoots and water-sprouts coming from the lower part of the trunk. The attacks of the subterranean form on the roots produce galls or swellings, and in the cracks of these galls the insects occur in great numbers. The vitality of the plant is greatly reduced and young trees soon die. In general, the life history resembles that of other plant-lice and the methods of control are similar. See Aphid. Consult Marlatt, *The Woolly Aphis of the Apple* (United States Department of Agriculture, Washington, 1897).

WOOL'MAN, John (1720-72). A Quaker preacher and social reformer, born in Northampton, N. J. His early years were spent on a farm, as store-clerk, and as teacher of poor children. About 1741 he began to speak at meetings of the Friends. In 1746 he set out with a companion to visit Friends in the backwoods of Virginia, and afterwards spent most of his life on similar journeys, supporting himself by work as a tailor. He died at York, England. His writings include a *Journal of John Woolman's Life and Travel in the Service of the Gospel* (1775, reëdited by John G. Whittier, 1871); *Some Considerations on the Keeping of Negroes* (1753-1762); *Considerations on Pure Wisdom and Human Policy, on Labor, on Schools, and on the Right Use of the Lord's Outward Gifts* (1768). *Serious Considerations with Some of His Dying Expressions* was published posthumously (1773), his *Works*, including some unpublished manuscripts, in 1774-75. Although somewhat too other-worldly, and lacking in poetic color, his *Journal* still deserves to be read, and it ranks as a minor classic.

WOOL'NER, Thomas (1825-92). An English sculptor and poet, born at Hadleigh, Suffolk. He was educated at Ipswich and in London, first in the studio of William Behnes and afterwards at the Royal Academy. In 1843 he exhibited his first work, "Eleanor Sucking the Poison from the Arm of Prince Edward." This and other works attracted some notice, but brought him little income, and from 1848 to 1852 he devoted himself to making portrait medallions, by which he earned only a meagre livelihood. In 1847 he made the acquaintance of Rossetti, and in 1850 he was one of the "Pre-Raphaelite Brotherhood" which published the short-lived *Germ.* To this periodical he contributed several statuesque poems, notably "My Lady Beautiful," afterwards republished in book form (1863). He became an associate of the Royal Academy in 1871 and an Academician in 1874. Woolner's statues are characterized by much dignity, and his portrait busts and medallions are faithful as well as pleasing. Among his important works are busts of Tennyson (1857 and 1873), Darwin, Newman, Maurice, Carlyle, Gladstone, Dickens, Kingsley, Temple, Huxley, Rajah Brooke, and Archdeacon Hare; statues of Lord Macaulay (1866), of Dr. Whewell (1873), of John Stuart Mill (1878), and of Bishop Fraser (1888); and groups and figures. He published several volumes of verse. Consult: Stephens, in the *Art Journal* (March, 1894), and Garnett, in the *Dictionary of National Biography.*

WOOL'RYCH, Humphry William (1795-1871). An English legal writer, born at Southgate, Middlesex. He was educated at Eton College, Saint Edmund Hall, Oxford, and Lincoln's Inn, whence he was called to the bar in 1821. He wrote many legal volumes, the more important of which are *Rights of Common* (1824); *Law of Certificates* (1826); *Law of Ways* (1829); *Commercial and Mercantile Law of England* (1829); *Law of Waters and Sewers* (1830); and *Treatise on Misdemeanours* (1842).

WOOLSACK. The name given to the seat of the Lord Chancellor of England in the House of Lords. It is composed of a large square bag of wool without either back or arms, and covered with red cloth. The woolsack was introduced in the House of Lords as the Chancellor's seat during the reign of Queen Elizabeth, as a memento of an act which was passed against the exportation of wool, then one of the main sources of the national wealth of England.

WOOL'SEY, Sarah Chauncey (1845—). A popular writer for young people under the pseudonym Susan Coolidge. She was born in Cleveland, Ohio, and subsequently lived in Newport, R. I. Her books include: *The New Year's Bargain* (1871); *What Katy Did* (1872), the beginning of a series of stories for young girls; *Verses* (1880); *A Guernsey Lily* (1881); *Mischief's Thanksgiving, and Other Stories* (1884); *A Little Country Girl* (1885); *Ballads of Romance and History* (1887); and *A Short History of the City of Philadelphia* (1887). She was editor of *The Autobiography and Correspondence of Mrs. Delaney* (1879), and *The Diary and Letters of Frances Burney* (1880).

WOOLSEY, Theodore Dwight (1801-89). An American scholar, a descendant of Jonathan Edwards and a nephew of Timothy Dwight. He was born in New York City, where his father, William W. Woolsey, was a prosperous merchant. After graduating at Yale in 1820, he spent a year in the study of law at Philadelphia, and two years at Princeton in the study of theology. He returned to New Haven and became a tutor in Yale, and then went abroad to pursue the study of Greek in Leipzig, Bonn, and Berlin. From 1831 to 1846 he was professor of Greek at Yale. For the promotion of classical literature he edited the *Gorgias* of Plato and four Greek tragedies. In 1846 he was chosen president of Yale, and, in accordance with precedents, he was then ordained to the ministry of the Congregational Church. The breadth and accuracy of his scholarship were soon impressed upon the college, and were particularly felt among the academic undergraduates. Leaving Greek to younger men, he devoted himself to instruction in history, political economy, and political science, and especially international law. He was a frequent preacher in the college pulpit, and an influential, though not a conspicuous, leader of public opinion during the stirring events which led up to the Civil War and the subsequent period of reconstruction. At the end of a quarter of a century, when he had reached the age of seventy, he resigned the presidency, continuing for a time to lecture on international law. During his administration Yale College advanced in wealth and influence and two new departments, the Scientific School and the School of the Fine Arts, were begun. He was one of the founders of the *New Englander,* and a frequent contributor to its pages; chairman of the American commission for the revision of the Authorized Version of the Bible; president of the World's Evangelical Alliance at its international meeting in New York; a lifelong member and at one time president of the American Oriental Society; and a regent of the Smithsonian Institution. His principal publications are: Editions of the *Alcestis* of Euripides (1834), of the *Antigone* of Sophocles (1835), of the *Prometheus* of Æschylus (1837), of the *Electra* of Sophocles (1837), and of the *Gorgias* of Plato (1843); an edition of Lieber's *Civil Liberty and Self-Government* (1871), and *Manual of Political Ethics* (1871); an *Introduction to the Study of International Law* (1860; many times republished); *Essays on Divorce and Divorce Legislation* (1869); *Religion of the Present and Future,* a collection of sermons (1871); *Political Science, or the State Theoretically and Practically Considered* (1877); *Communism and Socialism, in Their History and Theory* (1880); and *Helpful Thoughts for Young Men* (1882).

WOOLSEY, Theodore Salisbury (1852—). An American professor of law, born at New Haven, Conn., son of the preceding, and educated at Yale University and Law School, after which he traveled in Europe. In 1877 he became instructor in public law at Yale, and in 1878 professor of international law, and for a time dean of the Law School. He was one of the founders of the *Yale Review* and a frequent contributor. He wrote several essays which were collected under the title of *America's Foreign Policy* (1892), and he edited *Woolsey's International Law* and *Pomeroy's International Law.*

WOOLSON, Constance Fenimore (1848-94). An American novelist, born in Claremont, N.

H. She was a grandniece of James Fenimore Cooper. She was educated in Cleveland, Ohio, and at a French school in New York City. She lived first at Cleveland, then (1873-79) in Florida and the neighboring States, and thereafter chiefly in Italy, at Rome, Venice, and Florence. Her first literary work appeared in *Harper's Monthly* in 1870, and here much of her subsequent writing was published. Her volumes were: *The Old Stone House* (1873); *Castle Nowhere: Lake-Country Sketches* (1875); *Two Women: a Poem* (1877); *Rodman the Keeper: Southern Sketches* (1880); *Anne* (1882); *For the Major* (1883); *East Angels* (1886); *Jupiter Lights* (1889); *Horace Chase* (1894), which may be regarded as her best piece of work: and *The Front Yard, and Other Italian Stories* (1895). "No woman," says Mr. Stedman, "of rarer personal qualities, or with more decided gifts as a novelist, figured in her own generation of American writers." Miss Woolson excellently depicted native and local American types.

WOOL'WA. A Central American linguistic stock. See ULUA.

WOOLWICH, wo͞ol'ĭch *or* -ĭj. A metropolitan borough of London, England, formerly a town, in Kent, on the Thames, 9 miles east of Saint Paul's Cathedral (Map: London, E 9). The royal arsenal, the largest in Britain, contains war stores and establishments for manufacturing them, comprising three departments called the gun factories, carriage department, and laboratory. The arsenal covers 593 acres and employs over 14,000 men. On the common, south of the town, is the Royal Military Academy for the education of cadets for the artillery and engineers. Population, in 1891, 40,860; in 1901, 41,607.

WOON'SOCKET. A city in Providence County, R. I., 16 miles north by west of the city of Providence, on the Blackstone River, here spanned by a fine bridge, and on the New York, New Haven and Hartford Railroad and its leased lines (Map: Rhode Island, B 1). It has the Sacred Heart College and the Harris Institute Library with 15,000 volumes. There are three public parks, and a soldiers' monument. Woonsocket is primarily an industrial city, being especially known for the manufacture of cotton and worsted goods. Other important manufactures include foundry and machine-shop products, knit goods, hosiery, rubber, etc. In the census year 1900 the various industrial establishments had an invested capital of $14,279,361, and a production valued at $15,627,539. The water-works are the property of the city. Population, in 1890, 20,830; in 1900, 28,204. Woonsocket was settled about 1666; in 1867 it was incorporated as a town and in 1888 was chartered as a city. Its area was enlarged in 1871 by the annexation of a portion of Smithfield. Consult Richardson, *History of Woonsocket* (Woonsocket, 1876).

WOORALI. A South American vegetable poison. See CURARI.

WOOS'TER. The county-seat of Wayne County, O., 52 miles south by west of Cleveland, on the Pennsylvania and the Baltimore and Ohio railroads (Map: Ohio, G 4). It is the seat of the University of Wooster (Presbyterian), opened in 1870, and has a public library, and the Ohio Agricultural Experiment Station, which possesses fine buildings and grounds. The principal manufactures include boilers, engines, farm implements, flour, lumber products, pianos, glass, etc. The water-works are the property of the municipality. Wooster (named in honor of General David Wooster, q.v.) was laid out in 1808, and was incorporated in 1817. It received a city charter in 1868. Population, in 1890, 5901; in 1900, 6063.

WOOSTER, DAVID (1710-77). An American soldier. He was born in Stratford, Conn., graduated at Yale in 1738, and, entering the provincial army in 1739, served throughout King George's War (q.v.), acting as captain in the Louisburg expedition of 1745, and commanding for a time the sloop-of-war *Connecticut*. He became colonel of a Connecticut regiment in 1755, and served throughout the French and Indian War, during which he rose to the rank of brigadier-general. He was appointed collector of customs at New Haven, but resigned on the approach of the Revolutionary War, and was one of the eight brigadier-generals appointed by Congress in June, 1775. After serving in Canada, where for a time, owing to the death of General Montgomery, he held the chief command, he resigned to become major-general of Connecticut militia, and was mortally wounded (April 26, 1777) near Danbury, while defending that place against the attack of General Tryon.

WORCESTER, wu̹s'tẽr. The capital of Worcestershire, England, in the centre of the Severn Valley, on the eastern bank of the river, 27 miles southwest of Birmingham (Map: England, D 4). The most important public buildings are the cathedral, the shire-hall, the guild-hall, the county prison, the city library, the Worcester museum, the corn exchange, the music-hall, and a city grammar school, founded by Queen Elizabeth. A cathedral, dedicated to Saint Peter, was founded as early as the seventh century. In 1084 Bishop Wulfstan laid the foundation of a new cathedral, which was not completed till 1216. Restored since 1855, it is now distinguished by the simplicity, if not plainness, of the exterior, which is amply compensated for by a fine perspective, the lofty roof, and generally charming effect of the interior. The tombs of King John, of Arthur, Prince of Wales (eldest son of Henry VII.), and of Bishop Gauden (q.v.), are the chief ancient monuments in the building. The city owns the water and electric lighting works, slaughter-houses, markets, and cemeteries, and maintains a large recreation ground, swimming baths, technical and art schools, and a public library. Glove-making, leather dressing and staining, porcelain factories, ironworks, locomotive-engine factories, tanning and currying, horse-hair weaving, vinegar, wine and sauce making, coach-building, and the manufacture of chemical manures and agricultural implements are the chief industries. The frequent discovery of ancient remains proves that Worcester was a Roman station. It became a city under the kings of Mercia, and holds charters from Richard I. and subsequent monarchs. Here Cromwell overthrew a Scotch army under Charles II., September 3, 1651. Population, in 1891, 42,908; in 1901, 46,623.

Consult Curzon, *Manufacturing Industries of*

Worcestershire (Birmingham, 1883); Brassington, *Historic Worcestershire* (ib., 1894-95).

WORCESTER. The second city of Massachusetts, and one of the two county-seats of Worcester County; 44 miles west-southwest of Boston and nearly the same distance north-northwest of Providence, R. I. (Map: Massachusetts, D 3). It has one union railroad station, occupied by the three railroads which have leased the local companies and now cover the larger part of New England: the New York Central, the New York, New Haven and Hartford, and the Boston and Maine. The street railway system reaches every part of the city and extends into nearly all the neighboring towns. A line was opened to Boston in 1903.

Worcester is mainly situated in a valley, surrounded by hills of moderate elevation, and is about 500 feet above sea level. There are ten public parks, comprising 400 acres. The largest are Lake Park, of 110 acres, and Elm Park, of 86 acres. Among the important edifices of a public or semi-public character are the new city hall, court house, art museum, public library, which contains 137,000 volumes, the post-office, State armory, State lunatic asylum, five hospitals, and the buildings of the Women's Club, the American Antiquarian Society, the Worcester Society of Antiquity, the Young Men's Christian Association, the Young Women's Christian Association, and the State Mutual Assurance Company. The public school system includes three high schools. Worcester is the seat of Clark University (q.v.), the College of the Holy Cross (see HOLY CROSS, COLLEGE OF THE), of the Worcester Polytechnic Institute (q.v.), of a State normal school, and the Worcester Academy and the Highland Military Academy.

Worcester is preëminently a manufacturing city. The largest establishment in the city employs more than 4000 men in the making of every kind of wire. The Crompton and Knowles Loom Works employ 2500 men. Some of the other well-known manufactories are those of the Norton Emery Wheel Company, the Plunger and the Standard Elevator companies, the U. S. Envelope Company, the Worcester and the Globe Corset companies, the Coes Wrench Company, the Whittall carpet mills, the Harrington and Richardson Arms Company, and the Bradley Car Works. Besides these there are many smaller establishments for the manufacture of firearms, boots and shoes, clothing, food preparations, leather, machinery, machinists' tools, woven-wire goods, and woolens.

The government is vested in a mayor, elected annually, a board of nine aldermen elected at large, with minority representation, and a board of councilmen, three from each of the eight wards. These two boards constitute the City Council, and elect the heads of departments and have power to confirm or reject nominations made by the mayor to either board. The amounts paid for the support of the principal departments in 1902 were: for schools, $552,300; for the fire department, $194,300; for the police department, $153,600; for streets, $536,000; for the public library, $50,400; for the support of the poor, $78,800. The net funded debt is $5,682,887.92; and the valuation of taxable property is $116,211,511. The water-works are owned by the city and have cost $3,901,118. The sewerage system now includes 162.75 miles of sewers. It has cost $5,341,534.

The population in 1800 was 2411; in 1820, 2962; in 1850, 17,049; in 1870, 41,405; in 1880, 58,291; in 1890, 84,655; and in 1900, 118,421. More than half of the population in 1900 was of foreign parentage, principally Irish, Swedish, and Canadian. More than 40 different nationalities were represented.

A settlement called 'Quansigamog Plantations' was made here in 1673, but on the outbreak of King Philip's War in 1675 it was abandoned. In 1684 the place was resettled and called Worcester (from Worcester, England), but was again virtually abandoned on account of difficulties with the Indians in 1702. The permanent settlement dates from 1713. In 1722 Worcester was incorporated as a town, and in 1848 it was chartered as a city. In 1775 Isaiah Thomas (q.v.), the publisher, removed hither from Boston, and from 1790 to 1800 Worcester was one of the most important publishing centres in the United States. Consult: Hurd, *History of Worcester County* (Philadelphia, 1889); Rice (ed.), *Worcester in 1898* (Worcester, 1899).

WORCESTER, DEAN CONANT (1866—). An American zoölogist and writer, born at Thetford, Vt., and educated at the University of Michigan. While still an undergraduate he visited the Philippine Islands as a member of the Steere scientific expedition (1887-88), and in 1890 returned to that archipelago as one of the leaders of the Menage expedition. He remained there three years, studying not only the fauna of the islands, but their topography, history, and inhabitants. From 1893 he was instructor in zoölogy at the University of Michigan, and in 1895 was made assistant professor and curator of the zoölogical museum. In January, 1899, he was appointed a member of the United States Philippine Commission. His publications include various papers on the birds and mammals of the Philippines, several articles on political and social conditions in the islands, and *The Philippine Islands and Their People* (1898), a work of great value.

WORCESTER, EDWARD SOMERSET, second Marquis of (1601-67). An English nobleman and inventor, the son of the first Marquis of Somerset. In early life he devoted himself to mathematical and mechanical researches. In 1641 he entered the service of Charles I., who, in 1645, sent him to treat secretly with the Irish Catholics and to raise troops for service in England. The secret was discovered, Worcester was imprisoned on the charge of treason, and Charles I. disowned him. After his release Worcester spent four years in voluntary exile, and upon his return to England in 1652 was imprisoned in the Tower until 1654. Worcester wrote *A Century of the Names and Scantlings of Such Inventions as at Present I Can Call to Mind to have Tried and Perfected* (1663), in which he described a steam-engine as an admirable and most forcible machine for "driving up water by fire." Though he is known to have erected great water-works at Vauxhall, there is no proof that he constructed the engine described above. Consult Dircks, *The Life, Times, and Scientific Labors of the Second Marquis of Worcester*, with an annotated reprint of his *Century of Inventions* (1865).

WORCESTER, Joseph Emerson (1784-1865). An American lexicographer and pedagogical writer, born at Bedford, N. H. A graduate of Yale (1811), he taught at Salem, and after a brief stay at Andover moved to Cambridge (1819), where he devoted himself to study and writing till his death. He had already published a *Geographical Dictionary* (1817, enlarged 1823), and a *Gazetteer of the United States* (1818). At Cambridge he produced in rapid succession a number of text books in history and geography. He began his work in lexicography in 1828 by an edition of Johnson's *Dictionary* and an abridgment of *Webster's American Dictionary* (1829). In 1830 he published a *Comprehensive Pronouncing and Explanatory English Dictionary.* From 1831 to 1843 he edited *The American Almanac.* In 1846 he issued *A Universal and Critical Dictionary,* and after a suspension of his labors, owing to failure of his eyes (1847-49), repeatedly enlarged this until it became the great quarto *Dictionary of the English Language* (1860), the first illustrated dictionary in English. Worcester's various dictionaries were the first in America to take an objective rather than a didactic position toward the language. In contrast especially to the work of Webster, they sought to represent the language as it was rather than to mold it in special forms. An enlarged edition of the quarto *Dictionary* appeared in 1881. In method it has been the model for many successors.

WORCESTER, Noah (1758-1837). A New England theologian, born at Hollis, N. H. He served in the Continental Army during the War of Independence; in the New Hampshire Legislature; was licensed as Congregational preacher in 1786; ordained pastor at Thornton in 1787; and in 1802 was employed as State missionary. From 1810 to 1813 he had a ministerial charge at Salisbury, N. H., and then moved to Brighton, Mass., where he began a prolific literary career as editor of *The Christian Disciple* (1813-18), followed by *The Friend of Peace* (1819-29). He was active in founding the American Peace Society (1815). Among his more noteworthy publications are *Respectful Address to the Trinitarian Clergy* (1812), *The Atoning Sacrifice: a Display of Love not of Wrath* (1829), and *Last Thoughts on Important Subjects* (1833). Consult Ware, *Memoirs of Noah Worcester, D.D.* (Boston, 1844).

WORCESTER, Thomas (1795-1878). An American Swedenborgian divine. He was born at Thornton, N. H., son of Noah Worcester (q.v.); graduated at Harvard, 1818; was the first Swedenborgian minister in Massachusetts, being pastor of the Boston Society, 1821-67. He was president of the General Convention of his denomination, 1839-75.

WORCESTER COLLEGE. A college at Oxford, England. It was founded about 1698 by bequest of Sir Thomas Cookes, Bart., of Bentley Pauncefoot, Worcestershire, for a provost, six fellows, and six scholars. Worcester, though far from the largest or most splendid, is one of the most attractive of Oxford colleges, both in the variety of its buildings dating from the old monastic houses to the newly decorated chapel, and also in the beauty and extent of its gardens, which are of remarkable size and charm. According to the revised statutes of 1882 there were a provost, eight fellows, several honorary fellows and lecturers, fifteen scholars, and fifteen exhibitioners. The number of undergraduates is about one hundred. The college presents to ten livings.

WORCESTER MUSICAL FESTIVAL. An important English musical festival held every three years in Worcester. It is more popularly known as the 'festival of the three choirs,' owing to the fact that it was originally given by the cathedral choirs of Gloucester, Worcester, and Hereford, which first assumed the shape of annual meetings in 1774. The festivals were held alternately in the three cathedral cities mentioned. The meetings grew in importance, and increasing numbers of amateur singers joined with the choristers for the purpose of studying the works to be performed, so that although the meetings of the three choirs have not exactly retained their original character, the cathedral choirs of the three cities still constitute the nucleus of the chorus. In 1836 the festivals were extended to four days' duration, on which plan they have since been carried on. The programmes include the great oratorios and other choral works of the great composers past and present.

WORCESTER POLYTECHNIC INSTITUTE. A school of technology at Worcester, Mass., founded in 1865 by John Boynton of Templeton, and opened for students in 1868. It offers five courses of study: mechanical, civil, and electrical engineering, chemistry and general science, each covering four years, and all identical during the first term of the freshman year. The equipment of the institute includes the Salisbury laboratories, especially appropriated to work in physics, chemistry, and electrical engineering; the Washburn shops; the magnetic engineering and power laboratories; the hydraulic testing plant; Boynton Hall, containing offices and lecture rooms; and Newton Hall, a dormitory. The degree of Bachelor of Science is conferred in course, and the advanced degrees of Master and Doctor of Science and Mechanical, Civil, and Electrical Engineer are given after the completion of graduate courses. In 1903 the institute had 32 instructors, 275 students, and a library of 7000 volumes. Its productive funds amounted to $615,000, and the income was $73,000.

WORCESTERSHIRE, wụs'tẽr-shĭr. A western inland county of England, bounded by Stafford, Warwick, Gloucester, Hereford, and Shropshire (Map: England, D 4). Area, 751 square miles. Its surface is in general hilly and picturesque; it is watered by the Severn and Avon rivers. Orchards and pastures are the most important and extensive portions of the improved lands, the grain crops being small. Manufactures, especially of machinery, are also important, and the mineral products include large amounts of salt, clay, coal, and some iron. Population, in 1891, 413,760; in 1901, 488,401. County town, Worcester.

WORDE, Wynkin de (?-c.1534). A famous English printer and typographer. He was born, probably, in Lorraine, and went to England in 1477, as an assistant to Caxton. He superintended Caxton's famous printing office till the latter's death, and afterwards succeeded him. He made great improvements in the art of printing, and especially in that of type-cutting, which then formed a branch of the profession. He is said to have first introduced Roman letters into England, using them as italics are now used. He also made extensive use of engravings, which, however, appear to have been mostly obtained from the Continent. The books printed by him are distinguished by their neatness and elegance, and number 408 distinct works, against 99 by Caxton.

WOR'DEN, John Lorimer (1818-97). An American naval officer, born in Westchester County, N. Y. He entered the navy as a midshipman in 1835, and was commissioned a lieutenant in 1846. On March 9, 1862, he commanded the *Monitor* in her celebrated battle with the *Merrimac* or *Virginia* in Hampton Roads. During the action he was partially blinded by a shell, which struck the lookout hole of the pilot-house just opposite his eyes. After this engagement he was commissioned commander and placed in command of the ironclad *Montauk*. He twice bombarded Fort McAllister, in January and February, 1863; on February 3d was commissioned captain; on the 28th destroyed the *Nashville* under the guns of Fort McAllister; and on April 7th assisted Admiral DuPont in the attack on the defenses of Charleston. He was on special duty in New York in 1864-66; was head of the Naval Academy in 1870-74; was commissioned commodore in 1868, and rear-admiral in 1872; and retired in 1886.

WORDS'WORTH, Charles (1806-92). Bishop of Saint Andrews. He was born at Lambeth, London, and graduated with honors at Oxford, 1830; he was private tutor at Cambridge, 1830-33; second master of Winchester College, 1835-46; warden of Trinity College, Glenalmond, Perthshire, 1847-54, contributing largely to its establishment, and building the chapel largely at his own expense. He was consecrated Bishop of Saint Andrews, Dunkeld, and Dunblane. He was a member of the New Testament revision committee. His publications were numerous and varied. Of them may be mentioned *Shakespeare's Knowledge and Use of the Bible* (1865); a *Life* of Bishop Joseph Hall (1872); commentary on Ecclesiasticus (1881); *Public Appeals on Behalf of Christian Unity*, a collection of writings on this subject from 1854 to 1885 (1886); *Primary Witness to the Gospel* (1892). He was noted for his translations into Latin in prose and verse. His *Greek Primer for Beginners* reached its 83d thousand in 1896. For his life, consult: *Annals of My Early Life (1806-1846)* (1891); *Annals of My Life (1847-1856)* (1893); J. Wordsworth, *The Episcopate of Charles Wordsworth* (London, 1899, with full bibliography).

WORDSWORTH, Christopher (1774-1846). An English divine, born at Cockermouth, in Cumberland, the youngest brother of William Wordsworth, and educated at Trinity College, Cambridge. He became rector of Ashby in Norfolk (1804), domestic chaplain to the Archbishop of Canterbury (1805), rector of Woodchurch in Kent (1806), dean of Bocking in Essex (1808), and rector of Saint Mary's, Lambeth, and of Sundridge in Kent (1816). From 1820 to 1841 he was master of Trinity. Wordsworth was the author of *Ecclesiastical Biography* (6 vols., 1810); *Christian Institutes* (1836); *Who Wrote Icon Basilike?* (1824); and *King Charles the First the Author of Icon Basilike* (1828).

WORDSWORTH, Christopher (1807-85). An English divine and scholar, born at Cockermouth, in Cumberland, the youngest son of the preceding. He was educated at Winchester School, and at Trinity College, Cambridge, graduating in 1830. He was at once elected fellow of his college and was soon appointed tutor. In 1832-33 he visited Greece. He was master of Harrow (1836-44), Canon of Westminster (1844), Archdeacon of Westminster (1865), and Bishop of Lincoln (1868). His great work was a commentary on the Bible: *The New Testament* (1856-60), and *The Old Testament* (1864-70). Late in life he published a *Church History* (1881-83). He early gained a considerable reputation in classical scholarship with *Athens and Attica* (1836); *Pompeian Inscriptions* (1837); *Greece, Pictorial and Descriptive* (1839; new ed. with 600 engravings 1858; revised by Tozer, 1882); and *Theocritus* (1844). Consult *Life* by Overton and E. Wordsworth (London, 1888).

WORDSWORTH, Dorothy (1771-1855). See Wordsworth, William.

WORDSWORTH, John (1843—). An English bishop, born at Harrow, son of the Bishop of Lincoln and grandnephew of the poet. He was educated at Winchester and Oxford (New College), and became assistant master of Wellington College in 1866. In 1870 he was appointed prebendary of Lincoln. From 1883 to 1885 he was Oriel professor of Scripture interpretation at Oxford, fellow of Oriel, and Canon of Rochester. In 1885 he was made Bishop of Salisbury. His publications include: *Fragments and Specimens of Early Latin* (1874); *Bampton Lectures* (1881; 2d ed. 1887); *Old Latin Biblical Texts* (vol. i. 1883; vol. ii., with Sanday and White, 1886); *Novum Testamentum Latine, Secundum Editionem S. Hieronymi* (1898); *Bishop Serapion's Prayer-Book* (1899); and *Teaching of the Church of England for the Information of Eastern Christians*, with Greek by Dr. John Gennadius (1900).

WORDSWORTH, William (1770-1850). An English poet, born at Cockermouth, in Cumberland, April 7, 1770. He came from a family that had long been settled in the north country. William was the second son. His sister Dorothy (1771-1855), a remarkable woman, was the poet's companion through mature life. William was sent to the schools at Cockermouth and Penrith, and, after the death of his mother (1778), he was transferred to the grammar school at Hawkshead, a picturesque village by Esthwaite Water, where he remained till 1787. The years passed at Hawkshead were 'the seed-time' of his soul. Left to himself, he read a good deal, joined in the society and sports of the country folk, took long solitary strolls, and first had those mystic visions in which nature seemed to palpitate with a life of its own. William studied at Saint John's College, Cambridge, graduating in 1791. In 1790 he interrupted his studies to take a tour through France and Switzerland with Robert Jones, a college friend, after

WILLIAM WORDSWORTH

FROM AN ENGRAVING BY EDWARD McINNESS. AFTER A PAINTING BY MISS McINNESS

wards fellow of Saint John's. Unsettled in his plans, he again went to France, staying a full year (November, 1791, to December, 1792). He embraced with enthusiasm the principles of the Revolution, and, in spite of its excesses, his republicanism was not wholly dissipated till the French invasion of Switzerland (1798). As time went on he became a stanch conservative, if not a Tory. For this change, as sincere as it was natural, he was severely criticised by many of his republican contemporaries, for example by Byron; and in *The Lost Leader*, Browning, while not intending it directly for Wordsworth, yet used him "as a sort of painter's model" in describing the effect upon ardent young Liberals of the defection of an admired leader. Returning to England, Wordsworth made his first appearance as poet in *An Evening Walk* (1793), and *Descriptive Sketches taken during a Pedestrian Tour among the Alps* (1793). The poet's masters were then Pope, Goldsmith, and Cowper. These two poems, composed in the heroic couplet, contain nevertheless many refined and delightful sketches taken from nature at first hand. Coleridge saw in the second volume "the emergence of an original poetical genius." In 1795 Wordsworth settled with his sister at Racedown, near Crewkerne, moving (1797) to Alfoxden, three miles from Nether Stowey, where Coleridge was then living. At Racedown Wordsworth wrote several poems, in which the heroic couplet was abandoned. Among them were *Guilt and Sorrow* in the Spenserian stanza, and a tragedy in blank verse called *The Borderers*. But the main outcome of the period was a joint publication of the two poets entitled *Lyrical Ballads* (1798), a memorable volume, which, though severely criticised by the reviewers and neglected by the public, definitely marks an epoch in the history of English poetry. Coleridge contributed *The Ancient Mariner* and three other poems. Wordsworth's poems, "Simon Lee," "We Are Seven," "Expostulation and Reply," "were written" (so runs the advertisement) "with a view to ascertain how far the language of conversation in the middle and lower classes of society is adapted to the purposes of poetic pleasure." The volume closed with the beautiful *Lines on Tintern Abbey*, commemorating a tour with Dorothy up the Wye Valley. The *Lyrical Ballads*, with an additional volume, were republished in 1800. In his *Preface* Wordsworth elaborated the thesis that there is no "essential difference between the language of prose and metrical composition." The thesis was ably criticised by Coleridge in his *Biographia Literaria* (1817), and is now generally regarded as an extreme position. To it Wordsworth always held in theory, but, to his good fortune, he often forgot it in practice. The famous *Preface*, though needing many qualifications, was most salutary. It eventually put an end to the conventional poetic diction of the eighteenth century; in fact, the publication of the little book is generally taken to mark the definite beginning of the Romantic movement in England, and of the glories of nineteenth-century English poetry.

Meanwhile Wordsworth and his sister, having been supplied with funds by the Wedgwoods, had accompanied Coleridge to Germany (1798-99). Coleridge went to Göttingen to study philosophy; Wordsworth and his sister settled down in Goslar for the winter. The poet hardly knew a word of German, but his genius throve at Goslar. There he began his *Prelude* and his first song of "Lucy." On returning to England, William and Dorothy settled in Dove Cottage at Grasmere, the loveliest spot among the English Lakes (1799). After occupying other houses, the Wordsworths finally made their home at Rydal Mount (1813). In 1802 the Earl of Lonsdale died, and his successor paid over to the Wordsworths a debt of £8500 and afterwards further helped them. Having thus a competency, Wordsworth married (October 4, 1802) Miss Mary Hutchinson (born August 16, 1770), a friend from youth, portrayed in "She was a phantom of delight." For nearly fifty years Wordsworth's life flowed on tranquilly, a noble illustration of his own phrase "plain living and high thinking." Coleridge for a time lived near him and with him, but eventually the poets were estranged, never to be wholly reconciled. Friends and admirers gathered around Wordsworth, among whom were John Wilson, De Quincey, Henry Crabb Robinson, and Sir George Beaumont, the landscape painter. Southey, too, lived near at Keswick. In London Wordsworth associated with Rogers, Haydon, Hunt, Keats, and others. He continued to take many tours, of which those into Scotland, to the Highlands, furnished him with exquisite poetic material. In 1813 Wordsworth was appointed distributor of stamps for Westmoreland, a post that brought him £400 a year. In 1820 he spent four months in Switzerland and in Italy, visited Belgium in 1823 and 1828, and made his last Continental tour in 1837. In 1842 he received a Government pension of £300 a year; and in 1843 he succeeded Southey to the laureateship. He died at Rydal Mount, April 23, 1850, and was buried in the Grasmere churchyard. Dorothy survived her brother till January 25, 1855. Mrs. Wordsworth died January 17, 1859. A favorite child, Dorothy, who had married Edward Quillinan (q.v.), died in 1847. Two sons survived.

Wordsworth consecrated his life to poetry, issuing volume after volume, and for a long time meeting with little favor. The attitude of the orthodox critics was summed up in Jeffrey's "This will never do!" (*Edinburgh Review, November*, 1814). Wordsworth nevertheless had strong defenders in Wilson, De Quincey, Lamb, Coleridge, and the younger generation; and his serene belief in himself was finally justified by full recognition. *Poems* (2 vols., 1807) contained much of his finest verse, as "To a Highland Girl," "The Solitary Reaper," "I wandered lonely as a cloud," and the odes to Duty and on Immortality. In 1814 appeared *The Excursion*, a didactic epic in blank verse, ridiculed by Byron, but now regarded as the best of Wordsworth's longer poems. In 1815 Wordsworth republished his poems in two volumes, arranging them on philosophical principles. Later he published *The White Doe of Rylstone* (1815); *Thanksgiving Ode* (1816); *Peter Bell* (1819); *The Waggoner*, with Sonnets (1819); *The River Duddon* (1820), a series of noble sonnets, the best since Milton; *Ecclesiastical Sketches* (1822), an unfortunate attempt to shape the history of the Church in Britain to a sonnet sequence; *Yarrow Revisited, and Other Poems* (1835);

Poems, chiefly of early and late years (1842); *The Prelude*, a highly interesting autobiographical poem (posthumous, 1850); and *The Recluse*, a fragment (1888). Wordsworth also issued collected editions of his work, containing revisions and additions, in 1820, 1827, 1832, 1836-37, 1843, 1846, and 1849-50. It was Wordsworth's aim to depict the elemental passions in unaffected language, and in his best work he succeeded—though his simplicity sometimes overreaches itself and becomes mere tedious childishness. In his inspired moments, "Nature herself," said Matthew Arnold, "seemed to take the pen out of his hand, and to write for him with her own bare, sheer, penetrating power." Wordsworth's passion for nature and his insistence on the brotherhood of man passed into the thought of the nineteenth century, and in course of time permeated it. Though Burns and Cowper and Crabbe had described nature before him, it was his to take up what Arnold has called the office of modern poetry, the moral interpretation of nature. He held a sort of Neo-Platonic, almost pantheistic, view of the existence of a soul, something conscious and all but divine, in nature. In his choice of subjects, too, he vindicated the possibility of treating the lives and emotions of the humblest classes in a strain of deep poetry.

Bibliography. For works, consult *Poetical and Prose Works, together with Dorothy Wordsworth's Journals*, ed. by W. Knight (Eversley series, 16 vols., London and New York, 1896 et seq.); *Poetical Works*, ed. by Knight (8 vols., Edinburgh, 1882-86); by E. A. Dowden (Aldine edition, 7 vols., London, 1893); by J. Morley (1 vol., London and New York, 1888); reprints of the 1807 edition of *Poems* by Hutchinson (ib., 1897); *Prose Works*, including essays of great interest to one wishing to follow the poet's opinions, ed. by A. B. Grosart (6 vols., ib., 1876); and *A Description of the Wordsworth and Coleridge Manuscripts in the Possession of T. N. Longman*, ed. by W. Hale White (London and New York, 1897). Consult biographies by Christopher Wordsworth (London, 1851); by W. Knight (ib., 1889); by F. W. Meyers (English Men of Letters Series, ib., 1881); by Elizabeth Wordsworth (ib., 1891); *La jeunesse de Wordsworth*, by Emile Legouis (Paris, 1896; English trans. by J. W. Matthews, London, 1897); *Wordsworth, sein Leben seine Werke*, by M. Gothien (Halle, 1898). Critical estimates are contained in these works. For further appreciations, consult Coleridge, De Quincey, R. H. Hutton, Matthew Arnold (the very best, in *Essays in Criticism*, second series), J. R. Lowell, Aubrey de Vere, Dean Church, Stopford Brooke, Dowden, and Swinburne. The best work on Wordsworth's historical place in English poetry is *The Age of Wordsworth*, by C. H. Herford (London, 1897); and a thoughtful monograph by Walter Raleigh (ib., 1903) is well worth study. On September 29, 1880, a Wordsworth Society was formed, and its last meeting was held on July 9, 1886. Its valuable transactions were published at Edinburgh in eight volumes. A selection from his papers under the title *Wordsworthiana* was edited by W. Knight (London, 1889). Consult also *A Wordsworth Dictionary of Persons and Places*, by J. R. Tutin (Hull, 1891).

WORK (AS. *weorc*, OHG. *werah*, *werc*, Ger. *Werk*, work; connected with Gk. *ἔργον*, *ergon*, work, Av. *varəz*, to do). The work done by a body is defined as the product of the force it produces, and the distance in the direction of the force through which it acts; in angular motion it is the product of the angular displacement and the moment of the force acting. Work is done whenever energy is transferred from one body to another. (See Mechanics and Energetics.) The unit of work on the C. G. S. system is the erg, or a force of one dyne acting through a distance of one centimeter. A more practical unit is the joule, which is 10^7 ergs. On the foot-pound system, the unit of work is that required to raise one pound one foot vertically against the force of gravity at sea-level at latitude 45°; this unit is called a 'foot-pound.' It equals 1.383 joules, approximately.

WORK, Henry Clay (1832-84). An American song-writer and inventor, born at Middletown, Conn. In boyhood he was taken to Illinois by his father. Returning to Connecticut, Work was apprenticed to a printer, studied harmony, and achieved universal popularity during the Civil War by his songs, among which the most popular were "Kingdom Coming," "Marching Through Georgia" (1865), "Babylon Is Fallen." He wrote also temperance songs, the best known of which is "Father, Dear Father, Come Home with Me Now," and sentimental melodies, as "My Grandfather's Clock" and "Lilly Dale." He was an inventor and, among other things, patented a knitting machine, a walking doll, and a rotary engine.

WORKHOUSE. A name given, in England, to establishments for the segregation and maintenance of paupers; sometimes in the United States, to institutions in which vagrants, drunkards, and other minor offenders are detained on short sentences and at labor, but which are usually and rightly known as houses of correction. The institutions established in London and Westminster during the reign of Charles II. which are commonly referred to as the first English workhouses, were in reality houses of correction to which vagabonds and other petty offenders were committed. William III., in creating the Board of Trade, instructed its members to "consider the proper methods of setting on work and employing the poor, and making them useful." The idea was in the air that a workhouse, in the literal sense of the word, could be made an effective discouragement of unnecessary pauperism. In 1676 John Cary, a merchant of Bristol, brought about the building and opening of a workhouse in that city. The experiment was so successful that it was followed by the cities of Plymouth, Worcester, Hull, and Exeter. John Locke about this time, writing the first report of the Board of Trade, made a stong plea for the technical instruction as well as the compulsory industry of the dependent elements of society, but the public was well enough satisfied with a scheme of segregation and hard work so long as it diminished the burden of the support of the poor. And so remarkable in fact was the suppression of vagrancy and the lowering of the poor rate by the workhouse experiments which have been mentioned, that in 1722 a general act of Parliament authorized parishes, singly or in unions, to build workhouses and to refuse relief to all who would not enter them. For nearly fifty years the dread of the workhouse stimulated the poor to provide for themselves, but this wholesome condition was completely changed by a period of sentimentalism wherein the famous statute 22 George III., c. 83, in 1783, known as Gilbert's Act, practically broke down the workhouse principle. From this time began those abuses of outdoor relief which resulted in the appointment of the Poor Law Commission of 1832 and the Poor Law Amendment Act of 1834. See PAUPERISM.

The workhouse or house of correction in the United States is not a feature of the poor law system of a commonwealth, but of its system of penology. It is usually a developed or modified county jail. The nearest American approach to such a test of aid-deserving poverty as the English workhouse is intended to be is found in the woodyards and laundries maintained by charity organization societies.

WORKINGMEN'S CLUBS. Organizations of workingmen for various purposes, but partaking nothing of the character of trade-unions or friendly societies. Such clubs are practically unknown in the United States, but are common in England and on the continent. A large proportion of the London clubs of this kind were gambling or drinking associations. There are a large number of philanthropic clubs, connected as a rule with some church organization. The political clubs, about one-fourth of the total number, are generally Socialistic in tone. A small number are organized for educational purposes or social purposes of an educational nature. On the continent the clubs comprise athletic organizations, Socialist clubs, and church societies.

WORKINGMEN'S INSURANCE. The insuring of workingmen against accident, sickness, or old age, carried on solely by the Government or by the Government in conjunction with employers and employés. The system has attained its fullest development in Germany, Austria, and New Zealand, and is making fairly rapid progress in many European countries, notably Denmark, France, and Italy. See INSURANCE, section on the *Relation of the Government to Insurance;* OLD AGE PENSIONS.

WORKINGTON. A seaport in Cumberland, England, at the mouth of the Derwent, on the Solway Firth, 7 miles north of Whitehaven (Map: England, C 2). Its importance is due to the neighboring coal mines, the extensive iron, steel, and other factories, a thriving salmon fishery, and an export trade in industrial products. Population, in 1901, 26,141.

WORKINGWOMEN'S CLUBS. Organizations of workingwomen for social and educational purposes. They are as a rule self-governing and self-supporting, the fees, however, being very moderate. The primary aim of such clubs is to bring within the reach of the woman in factory or shop the advantages of pleasant surroundings, dancing, books, music, etc., but a common feature is the instruction given in the various branches of domestic science as well as in stenography, typewriting, bookkeeping, etc. In a number of cases vacation homes are maintained. The movement began in Boston about 1890 and has made rapid progress. There are now several State organizations of women's clubs and many independent organizations.

WORKSOP, wûrk'sŭp. A town in Nottinghamshire, England, 16 miles southeast of Sheffield, on the Ryton (Map: England, E 3). It has a fine old Norman church, with two lofty towers, a relic of an Augustinian monastery, founded in 1103, and other interesting remains. Malting is the staple industry and there are agricultural implement works, iron and brass foundries, saw mills, and chemical works. Population, in 1901, 16,112.

WORLDLY WISEMAN, MR. An unlovely character in Bunyan's *Pilgrim's Progress,* representing the unsatisfactory quality of knowledge gained only by experience and reason.

WORLD'S COLUMBIAN EXPOSITION. An international exposition held in Chicago, Ill., from May 1 to October 30, 1893. It had been proposed to celebrate the four hundredth anniversary of the landing of Columbus by a universal exposition, to be held in the United States, and the claims of New York, Washington, Saint Louis, and other cities as suitable places in which to hold such an exposition were strongly urged. Chicago, however, was successful in Congress, and accordingly on April 25, 1890, a bill was approved providing for the celebration of "The Four Hundredth Anniversary of the Discovery of America by Christopher Columbus by holding an International Exhibition of Arts, Industries, Manufactures, and the Products of the soil, mines, and sea, in the City of Chicago." A World's Columbian Commission was authorized, of which Thomas W. Palmer became president, by whom George R. Davis was appointed director-general. The funds for the Exposition consisted of $10,000,000 raised by the city of Chicago, a loan of $2,500,000 from Congress, debenture bonds for $5,000,000 issued by the Exposition authorities, together with miscellaneous contributions from various sources of about $3,000,000, making a total fund of about $20,000,000 that was available for use before the opening day. A site was chosen in Jackson Park in the southeastern part of Chicago, on the shore of Lake Michigan, covering an area of 666 acres, where 150 different buildings were erected.

The work of designing and construction was placed under the charge of a Bureau of Construction, of which Daniel H. Burnham was made chief. The principal buildings were constructed of a composition called staff, consisting of a mixture of plaster of Paris, with a little cement, glycerin, and dextrin, in water, which at a short distance gave the effect of marble. This appearance led to the name of White City, by which the Exposition subsequently became generally known. The following were the larger buildings: Administration Building, by Richard M. Hunt, in the style of the French Renaissance, surmounted by a gilded dome which formed one of the many conspicuous objects on the ground. Agricultural Building, by McKim, Mead & White, in the classic Renaissance style of architecture, with mammoth Corinthian pillars on either side of the main entrance. Electrical Building, by Van Brunt & Howe, in the Corinthian style of architecture. Fine Arts Building, by C. B. Atwood, in the Greek-Ionic order and a pure type of the most refined classical architecture. On three sides of the main building and connected with it by corridors were large annexes. The main building was entered by four great portals richly ornamented with architectural sculpture and approached by broad flights of steps. Forestry Building, in the rustic style of architecture, with a veranda, supporting the roof of which was a colonnade consisting of a series of columns composed of tree trunks in their natural state with bark undisturbed, which were contributed by the different States and Territories of the Union and by foreign countries, each furnishing specimens of its most characteristic trees. The main entrances were elaborately finished in different kinds of wood, the material and workmanship being contributed by various lumber associations. The roof was thatched with tan and other barks. Fisheries Building, by Henry I. Cobb, in the Spanish style of architecture, consisting of a large central structure with two small polygonal buildings connected with it on either end by arcades. The roof was of old Spanish tiles and the side walls in a pleasing color. The exterior of the building exhibited innumerable forms of capitals, modillions, brackets, cornices, and other ornamental details of which fish and other sea forms served as the motives of the designs. Government Building, by W. J. Edbrooke, in the classical style of architecture, constructed of iron and glass, with an imposing central dome 120 feet in diameter and 150 feet high. It contained the exhibits of the various departments of the Government, as well as that of the Smithsonian Institution. Horticultural Building, by W. L. B. Jenney, embracing a central pavilion with two end pavilions, each connected with the central one by a front and rear curtain forming two interior courts; these courts were beautifully decorated in color and planted with ornamental shrubs and flowers. The centre of the pavilions was roofed by a crystal dome, under which were exhibited the tallest palms, bamboos, and tree ferns that could be procured. In each of the pavilions there were galleries. Machinery Hall, by Peabody & Stearns, was in the best type of the Spanish Renaissance style. At the first story a covered loggia furnished a promenade which encircled the entire building. The building was spanned by three arched trusses, and the interior presented the appearance of three railway train-houses side by side. Manufactures and Liberal Arts Building, by George B. Post, was in the Corinthian style of architecture, and was the largest exposition building ever constructed up to that time. The principal thoroughfare of the building, called Columbia Avenue, extended longitudinally and was 50 feet wide, while an avenue of like width crossed it at right angles at the centre. The main roof was of iron and glass and arched an area 1400 feet long by 385 feet wide. The cost was $1,700,000. Mines and Mining Building, by S. S. Beman, in the early Italian Renaissance style, had columns and arches overhanging the principal entrances, which were richly decorated with sculptured groups and other embellishments emblematic of mining and its allied industries. Between the main entrances and the pavilions were ornamental arcades forming an open loggia on the ground floor. Transportation Building, by Adler & Sullivan, in the Romanesque style of architecture, with its interior treated similarly to a Roman basilica, with broad naves and aisles. The roof was in three divisions, the middle one of which was higher than the others, and was surrounded by a cupola that rose 165 feet above the ground. The main entrance consisted of an immense single arch enriched with carvings, bas-reliefs, and mural paintings coated with gold-leaf, whence its name of the Golden Doorway. Woman's Building, by Miss Sophia B. Hayden, in the Italian Renaissance style of architecture, was two stories in height, with an open rotunda 70 by 65 feet, which reached through the height of the building and was protected by a richly ornamented skylight. The rotunda was surrounded by a two-story open arcade producing an effect similar to that of the Indian courtyard.

In addition to the foregoing there were numerous State buildings, of which that of California was in the style of the old Missions; that of Florida, a miniature of Fort Marion; that of Massachusetts, a copy of the John Hancock House; and that of Virginia a suggestion of Mount Vernon. The foreign buildings were in many instances characteristic. Thus, that of Germany was in the quaint South German architecture; that of Sweden, in the style of the Swedish country house of the sixteenth century; that of Spain, representing the Convent of Rabida; and that of England, an old manor house of the time of Henry VIII. Also there were buildings specially typical of the nations or countries by which they were erected, as that of Ceylon in teak-wood, and that of Japan in the characteristic style of that country. Scattered through the grounds were numerous groups of sculpture, of which the most famous was the Columbian Fountain by MacMonnies, facing which was a colossal statue of the Republic by French, and over the peristyle still beyond was a quadriga representing the Triumph of Columbus, while the figures and animals by Kemeys and Procter were especially noteworthy. The amusement features were collected in a strip of land west of Jackson Park, to which the name of Midway Plaisance was given, and of these most worthy of note was the huge Ferris Wheel, 264 feet high. During the Exposition a series of international congresses, grouped under 20 departments and 224 general divisions, were held in Memorial Art Palace under the direction of a committee of which Charles C. Bonney was president. The topics discussed included every phase of economic, scientific, philosophical, and religious branches of thought. The total attendance at the Exposition was 27,539,041, of which 21,479,661 were paid. There were 65,422 exhibitors representing over 250,000 separate exhibits; these were examined by an international jury of awards consisting of 852 judges, about one-half of whom were foreigners. The award, consisting of a bronze medal and diploma, was given to 27,757 exhibitors, or 36 per cent. of the whole number catalogued, exclusive of those from France and Norway, whose exhibits were withdrawn from examination. At the close of the Exposition the total receipts from all sources were $33,290,065, while the total disbursements were $31,117,353, thus showing a profit, which, however, was considerably diminished by the expense of removing the buildings, etc. An official account of the Exposition is given in a *History of the World's Columbian Exposition Held in Chicago in* 1893, edited by Rossiter Johnson (New York, 1897-98), in four volumes.

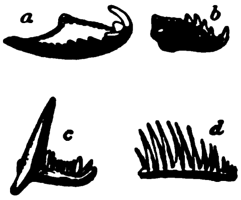
WORLD'S WOMAN'S CHRISTIAN TEMPERANCE UNION. An international association organized through the instrumentality of Miss Frances E. Willard (q.v.). Mrs. Margaret Bright Lucas, at that time president of the British Woman's Temperance Association, was the first president. She was succeeded by Miss Willard, who held the position until her death in 1898, when Lady Henry Somerset of England became president. The first world's convention was held in Faneuil Hall, Boston, in 1891, being the first international woman's convention of any kind ever held. Conventions have since been held in Chicago (1893), in London (1895), in Toronto, Can. (1897), in Edinburgh (1900), and in Geneva (1903). Fifty-six nations are now affiliated with the World's Woman's Christian Temperance Union, and the presidents of the national societies are ex-officio vice-presidents of the World's Union.

The Round the World missionaries who have gone out under the auspices of the World's Woman's Christian Temperance Union are Mrs. Mary Clement Leavitt, of Massachusetts, who before the organization of the World's Union had organized many national unions; Miss Jessie Ackerman, of California, who organized unions in Australia and federated them into a National Woman's Christian Temperance Union, of which she became president; Mrs. Elizabeth Wheeler Andrew, and Dr. Kate C. Bushnell, of Evanston, Ill., whose work had contributed to the breaking down of the system of legalized vice in the Indian Empire, and brought to light the abuses of the opium trade of India and China; Miss Mary Allen West, of Illinois, who fell at her post in Japan after a few weeks of heroic exertion; Miss Clara Parrish (now Mrs. Wright), who took up the work where Miss West laid it down; Miss Alice Palmer, who remained nearly three years in South Africa, placing the Woman's Christian Temperance Union there on a firm basis; Mrs. J. K. Barney, of Rhode Island, who paid particular attention to evangelistic work in penal institutions; Miss Kara G. Smart; and Mrs. Addie Northam Fields. Other World's missionaries are under appointment.

The most important special work undertaken by the World's Woman's Christian Temperance Union has been the polyglot petition for Home Protection, as Miss Willard named it, addressed "To the Governments of the World (Collectively and Severally)". This petition, written by Miss Willard, was circulated throughout the world, and the signatures came in fifty languages. There were 771,200 names in all, exclusive of the 350,000 that came from Great Britain. The petition was presented to President Cleveland on February 19, 1897.

WORM (AS. *wyrm*, Goth. *waúrms*, OHG. *wurm*, Ger. *Wurm*, worm, snake, dragon; connected with Lat. *vermis*, ORuss. *vermie*, worm, Gk. *ῥόμος*, *rhomos*, wood-worm). A popular term for a great variety of animals, variously classified. All are of low organization, and generally of elongated form and with very short legs or none at all. Many caterpillars, moreover, maggots, grubs, and other larval forms of insects are popularly, but unscientifically, called 'worms.' See CLASSIFICATION; ANNULATA; ASCARIS; CESTODA; EARTHWORM; ENTOZOA; FLATWORM; GORDIUS; LEECH; NEMATHELMINTHES; NEMERTINEA; PALOLO; ROUNDWORM; SCOLECIDA; SERPULA; THREADWORM; TRICHINA; VERMES; and similar titles.

FOSSIL WORMS. Fossil worms are known from geological formations of all ages. The tube-dwelling worms are represented by Serpula, which is common from the Jurassic upward and which is very abundant in some beds of Lower Cretaceous age in Germany and known on that account as the 'Serpulitenkalk' and 'Serpulitensand.' Spirorbis, also a recent genus, is common in the Upper Paleozoic formations, where its small spiral tubes are often found on fragments of shells and on the leaves and roots of Devonian and Carboniferous plants. Other Paleozoic genera are Autodetus, Cornulites, Conchicolites, Ortonia; and perhaps also Tentaculites (q.v.) may be included here. Burrows and trails are common in all beach and sandy shallow-water formations, but the form of the worms that made them can seldom be determined. Scolithus, Arthrophycus, Planolites, Scolecoderma, and many other generic terms have been applied to the different forms. Impressions of the bodies of worms and also their excrements are common in the Mesozoic rocks (Eunicites and Lumbricaria), and have been found also in the Paleozoic; Nereites in the Cambrian, and Planolites and Gyrichnites in the Devonian. Conodonts (q.v.) are found in most formations from Ordovician to Carboniferous age. Consult Von Zittel and Eastman, *Textbook of Paleontology* (New York and London, 1900).



FOSSIL JAWS OF ANNELID WORMS.

a, Lumbriconereites basalis; b, Œnonites rostratus; c, conodont *of Prisniodus elegans. d,* conodont of *Polygnathus dubius.*

WORM-EATING WARBLER. One of the most interesting and widely distributed of American warblers (q.v.). It is olive-green, yellow on the under surface, with darker stripes on its crown. It makes its nest in a well-hidden hollow of the ground in the woods, and breeds plentifully northward to Illinois and southern New England. Its scientific name is *Helmintherus vermivorus.*

WORM-EATING WARBLER.

WORMELEY, KATHARINE PRESCOTT (1830-—). An American translator and author, born in Ipswich, England. The daughter of a British admiral, she came to the United States in girlhood and first gained distinction by her active interest in the relief of Union soldiers during the Civil War. In this connection she published: *The United States Sanitary Commission* (1863); *Letters from Headquarters During the Peninsular Campaign* (1862); and *The Other Side of War* (1888). She translated the works of Balzac (40 vols., 1883-97), Molière (6 vols., 1892), and other works from the French, and wrote a *Life of Balzac* (1890). Her sisters, Mary Elizabeth (Wormeley) Latimer (1822-1904) and Ariana Randolph (Wormeley) Curtis (1835), were authors also, the former having published a number of volumes dealing popularly with modern European history.

WORM GRASS. See Spigelia.

WORMS, vôrms. A town of the Grand Duchy of Hesse, Germany, on the left bank of the Rhine, 22 miles north of Heidelberg (Map: Germany, C 4). Its chief structure is the cathedral, dating from the eleventh century, with a richly ornate Gothic portal of the fifteenth century. Second only in interest to the cathedral is the Church of Saint Paul, now used as a museum. The Church of Saint Martin (restored in 1888), the Gothic Liebfrauen-Kirche, and the town library, with early historical records and mementos of Luther, are other notable buildings. An interesting object is the mediæval Jewish synagogue. The town has manufactures of leather, cloth, machinery, shoddy, worsted yarn, chicory, chemicals, slate, and flour. In the vicinity is produced the famous wine known as *Liebfrauenmilch.* The town has a considerable river and canal trade. Population, in 1895, 28,611; in 1900, 40,714. Worms is the Roman *Borbetomagus.* From very early times the town was the seat of a bishop. It became the capital of the Burgundians, and later was occasionally the residence of the Frankish kings. It gradually emancipated itself from the rule of its bishops and became a free Imperial city. In 1122 the famous Concordat (q.v.), which settled the dispute regarding investitures, was concluded here. The most celebrated event in the history of Worms was the holding of the Imperial Diet of 1521, before which Luther made his sturdy defense. The town suffered greatly in the Thirty Years' War, and in 1689 was almost entirely destroyed by the French, a blow from which it never wholly recovered. In 1801 it was joined to France, and in 1815 to Hesse-Darmstadt.

WORMS. The larger number of entozoa for which the human body is the host are developed in the intestines. The intestinal worms of frequent occurrence are *Ascaris lumbricoides,* the lumbricoid or round worm; *Oxyuris vermicularis,* the threadworm or seat-worm; and the *tænia* or tapeworm (q.v.). The lumbricoid is treated under Ascaris, with regard to its appearance in animals, and under Lumbricoid in its relations to the human being. The *oxyuris,* known also as the thread, seat, pin, or maw worm, inhabits the large intestine, and especially the rectum. It is from two to five lines in length, and is frequently found in large numbers, agglutinated by mucus into a ball. While more frequent in young children, they occur at any period of life. They cause pain in the rectum, itching, and straining, all symptoms being worse at night. In girls the entozoa may migrate into the vagina and occasion pruritus vulvæ and leucorrhœa. They may thus occasion loss of sleep. The treatment is simple. An enema of cold water, salt and water, or infusion of quassia twice a day for two weeks causes an evacuation of the parasite. Vinegar, camphor, and creosote have also been used.

WORMS, vôrn, René (1869—). A French sociologist, born at Rennes and educated there and at the University of Paris. He lectured upon philosophy and social subjects, practiced law as well, and filled several important posts in the administrative service. He was active in founding the Parisian Société de Sociologie, and the Institut International de Sociologie, of both of which he became secretary. In M. Worms's best-known work, *Organisme et société* (Paris, 1896), he presents human society as a real organism, carrying the analogy much further than Herbert Spencer. His other publications include: *De la volonté unilatérale considérée comme source de l'obligation* (1891); *Précis de philosophie* (1891); *Éléments de philosophie scientifique et de philosophie morale* (1891); *La morale de Spinoza* (1892); and *Philosophie des sciences sociales* (1903).

WORMSEED. See Chenopodium.

WORM-SHELL. A mollusk of the family Vermetidæ, allied to the fresh-water Melaniidæ, whose body is slender and annelid-like, and whose small uncoiled shells resemble the twisted tubes of many sea-worms. These mollusks are free and spiral in early life, but soon settle down and become stationary, when the further growth of the shell is uncoiled. Most species are found in Eastern seas. A well-known species is *Vermetus lumbricalis,* illustrated herewith.

A WORM-SHELL.

WORMWOOD (from AS. *wermod,* Ger. *Wermuth;* etymology uncertain). A perennial herb, *Artemisia absinthium,* native in Europe and Asiatic Russia and found also in gardens and by roadsides in the United States and Canada. It has an erect somewhat shrubby stem from two to four feet high. The plant is aromatic, tonic, and bitter, and was used by the ancients for its medicinal properties. In Europe it is still used as an aid to weak digestion. Its principal use now is in the manufacture of absinthe. The name wormwood is sometimes extended to the entire genus *Artemisia.* See Artemisia; Absinthe.

WOR'NUM, Ralph Nicholson (1812-77). An English art critic, born at Thornton, Durham, and educated at University College, London. In 1834 he went abroad and for nearly six years devoted himself to the study of the art collections in the Continental galleries. In 1840 he settled in London as a portrait painter and writer on art. In 1847 he published a catalogue of the National Gallery which became the model for similar publications in all countries. In 1854 he was appointed keeper of the National

Gallery. His more important publications were: *The Epochs of Painting* (1847; enlarged 1859 and 1864); *Analysis of Ornament* (1856); and *Some Account of the Life and Works of Hans Holbein* (1867).

WORSAAE, vŏr′sä-â, Jens Jacob Asmussen (1821-85). A Danish historian and archæologist, born in Veile (Jutland). He was appointed assistant in the Copenhagen Museum of Northern Antiquities in 1838. In 1847 he was appointed inspector of antiquities in Denmark, and two years later received a commission to arrange and preserve the archæological remains of the country. He later became titular director of Danish antiquities, director of the Museum of Northern Antiquities at Copenhagen (1865), and of the Ethnographical Museum. In 1874-75 he was Minister of Public Instruction and Ecclesiastical Affairs. Among his works may be mentioned: *Danmarks Oldtid oplyst ved Oldsager* (1843; Eng. trans., *The Primeval Antiquities of Denmark,* 1849); *Blekingske Mindesmaerker fra Hedenold* (1846); *Minder om de Danske og Nordmaendene i England, Skotland og Irland* (1852; Eng. trans., *Memorials of the Danes and Norwegians in England,* 1852); *Den Danske Erobring af England og Normandiet* (1863); *Nordens Forhistorie* (1878; Eng. trans., *Prehistory of the North,* 1886).

WORSHIP (AS. *weor scipe*, honor, from *weor* , *wur* , worthy, honorable + *-scipe*, abstract suffix, Eng. *-ship*). The expression in any suitable form of the reverence which man feels for a superior being, and particularly for God. It is as old as the knowledge of superhuman beings, and ranges from the grossest superstition to the most elevated forms of Christianity. For some discussion of the primitive rites which come under this head, see Rite; Sacrifice. Prominent in its outward form has always been sacrifice; and in strictness such elements of Christian public services as prayer, reading of the Scriptures, and instruction are not properly to be denominated worship at all. In traditional theology, especially the Roman Catholic, a sharp distinction is drawn between what is technically known as *latria,* the worship due to God alone, and *dulia,* the reverence which may be expressed for the saints and for various sacred objects. Worship may be private; but it naturally tends to become common among those who follow the same religion, and thus to culminate in public forms. Such forms were undoubtedly established among Christians as early as the end of the first century; in the *Teaching of the Twelve Apostles* forms are found designed to be used in the celebration of the Eucharist. (See Liturgy.) Musical accompaniment early grew up in the worship of various nations, and added solemnity to the public rites. Certain formal postures were also recognized as appropriate to the devotion expressed. The early Christians are found to have used four of these—the standing, the kneeling, the inclined, and the prostrate. Kneeling was the commonest, but standing was substituted during the Easter season and on Sundays, to symbolize the resurrection of Christ.

WORSLEY, wûrz′lĭ. A coal-mining and cotton-manufacturing town in Lancashire, England, 5 miles west-northwest of Manchester (Map: England, D 3). Population, in 1901, 12,448.

WORSLEY, Philip Stanhope (1835-66). An English poet, born at Greenwich, in Kent. He was educated at the Cholmeley Grammar School, Highgate, and at Corpus Christi College, Oxford, where he won the Newdigate prize for English verse in 1857, and graduated in 1861. His original poems appeared in 1863 under the title, *Poems and Translations* (reprint with additions, 1875). Though they are graceful, Worsley's fame rests on his translations of the *Odyssey* and of the first twelve books of the *Iliad* in Spenserian stanzas. The *Odyssey* was published in 1861 and the *Iliad* in 1865. The *Iliad* was completed by John Conington in 1868. Consult Matthew Arnold's essay *On Translating Homer.*

WORSTED. See Woolen and Worsted Manufactures.

WORT. See Brewing.

WÖRTH, vĕrt. A village of Alsace-Lorraine, situated on the Sauer, about 10 miles southwest of Weissenburg (Map: Germany, B 4). Here, on August 6, 1870, subsequent to their defeat at Weissenburg, the French under MacMahon were defeated with great loss by the Germans commanded by the Crown Prince of Prussia. The fiercest fighting of the day occurred in the village of Fröschweiler, which was taken by storm after a desperate struggle in the streets. The French lost 8000 men in dead and wounded and 9000 prisoners. The German loss was more than 10,000 men in dead and wounded. French historians refer to it as the battle of Reichshofen. Population, about 1100.

WORTH, Charles Frederick (1825-95). An Anglo-French dressmaker, born at Bourne, Lincolnshire. In 1846 he went to Paris, and for twelve years was in the employ of Gagelin, a silk-weaver. He began to design articles of dress and in 1858 went into business as a lady's tailor. He came to the notice of the Empress Eugénie, and thereafter had every opportunity to display his genius as a designer.

WORTH, William Jenkins (1794-1849). An American soldier, born in Hudson, N. Y. He entered the Twenty-third Infantry as a first lieutenant in March, 1813; served as an aide to General Scott; and was brevetted captain for gallantry at Chippewa, and major for gallantry at Lundy's Lane, where he was severely wounded. In 1838 he was made colonel of the Eighth Regiment of infantry, and on April 19, 1842, defeated the Seminole Indians at Palaklaklaha. During the Mexican War he served under General Taylor, and for services in the attack on the Bishop's Palace at Monterey was brevetted major-general. He then served under General Scott in the Southern campaign; greatly distinguished himself at Cerro Gordo, Churubusco, Molino del Rey, and Chapultepec; and on September 13, 1848, received from the authorities of the City of Mexico the overtures for a surrender. After the war until his death he commanded the Department of Texas. A monument to his memory was erected at the intersection of Broadway and Fifth Avenue, New York, in 1858.

WORTH′EN, Amos Henry (1813-88). An American geologist, born at Bradford, Vt. He was educated at Bradford Academy, and shortly after graduation removed to Kentucky, and from there to Cumminsville, Ohio, where he taught school for some time. In 1836 he moved to Warsaw, Ill., where he afterwards resided, except for a short stay in Boston (1842-44). In geology he was self-taught and pursued his studies while engaged in business, becoming an expert paleontologist. In 1851 he became a member of the American Association for the Advancement of Science, in 1853 assistant State geologist of Illinois, and in 1855 filled a similar position in Iowa. In 1858 he became State geologist of Illinois, a position which he held till 1877, when the Geological Survey was abandoned. In the same year he was appointed curator of the State Historical Society and Museum of Natural History, a position which he retained till his death. He gathered a large collection of Carboniferous crinoids and his most important discoveries were among the Lower Carboniferous. He also made valuable paleontological discoveries of fish remains and terrestrial flora.

WORTHEN, William Ezra (1819-97). An American civil engineer, born at Amesbury, Mass. He was educated at Harvard College and practiced his profession in Massachusetts prior to 1850, when he moved to New York. There he designed many large buildings and water-works of several cities. Besides several papers on hydraulic and sanitary subjects, he published: *Cyclopædia of Drawing* (1857); *First Lessons in Mechanics* (1862); *Rudimentary Drawing for Schools* (1863).

WORTHIES OF ENGLAND, The. The greatest work of Thomas Fuller, a voluminous collection of national biographies, originally posthumously published in 1662. It was reprinted, with explanatory and corrective notes, in 1811, by John Nichols, and in 1840 by P. Austin Nuttall.

WORTHING, wûr′thĭng. A fashionable watering-place on the Sussex coast, England, 10 miles west of Brighton (Map: England, F 6). Its importance began with the nineteenth century. Early fruits are grown under glass here, an industry to which many acres of land are devoted. Population, in 1891, 16,606; in 1901, 20,006.

WORTHINGTON, wûr′thing-ton, Henry Rossiter (1817-80). An American inventor and hydraulic engineer, born at Tarrytown, N. Y. He early devoted himself to the study of steam machinery; invented the independent feed pump, and in 1849 patented the direct-acting steam pump. Five years later he built the first direct-acting compound condensing engine, and soon afterwards he invented the duplex pump. See Pumps and Pumping Machinery.

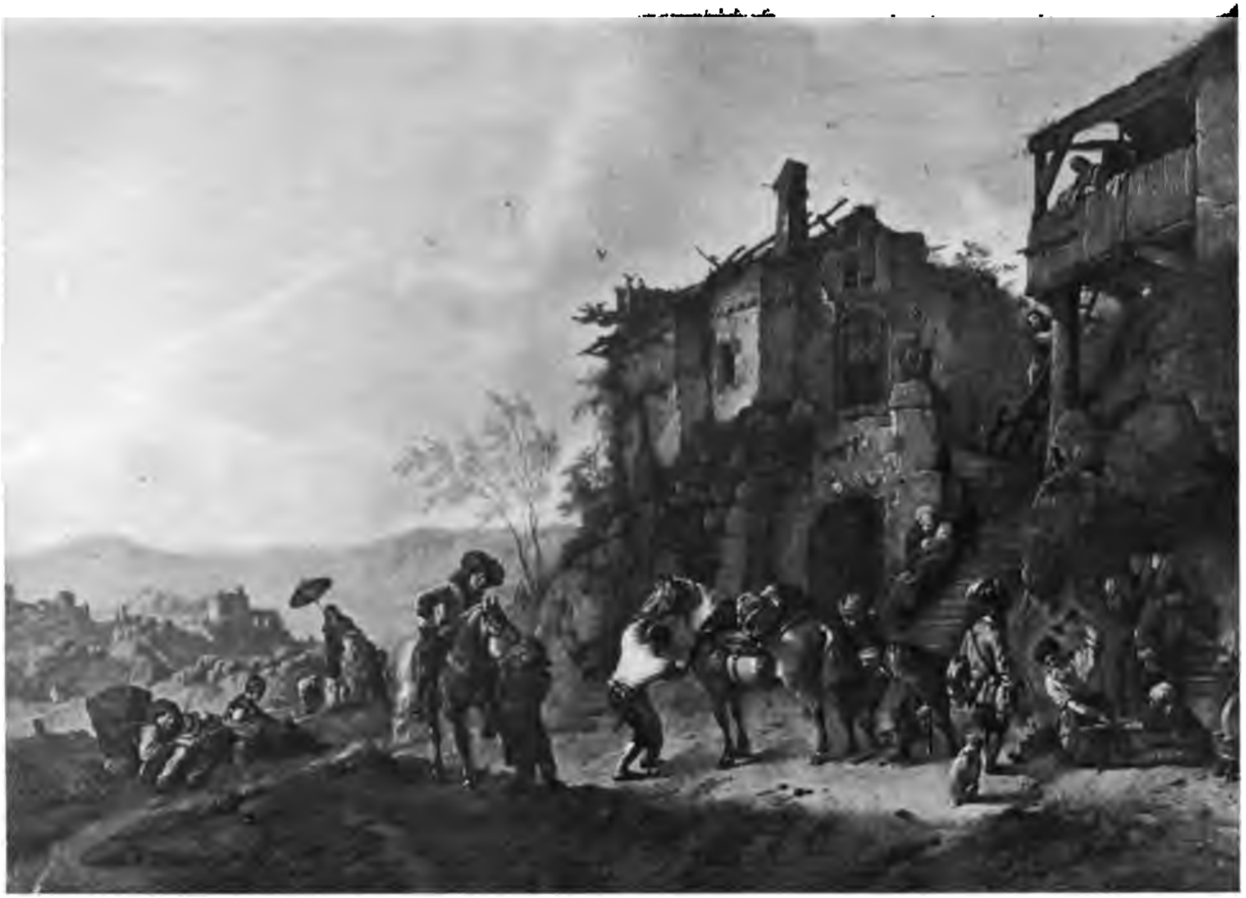
WOT′TON, Sir Henry (1568-1639). An English diplomat and poet. He was born at Boughton Malherbe, in Kent, and educated at Winchester School and at New and Queen's Colleges, Oxford. He traveled for nearly seven years on the Continent. In 1595, after his return to England, he entered the service of Robert Devereux, Earl of Essex, and made a number of foreign journeys in his behalf. Being implicated, through this connection, in the condemnation falling upon Essex for conspiracy (1601), Wotton remained out of England during the remainder of Elizabeth's reign, though once he journeyed from Italy to Scotland, disguised as an Italian, to warn James VI. (afterwards James I. of England) of a conspiracy against his life. Upon the accession of James I. he was recalled to England and appointed Ambassador to Venice in 1604. With two intermissions he retained the post until 1624. In 1624 he became provost of Eton and held the post until his death. Wotton is the author of two poems included in every collection of English verse, "The Character of a Happy Life," and "On His Mistress, the Queen of Bohemia," and a posthumous publication, *Reliquiæ Wottonianæ, or a Collection of Lives, Letters, Poems, with Characters of Sundry Personages and Other Incomparable Pieces of Language and Art* (1651). This volume contained the memoir by Izaak Walton.

WOTTON, William (1666-1726). An English scholar, born at Wrentham, in Suffolk. His father, trained in the classics by Merle Casaubon, began to teach the boy Latin and Greek at the age of four, and Hebrew at the age of five. In his tenth year William entered Catharine Hall, Cambridge, and the master, John Eachard, recorded that in these languages he was second neither to Hammond nor to Grotius. After graduating B.A. in 1679, Wotton was elected fellow of Saint John's College, Cambridge, took orders, and held various livings, eventually becoming a prebendary in Salisbury Cathedral (1705). His scholarship was recognized by an election to the Royal Society (1687). Wotton, one of the most precocious of scholars, is best known as the author of *Reflections upon Ancient and Modern Learning* (1694), written on the side of the moderns in the famous controversy of the time. Among his other works were a *History of Rome* (1701), and *Traditions and Usages of the Scribes and Pharisees* (1718). Wotton also studied Welsh. After his death appeared *Leges Wallicæ* (1730), a translation of the laws of Hywel Dda. For the principles on which Wotton was educated, consult Henry Wotton's *Essay on the Education of Children* (posthumous, London, 1753).

WOULD-BE, Sir Politick and Lady. A tiresome and pompous traveler and his pedantic wife, in Jonson's *Volpone.* The two characters, omitted in some revised editions of the play, are a satire aimed against John Bull and his wife when traveling.

WOUND (AS. *wund,* OHG. *wunta,* Ger. *Wunde,* wound; probably connected with Goth. *winnan,* to suffer). An injury attended with a division of tissue produced by sudden mechanical force. The skin may be broken, in the case of an open wound; or it may be unbroken, and deep structures attacked, as in a subcutaneous wound. Wounds are termed *penetrating,* when they enter a cavity without emerging; *perforating,* when they enter and emerge from a cavity. All wounds are accompanied by some death of tissue. If great areas are contused or lacerated, death and destruction are great, and graver conditions arise. Wounds may be classified as *aseptic,* when they are not contaminated by poisonous infection; and as *septic,* when bacterial or other fermentative agents have been admitted, in which case suppuration and sloughing ensue.

Among the local symptoms of wounds are impairment of function, pain, bleeding, and shock.



WOUWERMAN

"THE SMITHY," FROM THE PAINTING IN THE ROYAL GALLERY, DRESDEN

Severing of muscles may be the result of a wound, leaving a limb powerless, for example. Pain results from laceration of nerves, and may vary in character from a sharp twinge to a dull ache. The amount of hemorrhage depends upon the nature and size of the wound, and the number and size of blood vessels injured. For shock, see that title. A special danger in the case of a large wound is that of fat-embolism. This condition occurs when fat-globules gain access to the blood and are carried about with the circulation to lodge in some organs and produce death.

Repair of wounds is the process by which the cells of the part replace lost tissue. The most economical method is by *primary adhesion*, or 'first intention.' This occurs when the parts can be brought together in close coaptation and the parts are aseptic. There may be few or no symptoms of inflammation. Pressure, suturing, or position may secure the coaptation necessary. If this be impossible, and the edges of the wound must be left apart or there is a large amount of tissue missing, healing by 'secondary intention' or *granulation* occurs. That is, new tissue grows up in the deepest part of the wound, appearing like a heap of granules, gradually filling up the gap, and finally the skin shoots across when the granulations reach the surface. This process is wasteful of tissue and of the patient's strength, as suppuration occurs during its progress. After surfaces of a wound have begun to granulate, they may be brought together so that the granulations fuse, and the gap is closed. This is called healing by 'third intention.' Subcutaneous wounds heal similarly, the exudations being absorbed, and if there be no bacterial infection the process is rapid. Healing under a blood clot or by 'scabbing' is also an economical method. In the case of a fracture or wound of bone, a callus (or provisional deposit of new bone) occurs, covering the ends of the fragments and cementing them together. Gradually part of this callus disappears, as 'knitting' is complete. Wounded arteries heal much like bone.

In the treatment of a wound the surgeon must first stop the hemorrhage, by ligature, pressure, torsion of arteries, or the application of heat. The wound must then be cleansed and disinfected, all dead or dying tissue, blood, and foreign bodies being removed. The lips of the wound must then be brought together as far as possible, and kept in place by suture (q.v.), or by adhesive plaster. Drainage must be secured, by the use of a tube, a piece of gauze, a bunch of horsehair, or other device, if the wound cannot be closed. An aseptic dressing must then be applied. This may be of wool, cotton, gauze, jute, etc., carbolized, sublimated, or treated with boric acid, thymol, iodoform, or other disinfectant. Dressings must be changed and removed occasionally.

Poisoned wounds may be the results of the microbial infection of glanders, anthrax, rabies, actinomycosis, etc. (qq.v.), or may be due to chemical agents. Dissection wounds are septic wounds generally of great virulence, contracted during post-mortem examinations or the dissection of dead bodies. They are due to microbic poisoning. In many poisoned wounds amputation is early necessary, or free incisions to favor suppuration and sloughing off of the attacked tissue. Meanwhile internal supportive treatment is necessary. See Gunshot Wounds.

Consult: Morris, *How We Treat Wounds To-Day* (New York, 1886); Keen and White, *American Textbook of Surgery* (Philadelphia, 1899); Robb, *Aseptical Surgical Technique* (ib., 1902).

WOUNDWORT. See Stachys.

WOUWERMAN, vou′vĕr-män, Philips (1619-68). A Dutch animal painter, born at Haarlem. His landscapes show the influence of Jan Wynants and his figures that of Pieter de Laar, under whom it is supposed that he studied; another supposition is that he was a pupil of Verbeek. He is recorded as a member of the Painters' Guild in 1642, and died May 19, 1668. Wouwerman's art is the culmination of Dutch painting as regards the combination of figures and landscape. Both are treated with equal mastery, neither being subordinate, yet without loss of the harmony of the picture. He was, above all else, the painter of the horse, which he portrayed engaged in all of its services to mankind; in battle and hunting scenes, the pampered riding or carriage horse of the rich, the overworked cart horse of the poor. The centre of his pictures is usually a white or gray horse, upon which the high light is concentrated. The human figures, from cavalier to beggar, are equally well done. Wouwerman is in all respects a brilliant draughtsman, and his composition is faultless. His landscapes belong to the very best of the Dutch school, being especially good in aerial perspective. The tone is a silvery gray, giving play to a harmonious coloring with fine discrimination of values. He was a most prolific painter, above eight hundred works being ascribed to him, besides the many figures he painted for the landscapes of others. Dresden possesses sixty-four; then come Saint Petersburg with fifty, the Cassel and Munich galleries with twenty, and the Louvre and various English collections.

His younger brother Pieter (1623-82) developed under Philips's influence, and painted similar subjects. His work is more detailed in execution and darker in color. Though far inferior to his brother, he copied the latter's pictures with great success. Many of the works ascribed to Philips are probably by his brother. The works of Jan (1629-66), the youngest member of the family, represent moonlight scenes and sand dunes, and are extremely rare. He was probably a pupil of Wynants. Consult: Wurzbach, in Dohmè, *Kunst und Künstler Deutschlands und der Niederlande* (Leipzig, 1878); and Kämmerer, *Ueber die Composition in Wouwerman's Gemälden* (ib., 1879).

WOVO′KA (Cutter), or Jack Wilson (c.1856—). A Piute Indian prophet of Nevada, the originator of the Messiah or Ghost Dance religion, born in Mason Valley, west of Walker Lake, Nevada. On his father's death, about 1870, the boy was taken into the family of David Wilson, a white ranchman from whom he got the name by which he is commonly known among the whites. In the war of 1888-89 he was stricken with a severe fever during which the Piute were thrown into great excitement by an eclipse of the sun. Wovoka fell into delirium culminating in a trance, during which he thought he saw the God of the Indians and all the Indians who had died engaged in their old-time sports and occupations, as before the white man came. He was given a revelation and a dance which he was commanded to communicate to his people, with the promise that by strictly observing the doctrines and ceremonial they would be enabled to rejoin their departed friends in a new Indian earth which was rapidly approaching from the west, stocked with game and everything of the old Indian life, and which would slide over the present earth, driving the whites before it to the land beyond the water from which they had originally come. In the same connection he was to preach the brotherhood of the Indian race, and the abolition of tribal warfare, the war dance and all that savored of war; to forbid laceration, destruction of property, and excessive grief at funerals, and to permit the equality of women in ceremonial affairs. On his return from the spirit world he at once began to preach the new doctrine, which, in spite of its prohibition of their cherished war and funeral customs, appealed strongly to the Indians for the hope it held out of a happy future. The songs and dances of the ceremonial, popularly known as the Ghost Dance, soon became general among the Piute (q.v.), and the report spread to other tribes across the mountains, which sent delegations to interview and receive instructions from 'the Messiah' until the Ghost Dance had spread to nearly all the Indian tribes from the Sierras to the Missouri River, and from the Canadian frontier almost to the Mexican border. Among the Sioux (q.v.) the religious ferment intensified a feeling of dissatisfaction over certain treaty grievances, resulting in the war of 1890-91. The dance reached its highest point about a year later, after which the excitement rapidly subsided, owing to the failure of the prophecies at the appointed time. It exists now only as a semi-social affair. Consult Mooney, *The Ghost Dance Religion* (Washington, 1896).

WRANGEL, vräng′*e*l, FRIEDRICH HEINRICH ERNST, Count (1784-1877). A Prussian general. He was born at Stettin; entered the Prussian Army as ensign, 1796; fought in the campaigns against Napoleon, rising to the rank of colonel, and was made major-general in 1823, and lieutenant-general in 1838. He was given command of the allied forces against Denmark in 1848, but in September he was summoned home, and in November suppressed a popular uprising in Berlin, for which service he was made general of cavalry. He was created a field-marshal in 1856, upon the 60th anniversary of his entrance into the military service. He commanded the allied Austrian and Prussian forces against Denmark in 1864, but soon after the opening of the war retired from the command.

WRANGEL (or **WRANGELL**), FERDINAND, Baron (c.1794-1870). A Russian explorer and naval officer. He was born in Livonia, and after graduating at the Imperial Naval Academy at Saint Petersburg entered the Russian Navy. He sailed twice around the world and took part in several scientific expeditions. In 1820 he was placed in command of an expedition planned to explore the Polar regions north of Asiatic Russia. He advanced on sledges to 72° 2′ north latitude, from which point he sighted the open sea beyond. The land known as Wrangel Land was not discovered by him, but was explored and named after him by Long in 1867. He was Governor of Alaska from 1829 to 1834, during which time he organized and directed a commercial company for the development of the region. In 1849 he became a vice-admiral, and from 1853 to 1858 he held the post of minister of marine. He opposed the sale of Alaska to the United States. His own complete account of his Polar expedition was published in Russian (Saint Petersburg, 1844). A briefer account, being extracts from his diaries, was published in German in 1839 and an English translation by Mrs. Sabine entitled *Wrangell's Expedition to the Polar Sea in 1820-23* (London, 1840).

WRANGEL, KARL GUSTAV, Count (1613-76). A Swedish commander, born at Skokloster, near Upsala. He entered the military service in 1627, under Gustavus Adolphus. After the death of the King (1632) he served with Bernhard of Saxe-Weimar and Banér. At the death of Banér in 1641, though the command of the army was his by right, he consented to serve under Torstenson. In 1644 he took command of the Swedish fleet and defeated the Danes near the island of Fehmarn. At the close of the Danish war in 1645 he was made count, and in the following year took command of the Swedish army in Germany. With Turenne he forced Maximilian of Bavaria to an armistice in 1647. He served against the Poles in 1655-56, and against the Danes in 1657-59, with much distinction. In 1674 he led the Swedish army against the Elector of Brandenburg, but was compelled by failing health to leave it, and returned to Sweden.

WRANGELL, răŋ′g*e*l. A village in the Southern District of Alaska, 160 miles southeast of Juneau, on Wrangell Island at the mouth of the Stikine River (Map: Alaska, J 4). It has salmon canneries and a hatchery, and exports fish and furs. A Presbyterian mission was founded here in 1877. Wrangell was settled by Russians in 1833 and was of considerable importance as a distributing centre at the time of the exploitation of the Cassiar gold fields. Population, in 1900, 868.

WRANGEL (răŋ′gel) **LAND**. An island in the Arctic Ocean, in latitude 71° north, longitude 180°, about 400 miles northwest of Bering Strait (Map: Arctic Regions). It is about 70 miles long and 25 miles broad, and consists chiefly of naked granite rocks over 2000 feet high. The island was first reported by natives of the Siberian coast early in the nineteenth century, and the Russian explorer Wrangel, after whom it was named, went in search of it in 1821. It was first sighted by the American explorer Long in 1867 and explored in 1881 by Hooper, who took possession of it for the United States and called it "New Columbia."

WRANGLER. A term applied to one who has attained a first class in the mathematical honor examination in the University of Cambridge. The word owes its origin to the public disputations formerly held as part of the examinations. The honor men, or those reaching a certain rank, are divided into three classes according to merit, wranglers, senior optimes, and junior optimes, the highest of the first class being known as senior wrangler.

WRASSE (from Welsh *gwrachen*). A spiny-rayed marine fish of the family Labridæ. The form is somewhat perch-like, but the back is straighter. There is a single long dorsal fin, the spines of the anterior portion of which are surmounted by short membranous filaments, the posterior portion having short and split rays. The mouth is protrusible, with thick fleshy lips, folded so as to appear double. The colors are generally very brilliant, especially in the Oriental genus Julus, an example of which is depicted on the Colored Plate of PHILIPPINE FISHES. They chiefly frequent rocky shores, and are generally seen in small shoals, often hiding under seaweeds, where they feed on crustaceans, mollusks, and marine worms. They are often caught by bait intended for other fish, but their flesh is not much esteemed. No North American fish is popularly called a wrasse, but the family is represented here by the cunners, tautogs, ladyfishes, doncellas (qq.v.), and similar forms of our southern and western seacoasts.

WRATH, CAPE. See CAPE WRATH.

WRAT'ISLAW, ALBERT HENRY (1822-92). An English Slavonic scholar. He was born at Rugby of a Czechic family which had settled in England. He was educated at Rugby School and the University of Cambridge, and in 1850 was appointed head master of Felsted School. In 1855 he became the head of King Edward VI.'s school at Bury Saint Edmund's, where he remained till 1879, when he was given the living of Manorbier, Pembrokeshire. In 1889 he retired. His more important works are *Lyra Czecho Slovanska* (1849); *Life, Legend, and Canonization of Saint John Nepomuk* (1873); *The Native Literature of Bohemia in the Fourteenth Century* (1878); and *Sixty Folk-Tales from Exclusively Slavonic Sources* (1889).

WRAXALL, răks'ąl, Sir FREDERICK CHARLES LASCELLES (1828-65). An English writer, born in Bristol. He was a grandson of Sir Nathaniel William Wraxall (q.v.). He was educated at Saint Mary's Hall, Oxford, but left without a degree. He lived mostly on the Continent, and served for nine months as assistant commissary in the Crimean War. His experiences in the East are described in *Camp Life* (1860). Among his other books are *Handbook to the Naval and Military Resources of European Nations* (1856); *Armies of the Great Powers* (1859); *Military Sketches* (1864); and *Life and Times of Caroline Matilda, Queen of Denmark and Norway* (1864), which is a substantial work. He also wrote several entertaining novels, as *Wild Oats* (1858); *Only a Woman* (1860); *Married in Haste* (1863); and *Golden Hair, a Tale of the Pilgrim Fathers* (1864).

WRAXALL, Sir NATHANIEL WILLIAM (1751-1831). An English historical writer. He was born at Bristol and was educated there. He lived for several years as an author and would-be man of fashion, partly in England and partly on the Continent. In 1780 he entered Parliament, where for fourteen years he pursued a somewhat tortuous and noisy career. After his retirement he devoted himself largely to compiling his historical memoirs and was often involved in quarrels as a result of his publications. Wraxall must be regarded as a fairly accurate raconteur, though his veracity has been often impeached, and his pictures of political life have some historical value. His publications include: *Memoirs of the Kings of France of the Race of Valois* (1777); *Memoirs of the Courts of Berlin, Dresden, Warsaw, and Vienna* (1779); *Historical Memoirs* (1815); and *Posthumous Memoirs* (1836). The last two were republished with additions by H. B. Wheatley in 1884.

WRAY'BURN, EUGENE. A kindly, indolent young barrister in Dickens's *Our Mutual Friend.* He becomes interested in the "Harmon mystery" and thus makes the acquaintance of Lizzie Hexam, daughter of a longshoreman who is suspected of murdering the heir. He finally marries her, after being attacked and nearly murdered by the jealous Bradley Headstone.

WRECK (AS. *wræc*, exile, misery, Icel. *rek*, *reki*, anything drifted or driven ashore, from AS. *wrecan*, Icel. *reka*, Goth. *wrikan*, to persecute, *OHG. rehhan*, Ger. *rüchen*, to revenge; connected with Lith. *vàrgas*, affliction, OChurch Slav. *vraga*, enemy, persecutor, Lat. *urgere*, to press, Gk. *ειργειν*, *eirgein*, to repel, Skt. *varj*, to turn aside). A vessel which has been stranded or so badly injured as to be helpless. The number of wrecks which occur annually is very large, amounting to about 4 per cent. of all ships in actual use. This has led to the development of a special form of industry called 'wrecking.' The means of raising sunken vessels and removing stranded ones are various. They may be lifted with chains; by submerging hollow caissons, lashing them to the hull and then pumping them out; by closing all openings in the vessel's hull and pumping the water out; by inserting air bags in the hull and inflating them; or by a combination of these methods or of similar ones. Stranded wrecks have been removed in many different ways: by digging a canal to them from deep water; by building launching ways underneath; by cutting them in two (where caught on the rocks) and removing the parts separately and reconnecting them; and of course by hauling them into deep water by means of lines leading to tugs or anchors.

In law, wreck is defined as parts of vessels or their cargoes cast upon the land by the sea. By the common law, fragments of vessels or other property floating upon the sea do not come under this classification; they are known as *derelict* property, and belong to the jurisdiction of the admiralty courts. By the statute of 17 and 18 Victoria all *jetsam*, *flotsam*, and *ligan*, which were formerly classed as derelict property, were included under the head of wreck. Under the ancient English law all wreck belonged to the Crown, but by the statute above referred to the owner may claim his property upon the payment of the proper salvage. In the United States the disposition of wrecks belongs to the several States. The owner of a wrecked vessel may abandon his property and is not obliged to remove it, even though it obstruct navigable waters, nor is he liable for damage occasioned thereby. Federal statutes provide that stealing from wrecks, obstructing the escape of a crew from a wrecked vessel, extinguishing lights or setting up misleading lights in order to cause wrecks, shall be punished as felony. In the law of marine insurance, a vessel becomes a wreck and may be abandoned to the insurers when she becomes so disabled as to be unnavigable. See SALVAGE.

WRECKFISH. One of the great deep-water sea-bass of the genus Polyprion, closely related to the jewfish (Stereolepis). It is usually to be seen about floating timber and wrecks. Two species are known—one in the South Pacific, and the other (*Polyprion cernium*), the 'stone-bass' of English and 'cernier' of French fishermen. The latter reaches a weight of 86 pounds, and its flesh is excellent. Consult Yarrell, *British Fishes* (London, 1862).

WREDE, vrā'de, KARL PHILIPP, Prince (1767-1838). A Bavarian field-marshal, born at Heidelberg. He studied at the university in his native city. In 1799 he led a body of Bavarian volunteers to join the Archduke Charles of Austria in the struggle against the French, and for his conduct in that campaign he was made a major-general. After the peace of 1801 he devoted time and labor to the organization of the Bavarian army. He held important commands in the French campaigns against the Austrians, Prussians, and Russians till 1813, when Bavaria joined the Allies. He was defeated by Napoleon at Hanau. Soon after he was chosen to command the Fifth Corps of Schwarzenberg's army, and fought in the battles of La Rothière, Bar-sur-Aube, and Arcis-sur-Aube in the campaign of 1814. His services were rewarded by the dignities of field-marshal and prince, and by the gift of the domain of Ellingen. He was subsequently employed on many important diplomatic missions.

WREN (AS. *wrenna, wrænna*, wren; perhaps connected with AS. *wræne*, wanton). A subfamily of birds (Troglodytinæ) of the family Troglodytidæ, the other members of which are the mocking-birds and thrashers (qq.v.). The wrens have a slender, slightly curved, and pointed bill, the edge of the mandibles entire; the wings very short and rounded; the tail short and often carried erect; the legs slender and rather long. Their plumage is generally dull. There are about 150 species, natives chiefly of the Northern Hemisphere, and most of them are American. They live on or near the ground, seeking for insects and worms among low bushes, and in other similar situations. Perhaps the best known species, and a good example of the group, is the European wren (*Troglodytes vulgaris*). It is only about four inches long, reddish brown above, with narrow transverse streaks of dark brown, yellowish white below, the greater wing-coverts with three or four small bead-like spots of white. It frequents gardens, hedges, and thickets, flitting from bush to bush, or from one stone to another. The male has a loud, sweet song. The nest is large for the size of the bird, oval, domed above, with an opening on the side, and is composed of hay or moss, lined with feathers, and is often placed under the thatch of a building, against the side of a moss-covered tree, or elsewhere so as to be sheltered from rain.

No other true wren is found in Europe, but the United States has a dozen or more species, several of which agree very closely in color and habits with the European type. Such a one is the familiar house-wren (*Troglodytes aëdon*), abundant in the eastern parts of the United States. It is less shy than the European wren, and often builds its nest near houses, and in boxes prepared for it. The nests are made to fill the boxes; and to effect this, a large mass of heterogeneous materials is sometimes collected. The song of the house-wren is simple but sweet. The male is a very bold, pugnacious bird. In the southern half of the United States another very similar species, Bewick's wren (*Troglodytes Bewickii*), is prevalent. It has a much longer tail than the house-wren, but behaves in the same way, and its nest and eggs (see Plate of EGGS OF SONG-BIRDS) are of the typical pattern. The winter wren (*Troglodytes hiemalis*) is similar to the European wren. It is common throughout North America, but is migratory, breeding in Canada and wintering in the Southern States. It is noted for the surprising loudness as well as the musical quality of its spring song.

The other wrens of the United States belong to several different genera. Among the best known is the Carolina wren (*Thryothorus Ludovicianus*), a rather southerly species breeding as far north as Connecticut and wintering from Maryland southward. It is a large species, 5½ inches long, with considerable white in the plumage. This bird is one of the most varied and cheerful vocalists in America; it sings a sweet and gleeful medley of notes, some of which seem culled from other bird-songs, so that this fine species is popularly called the 'mocking' wren. (See Plate of WRENS, WARBLERS, ETC.) Other wrens, except marsh-wrens (q.v.), are mainly denizens of the West and Southwest. The cactus-wrens of the genus Heleodytes (large brownish birds frequenting the arid, cactus-growing plains of the Mexican border), and the cañon-wrens of the genus Catherpes, inhabiting the rocky defiles of the southern Rocky Mountain region and noted for their brilliant singing, are conspicuous Western species; also the rock-wren (q.v.).

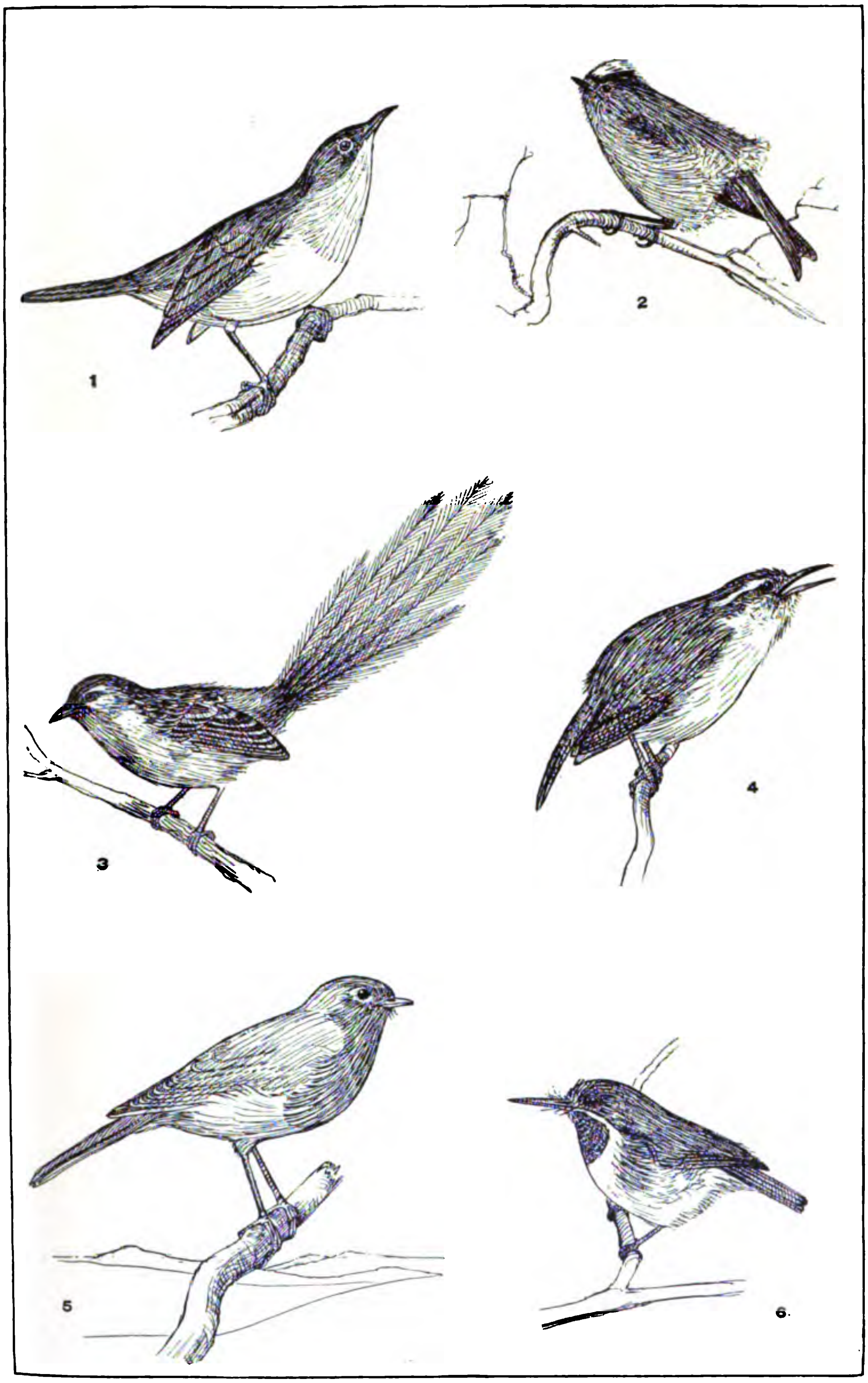
Consult British and North American authorities, cited under BIRD, especially Coues, *Birds of the Colorado Valley* (Washington, 1878).

WREN, Sir CHRISTOPHER (1632-1723). One of the greatest of English architects, born at Knowle, Wiltshire. He was a graduate of Wadham College, Oxford, Fellow of All Souls' in 1653, and Savilian professor of astronomy in 1660. He was one of the founders of the Royal Society and its president in 1681. As a scientist and mathematician of wide reputation he was in 1663 appointed one of the commissioners for the repair of old Saint Paul's Cathedral (q.v.), London. There were at this time few trained architects in England, and Wren, finding himself gradually drawn, by frequent consultations on building matters, into a profession which he had not originally intended to follow, devoted himself to its study with increasing enthusiasm. In 1665 he began the Sheldonian Theatre at Oxford and the Library of Trinity College, Cambridge.

The great fire of London in 1666 gave the real opportunity for the manifestation of his genius; from that time on for forty years there was hardly an important building in or near London planned without his aid. Winchester Palace, extensive addition to Hampton Court, Chelsea Hospital, Marlborough and Buckingham Houses, the old Royal Exchange, Greenwich Hospital (in part), and a series of fifty-three parish churches in London, are among the works. He employed a large force of assistants and deputies to carry out his plans, but impressed the stamp of his individual style on everything that was committed to his charge. For his great masterpiece, see SAINT PAUL'S CATHEDRAL.

Working in an age when his art had wofully declined in England, he succeeded in raising the

WRENS, WARBLERS, ETC.



1. CEYLON WHITE-EYE (Zosterops Ceylonensis)
2. GOLDEN-CROWNED KINGLET (Regulus satrapa).
3. EMU WREN (Stipiturus malacurus).
4. GREAT CAROLINA WREN (Thryothorus Ludovicianus).
5. ENGLISH ROBIN REDBREAST (Erythacus rubecula).
6. JAMAICAN GREEN TODY (Todus viridis).

standard of taste by the refinement and propriety of all his designs. His work exerted a strong influence on the nascent architecture of the American colonies, especially that of the churches, though it is doubtful whether he designed any of the American buildings attributed to him. He is buried in Saint Paul's, where on a tablet is inscribed the well-known epitaph, "Si monumentum requiris circumspice" (If thou seek his monument, look about thee). Consult his biography by Elmes (London, 1852) and by Philimore (ib., 1883); Clayton, *Churches of Sir Christopher Wren* (ib., 1848); Loftie, *Inigo Jones and Wren* (New York, 1893); and the authorities referred to under SAINT PAUL'S CATHEDRAL.

WREN-TIT, or GROUND-TIT. A small, long-tailed, brown, wren-like bird (*Chamæa fasciata*) of the coast region of southern California, which keeps close to the ground, searching for its insect food, and uttering a low, trilling, titmouse-like call. It nests in low bushes and lays light-blue, unspotted eggs. It is set apart in a family (Chamæidæ) by itself, and is regarded as intermediate between the gnatcatchers and the titmice.

WRESTLING (from *wrestle*, AS. *wræstlian*, *wraxlian*, to wrestle, frequentative of *wræstan*, Icel. *reista*, to twist, probably from AS. *wrīþan*, Icel. *rīþa*, OHG. *rīdan*, to turn, twist, wrest). A sport in which one person tries to throw another to the ground. The rule with the Greek wrestlers was to secure three throws before the victory was decided. The wrestlers were accustomed to rub their bodies with oil in the belief that they secured a greater pliancy of limb, and doubtless also to check any excessive perspiration. In order to obviate the difficulty of grasping each other with firmness owing to the coating of oil, the wrestlers were required either to roll in the dust of the Stadium or to be sprinkled in the fine sand kept for that purpose at Olympia. Should one of the wrestlers in a match fall and drag his adversary with him, the combat was continued on the ground. The Greek method of wrestling subsequently passed to the Romans, and by them was introduced throughout Europe. Græco-Roman wrestling of to-day must not be confused with the ancient Greek method of wrestling, for it is neither a variation of the ancient Greek or Roman, nor even a compound of the two. The Græco-Roman style was adopted in France about the middle of the nineteenth century and is now the only recognized mode in that country. It was introduced into England in 1869 and 1870. In America it has become popular. The style proper does not begin until both men are on the ground.

'Tripping,' which is the essence of the English game, is barred in the Græco-Roman. Of the distinctive English style of wrestling, the following points are the most important. In the *Cornwall and Devon* style, the wrestler is required fairly to throw his opponent flat on his back before a decision can be won. In order to secure the throw, two shoulders and one hip must be on the ground, or two hips and one shoulder. This is called 'three points down.' The various artifices used in this style of wrestling are called 'trips' or 'chips.' They include the following: The flying mare, the inside lock forward, the inside lock backward, the double-lock, the forehand play, the after play, inside and outside clamp, the pull under, and the cross heave. In the *Lancashire* style or *catch-as-catch-can* unlimited action is permitted. It is the roughest of the English methods and is also one which most appeals to the athlete. Throttling is forbidden by the rules, but it is invariably resorted to. Tripping and catching hold of the legs are permitted, and in the floor work the style comes nearer the French or Græco-Roman than any other method of wrestling. The most important trips are the double-Nelson, the half and three-quarter Nelson, the lock, ham and leg, the flying mare, heave and leg holding. The cleanest style and the one possessing the most simple rules is the *Cumberland and Westmoreland* style, in which the wrestlers on taking hold stand up chest to chest, each combatant placing his chin on his opponent's right shoulder, at the same time grasping him around the body, one man placing his left arm above the right of his antagonist. When both men have secured their hold and are reckoned as fairly on their guard, the struggle begins. If one of them breaks hold, i.e. loses his grip, if yet on the ground and his opponent retains his hold, the one who has lost his grip is declared the loser. Similarly if either man touches the ground with one knee or any other part of the body, though he may still retain his hold, he is not permitted to recover himself and is declared the loser. The *Irish* or *collar-and-elbow* style is as interesting as it is peculiar. The contestants seize each other by the neck with one hand, and by the elbow with the other, and when one of them touches the ground with his hand, knee, back, or side, the fall is won. In Burma and throughout the East Indies wrestling has reached a high degree of development. The wrestlers are nude, and skill rather than strength is made to count.

JAPANESE WRESTLING (JIUJUTSU or JIU-JUTSO). A method of self-defense without weapons; the modern form of the old *samurai* weaponless combat. It first became popular in Japan in the sixteenth century, its origin being traced to Akiyama, a learned physician, who at that period lived at Nagasaki. He is said to have brought it back from China. Before he died, Akiyama had elaborated the Chinese system to the extent of discovering 303 methods of seizing and throwing an opponent, or otherwise disabling him. Jiu-jutsu, owing to its semi-secret character, is usually taught in night sessions, and although the majority of the pupils gain considerable skill in the system, only a few acquire a complete mastery of it. It *is* extremely difficult to penetrate the secrets of the higher playing, owing to the jealousy with which it is guarded by its professors. The rank and file of the police departments of Tokio, Kobé, and Yokohama are compelled to attain a certain degree of efficiency in the art, although no pupil receives a lesson before pledging himself on oath not to reveal the methods. When it is realized that the master of this science can by a slight, swift movement benumb a victim's brain, dislocate his hip or shoulder, burst or twist a tendon, or break an ankle, there is excellent reason for the Japanese system of confining the proficiency in the higher degrees of the art only to men of perfect self-command and good moral character. The Japanese wrestler does not meet his opponent by a sustained counter-effort as does a boxer, but instead makes a shirking of physical contact and the avoidance of effort an important part of his play. An aggressive combatant has to be exceedingly careful that his aggressiveness and impetuosity are not deftly deflected so that by the exercise of some little trick of the game he himself is made to dislocate his shoulder or break a limb without the expenditure of the slightest effort on the part of his opponent. At the beginning of the twentieth century there were many important kinds of jiu-jutsu throughout Japan, which, although they differed slightly from each other in methods and practice, were practically a unit in teaching the idea of Akiyama. There were forty different schools in Tokio alone.

WREXHAM, rĕks'*a*m. A municipal borough in Denbighshire, North Wales (Map: Wales, C 3). It stands 12 miles southwest of Chester, on an affluent of the Dee. The town is well built, and the church, a handsome edifice in Perpendicular, dating from 1470, with a tower 135 feet in height, is styled 'one of the seven wonders of Wales.' The churchyard contains the tomb and quaint epitaph of Elihu Yale (1648-1721), founder of Yale College. The town owns an electric lighting depot, cattle mart, slaughter houses, and markets, and maintains a sewage farm, cemetery, art school, and free library. In the vicinity are collieries and lead mines, and the town has iron works, paper mills, breweries, and important markets and fairs. Population, in 1901, 14,966.

WRIGHT, Arthur Williams (1836—). An American scientist and educator, born at Lebanon, Conn. He graduated at Yale in 1859, and was an instructor in the Sheffield Scientific School in 1867-68. He studied in Heidelberg and Berlin in 1868-69; was professor of physics and chemistry in Williams College in 1869-72; professor of molecular physics and chemistry in Yale, 1875-87; and in 1887 was made professor of experimental physics. He contributed numerous scientific papers, chiefly on astronomical and electrical subjects, to various publications, and became a Fellow of the Royal Astronomical Society, and a member of the National Academy of Sciences.

WRIGHT, Carroll Davidson (1840—). An American economist and statistician, born in Dunbarton, N. H. He began to study law in 1860, but his course was interrupted by the war, in which he served first as a private and finally as a colonel in the Union army. Resuming his studies in Boston in 1865, he was soon admitted to the New Hampshire bar. After serving two terms in the Massachusetts Senate, to which he was elected in 1871, he was chief of the Bureau of Labor Statistics of Massachusetts from 1873 to 1888, in which position he superintended the State censuses of 1875 and 1885. In 1885 he became United States Commissioner of Labor, a position which he still holds. In his long service he has published in the annual and special reports and the bulletin of the department many valuable statistical studies of the labor question. He was placed in charge of the completion of the census of 1890 and has made other valuable investigations at the request of Congress. He became president of the American Statistical Association and occupies an honorary chair of political science in the Catholic University in Washington. He was an important member of the commission appointed by the President to investigate and arbitrate the strike of the anthracite coal miners in 1902, and he served on many other conciliatory boards. Andrew Carnegie made him one of the original trustees of the Carnegie Institution. In 1902 he accepted the presidency of the College Department of Clark University, Worcester, Mass. His writings include a large number of essays in the periodicals, and the following works: *The Industrial Evolution of the United States* (1895); and *Outlines of Practical Sociology* (1899).

WRIGHT, Charles Henry Hamilton (1836—). An Irish clergyman, born in Dublin and educated at Trinity College, Dublin. He was Bampton lecturer in 1878, Donnellan lecturer in 1880, and Grinfield lecturer on the Septuagint in the University of Oxford from 1893 to 1897. He was examiner in Hebrew at the University of London from 1897 to 1899, and examiner in Hebrew at Victoria University, Manchester, from 1897 to 1899, and at the University of Wales until 1901. His publications include: *Grammar of Modern Irish* (1855); *Book of Genesis in Hebrew* (1859); *Bunyan's Works with Notes* (1866); *Biblical Essays* (1885); *Roman Catholicism Examined in Light of Scripture* (1897); and *Genuine Writings of Saint Patrick with Life* (1902).

WRIGHT, Chauncey (1830-75). An American physicist and philosophical writer, born in Northampton, Mass. He graduated at Harvard in 1852, and became a computer for the *American Ephemeris and Nautical Almanac,* then just established. By frequent contributions to magazines and reviews he won a wide reputation as a physicist and mathematician. He was corresponding editor of the American Academy of Arts and Sciences from 1863 to 1870, delivered a course of university lectures at Harvard on the principles of psychology, and was an instructor at Harvard in mathematical physics in 1874-75. He published at intervals between 1864 and 1875 a notable series of articles in the *North American Review,* was a frequent contributor to the *Nation,* and in 1871 published two papers on the "Genesis of Species" in reply to St. George Mivart's attack on the theory of natural selection, which were republished in England at Darwin's instance. A collection of his writings with a biographical sketch by Charles Eliot Norton was published under the title *Philosophical Discussions* (1877). Consult a chapter in Fiske, *Darwinism and Other Essays* (Boston, 1885).

WRIGHT, Elizur (1804-85). An American journalist and Abolitionist, born in South Canaan, Conn. He graduated at Yale in 1826, and was professor of mathematics and natural philosophy at Western Reserve College, 1829-33. Then he settled in New York, where he was for five years secretary of the Anti-Slavery Society, editing within that time two anti-slavery periodicals, *Human Rights* and the *Quarterly Anti-Slavery Magazine.* In 1839 he went to Boston and edited the *Massachusetts Abolitionist,* the *Chronotype,* and its successor, the *Commonwealth.* He was State insurance commissioner of Massachusetts in 1858-66. and he wrote frequently on insurance and political topics.

WRIGHT, Fanny (Madame Frances D'Arnsmont) (1795-1852). A Scotch-American philanthropist and reformer, born at Dundee, Scotland. In 1818 she visited the United States, and after her return to Great Britain in 1820 she wrote a volume of *Views of Society and Manners in America,* which was published in London the following year and in Paris in 1822. Five years later she again visited the United States, and, becoming interested in the slavery question, she founded a colony of free negroes at Nashoba, near Memphis, Tenn. The colony proved a failure, however, and the colonists were finally settled in Haiti. During the years from 1833 to 1836 she attracted considerable attention as a reckless lecturer on social problems. She then, for a time, edited *The Gazette,* and later *The Free Enquirer* at the Owen community of New Harmony, Ind. During a visit to France in 1838 she married a M. D'Arnsmont, but soon afterwards separated from him, and, returning to the United States, made her home in Cincinnati. Her published works include: *Altdorf,* a tragedy (1817); *A Few Days in Athens,* a defense of the philosophy of Epicurus (1822); and *A Course of Popular Lectures on Free Inquiry, Religion, Morals, Opinions, etc.* (1829; 6th ed. 1836). Consult Gilbert, *Memoir of Fanny Wright, the Pioneer Woman in the Cause of Women's Rights* (Cincinnati, 1855).

WRIGHT, George Frederick (1838—). An American theologian and geologist, born at Whitehall, N. Y., and educated at Oberlin College and Theological Seminary. In 1862, while holding a pastorate at Bakersville, Vt., he became interested in the geology of that region. At Andover in 1871 he was a pastor of a Congregational church. He was professor of New Testament language and literature at Oberlin Theological Seminary in 1881-92, when he became professor of the harmony of science and religion. He was assistant geologist on the Pennsylvania survey in 1881-82 and served on the United States Geological Survey in 1884-92. His publications include: *Studies in Science and Religion* (1882); *Glacial Boundary in Ohio, Kentucky, and Indiana; Ice Age in North America* (1889); *Mars and the Glacial Period* (1892); *Greenland Icefields and Life in the North Atlantic* (1896); and *Scientific Aspects of Christian Evidences* (1898).

WRIGHT, Horatio Governeur (1820-99). An American soldier, born at Clinton, Conn. He graduated at West Point in 1841, entered the corps of engineers, for about six years was engaged in important engineering work for the Government, and in 1855 was promoted to be captain. In April, 1861, he went as chief engineer on the expedition sent to destroy the Norfolk Navy Yard. He was chief engineer of General Heintzelman's division at the first battle of Bull Run and he held the same position in the Port Royal expedition, during which he also commanded a brigade. He became brigadier-general of volunteers in September, 1861, and in 1862 commanded the land forces which captured Fernandina, Jacksonville, and Saint Augustine. He commanded a division during the Pennsylvania campaign, and the Sixth Corps at the capture of Rappahannock Station, and also during the latter part of the Richmond campaign. On May 12, 1864, he was promoted to be major-general of volunteers, and brevetted colonel in the Regular Army for gallantry at Spottsylvania, where he had been wounded. When General Early threatened Washington in July, 1864, Grant sent Wright with the Sixth Corps to defend the national capital. After driving the Confederates as far south as Winchester, Wright took part in the Shenandoah campaign, was again wounded at Cedar Creek, and later rejoined Grant before Petersburg, where he led his troops in the assault on April 2d, which broke the Confederate line and ended the siege. For this he was brevetted major-general in the Regular Army. He was commissioned lieutenant-colonel of engineers on November 23, 1865. After the close of the Civil War he was a member of various important commissions, and in June, 1879, was promoted to the rank of brigadier-general and was made chief of engineers. He retired in 1884.

WRIGHT, Sir James (1716-85). A British colonial Governor, born in Bloomsbury. He entered Gray's Inn, London, in 1741, was called to the bar, and practiced in Charleston. He became agent of the colony of South Carolina, and May 13, 1760, was appointed Lieutenant-Governor of Georgia, and in 1762 Governor. The attempt of South Carolina to extend her jurisdiction over parts of Georgia was defeated and the territory of the latter colony was enlarged through treaties with the Indians. He was able to cause a limited use of the stamps provided under the Stamp Act, for which use Georgia was much blamed by the other colonies. In 1771-73 he visited England and was created a baronet for his services. On his return he was unable to prevent the appointment of a committee of correspondence, but did cause Georgia to be unrepresented in the First Continental Congress in 1774. The Liberty Boys seized the magazine in Savannah in 1775 and took charge of the port. On June 18, 1776, Wright was arrested, but escaped to a man-of-war in the harbor and remained until after an unsuccessful attempt to take the city, when he returned to England. On the recapture of Savannah by the British December 29, 1778, he returned and attempted to institute severe measures against the Revolutionary party. Wright abandoned the province July 11, 1782, and was active in endeavoring to secure compensation for the American Loyalists. In return for his efforts and his own losses he received a pension of £500. Consult Georgia Historical Society *Collections* (1873).

WRIGHT, John Henry (1852—). An Amercan classical scholar, born at Urumyah, Persia. He was educated at College Hill, Poughkeepsie, and at Dartmouth College, from which he graduated in 1873; from 1876 to 1878 he continued his studies at the University of Leipzig. In the years 1878-86 he was assistant professor of Greek in Dartmouth College; he then became professor of classical philology and dean of the Collegiate Board in Johns Hopkins University, but a year later was called to be professor of Greek at Harvard University, and in 1895 was made dean of the Graduate School. He edited Collignon's *Manual of Greek Archæology* (Eng. trans. 1886) and *A History of All Nations* (1901). In 1888 he became associate editor of the *Classical Review,* and in 1897 editor-in-chief of the *American Journal of Archæology.*

WRIGHT, JOSEPH (1734-97). An English figure and portrait painter. He was born at Derby, and, after studying in London with Thomas Hudson, painted portraits in his native town till 1773. He is, however, most celebrated for his figure subjects painted at this time, which are generally fire-light or candle-light scenes. In 1773-75 he visited Italy, and thereafter painted chiefly conflagration scenes, perhaps owing to the strong impression made upon him by an eruption of Mount Vesuvius, of which he painted no less than eighteen pictures. After his return to England he continued his profession at Derby. His portraits are of a more homely and domestic character than those of Gainsborough and Reynolds, but are well modeled and conscientiously painted. Most of them are in private possession in and near Derby; the National Portrait Gallery possesses those of Sir Richard Arkwright, Erasmus Darwin, and the painter himself. He succeeded especially well with children; witness the "Little Arkwrights with a Goat" and the "Little Newtons Picking Cherries." His most celebrated subjects include the "Orrery" (1766); the "Airpump" (1768, National Gallery); "Edwin" and "Maria" (1780); and a "Dead Soldier" (1789). His landscapes are least effective by reason of the entire lack of atmosphere. Consult his *Life and Works*, by Bemrose (London, 1885).

WRIGHT, JOSEPH (1756-93). An American portrait painter. He was born at Bordentown, N. J., the son of Patience Wright, a noted modeler of miniature heads in wax. In 1772 he went to London, where he studied designing, but devoted himself particularly to portrait painting. In 1782 he went to Paris, where he had the patronage of Benjamin Franklin, and the following year he returned to the United States. He painted a three-quarter length portrait of General Washington (1783), then a portrait of General Washington and his wife, and also executed a miniature profile of Washington from life. Other portraits include those of John Jay (1786, Historical Society, New York), and one of Madison. In 1792 President Washington appointed him draughtsman and die-sinker of the newly established mint at Philadelphia, and he designed the earliest coins and medals issued by the Government.

WRIGHT, JOSEPH (1855—). An English philologist. In 1891 he was appointed deputy professor, and in 1901 professor, of comparative philology in the University of Oxford. In 1899 he was granted a civil list pension of £200 a year to help him in completing *The English Dialect Dictionary*, a highly valuable work, the publication of which began in 1896. His other works include primers of *Old High German* (1888), *Middle High German* (1888), and *Gothic* (2d ed. 1899); and a *Grammar of the Dialect of Windhill in the West Riding of Yorkshire* (1892). He was also associated with R. S. Conway and W. H. G. Rouse in the translation (1888 et seq.) of Brugmann's *Grundriss der vergleichenden Grammatik der indogermanischen Sprachen.*

WRIGHT, LUKE E. (1847—). An American lawyer and administrator, born in Memphis, Tenn. He was privately educated and admitted to the bar at Memphis, where he rose rapidly to a high position in his profession. He took an active part in the relief work during the yellow fever epidemic of 1878, and from 1880 to 1883 was Attorney-General of the State. In 1896 he supported Palmer and Buckner, the Gold Democratic candidates for the Presidency and Vice-Presidency. President McKinley appointed him in 1900 a member of the Philippine Commission, and on the establishment of civil government in the islands in 1901 he became Vice-Governor, acting as Governor during Governor Taft's absence in the United States and Europe in 1902. In December, 1903, he became Governor of the Philippines in succession to Taft, who early in 1904 succeeded Elihu Root as Secretary of War in President Roosevelt's Cabinet.

WRIGHT, MARCUS JOSEPH (1831—). An American soldier and author, born at Purdy, Tenn. He received an academic education, was admitted to the bar, and practiced at Memphis. At the beginning of the Civil War he was lieutenant-colonel of the 154th Regiment, Tennessee Militia, which was mustered into the Confederate service. From February, 1862, until its evacuation he was Military Governor of Columbus, Ky., and with his regiment was present at Belmont and Shiloh. After serving on the staff of Gen. B. F. Cheatham, he became brigadier-general December 13, 1862, and was engaged at Chickamauga and Missionary Ridge. In 1863-64 he was in charge of the district of Atlanta. After the evacuation of the city, he commanded at Macon, and then in northern Mississippi and western Tennessee. He published *Life of General Scott* (1894) and *Life of Gov. William Blount* (1884).

WRIGHT, SILAS (1795-1847). An American political leader, born at Amherst, Mass., May 24, 1795. He graduated at Middlebury College, Vt., in 1815, was admitted to the bar in 1819, and began the practice of his profession at Canton, N. Y. From 1823 to 1827 he was a member of the State Senate, acting with the 'Bucktail' faction in opposition to the policy of De Witt Clinton. He rendered conspicuous service in the State militia, of which he became brigadier-general in 1827. In 1827-29 he was a Democratic member of Congress, but voted for the tariff act of 1828. He was then Comptroller of the State of New York until 1833, when he was chosen to succeed William L. Marcy in the United States Senate. As a Senator he supported the Administration of President Jackson, advocated the establishment of the sub-treasury system, and voted for the annexation of Texas. On the slavery question he maintained the right of petition and the sovereignty of Congress in the Territories, although he favored the exclusion from the mails of Abolition literature calculated to excite the prejudices of the Southern States. In 1844 he was elected Governor of New York, chiefly on account of the factional fight between the 'Hunkers' and 'Barnburners,' led by Marcy and Van Buren respectively, but was defeated for reëlection. He opposed the calling of the constitutional convention of 1846, vetoed a bill for canal improvements, and took strong measures against the anti-rent disturbances. Upon the expiration of his term in 1847 he retired to his farm. He died at Canton, N. Y., August 27, 1847. Consult the *Lives* by Gillet (Albany, 1874), Hammond (Syracuse, 1848), and Jenkins (Auburn, 1847).

WRIGHT, Thomas (1809-84). A Scotch physician and geologist, born at Paisley, Renfrewshire. He was educated at the Royal College of Surgeons, Dublin, and at the University of Saint Andrews. It was as a geologist, however, that he became chiefly distinguished. His collection of Jurassic Echinodermata and Cephalopoda was unsurpassed. In 1878 he won the Wollaston medal. He wrote: *British Fossil Echinodermata of the Oölitic Formations* (1860-61); *The Cretaceous Echinodermata* (1864); and *Lias Ammonites* (1878-84).

WRIGHT, Thomas (1810-77). An English antiquary, born at Tenbury in Shropshire and educated at Trinity College, Cambridge. In 1836 he went to London and in 1837 he was elected a fellow of the Society of Antiquaries. He was one of the founders of the Camden Society (1838), of the Percy Society (1841), of the Shakespeare Society (1841), and of the British Archæological Association (1843). Wright published nearly a hundred works, including translations and books edited for various learned societies. He was careless and inaccurate to an astonishing degree, and yet he deserves much credit for opening the way to better equipped scholars. Most of Wright's principal publications are included in the following list: *Early English Poetry*, an anthology in black letter (4 vols. 1836); *The Latin Poems Commonly Attributed to Walter Mapes* (1841); *Specimens of Old Christmas Carols* (1841); an edition of the *Canterbury Tales* (1847-51); *Popular Treatises on Science, Written During the Middle Ages* (1841); *The Chester Plays* (1843-47); *Reliquiæ Antiquæ: Scraps from Ancient Manuscripts, Illustrating Early English Literature and the English Language* (1839-43); *Queen Elizabeth and Her Times* (1838); *Saint Patrick's Purgatory* (1844); *Wanderings of an Antiquary, Chiefly upon the Traces of the Romans in Britain* (1854); *Essays on Archæological Subjects* (1861); *A History of Domestic Manners and Sentiments in England During the Middle Ages* (1862); *Political Poems and Songs Relating to English History* (1859-61); and *Feudal Manuals of English History* (1872). Wright collaborated with J. O. Halliwell on a *Dictionary of Archaic and Provincial Words* (1846) and on Nares's *Glossary*.

WRIGHT, Thomas (1859—). An English author, principal of the Cowper School at Olney. He was born at Olney, in Buckinghamshire, and educated at Buxton College, Forest Gate, and in the library of the British Museum. His writings comprise: *The Town of Cowper* (1886); the standard *Life of William Cowper* (1892); and *The Correspondence of William Cowper* (1902). He is also the author of biographies of *Defoe* (1894) and of *Dickens* (1901); of several novels, as *The Blue Firedrake* (1892) and *The Mystery of Saint Dunstan's* (1892); of a volume of verse called *The Acid Sisters* (1897); and of *Hind Head, or the English Switzerland* (1898).

WRIGHT, William (1830-89). An English Orientalist, born at Mullye or Mallai on the Nepal frontier, India. He studied at Saint Andrews, Edinburgh, at Halle, and at Leyden, gaining a wide knowledge of Syriac and Arabic under such teachers as Rödiger and Dozy, and adding an acquaintance with Sanskrit. He was professor at University College, London (1855-56), and at Trinity College, Dublin (1856-61). From 1861 to 1870 he was engaged in cataloguing the Syriac manuscripts in the British Museum (published 1871). In 1870 he became professor of Arabic at Cambridge. He assisted in preparing the Syriac lexicon of Payne Smith and the Arabic lexicon of Dozy, and published: in Arabic, the *Travels of Ibn Jubair* (1852); *Opuscula Arabica* (1859); *Kamil of Al-Mubarrad* (1864-82); and an Arabic grammar, based on *Caspari*, but in the later editions practically an independent work (1859-62; 3d ed. by de Goeje, 1896-98); in Syriac the *Homilies of Aphraates* (1869); *Apocryphal Acts of the Apostles* (1871); *Chronicle of Joshua the Stylite* (1882); and *Book of Kalilah and Dimnah* (1883). His *Lectures on the Comparative Grammar of the Semitic Languages* was published posthumously (1890), edited by his successor at Cambridge, Robertson Smith.

WRIGHT, William Aldis (1836—). An English scholar. He was educated at Trinity College, Cambridge. After serving for many years as librarian, he became vice-master of Trinity (1888). With William George Clark (q.v.) he collaborated on the Cambridge Shakespeare (9 vols. 1863-66), the Globe Shakespeare, and the Clarendon Press series of single plays. With J. Eastwood he edited *The Bible Word Book* (1866; rev. ed. 1884). He also contributed largely to Smith's *Dictionary of the Bible* (1860-66). Among the works edited independently are Bacon's *Advancement of Learning* (1869); the *Chronicle of Robert of Gloucester* (1887); *Letters and Literary Remains of Edward FitzGerald* (1889); *Letters of FitzGerald to Fanny Kemble* (1895); *Fascimile of the Milton MS. in the Library of Trinity College, Cambridge* (1899); and *FitzGerald's Miscellanies* (1900).

WRIGHTIA (Neo-Lat., named in honor of William *Wright*, a Jamaica physician and botanist of the eighteenth century). A genus of plants of the natural order Apocynaceæ, containing some of the greatest twining shrubs of the East Indies. Attaching themselves to trees for support, they finally attain a tree-like thickness and height, and kill the supporting trees by their choking embrace. The timber of some species, as *Wrightia tomentosa* and *Wrightia coccinea*, is valuable. The latter species is a large tree, the other tree-like species being comparatively small. *Wrightia zeylanica*, a native of Ceylon, yields Conessi bark, which was formerly a popular medicine. *Wrightia tinctoria*, common in many parts of India, yields an inferior indigo.

WRIST-DROP. See Lead Poisoning; Neuritis.

WRIT (from AS. *writan*, to write, OHG. *rizan*, Ger. *reissen*, to tear). A mandatory precept issued by a court in the name of the State for the purpose of compelling a designated person to do some act specified therein. Under the common-law system of practice all actions were begun by *original writs* or by *bill*. This practice arose from the fact that in early times in England no wrong could be redressed except by special authority from the sovereign. The dates of the origin of the older writs are not certain, but they provide only for the redress of certain flagrant wrongs which recurred most frequently. These writs were issued by the chancellor or by the clerks of the Court of Chancery in the name of the King. There was a long period during which no new writs were devised and justice was often denied because the circumstances of a case were not similar to those alleged in any existing writ. This hardship led to the enactment of the statute, Westminster 2 (13 Edward I., c. 24), by which it was provided that where there was an injury or wrong which was similar (*in consimili casu*) to a recognized wrong, for which there was a remedy under an existing writ, the Court of Chancery should frame a writ to cover the new facts. The statute was not liberally construed, but it resulted in several additions to the original writs. The forms of the original writs were preserved in a court record known as *The Register of Writs.*

An original writ contained a short statement of the facts complained of, and directed the sheriff to command the defendant to satisfy the claim; and if he failed to do so, to summon him to appear in court and answer the complaint. As each writ could be used to begin an action upon any state of facts practically similar to those alleged in it, the complaint in a writ was usually a fiction, and the plaintiff was permitted to prove the actual facts upon which he based his claim. This use of fictions became the distinctive feature of common-law pleading and continues where that system prevails. Among the more important writs for the beginning of *real* and *mixed* actions are: The *writ of right,* for the recovery of real property; *formedon,* for the recovery of lands; *dower,* for the enforcement of a widow's right of dower; *quare impedit,* to ascertain the right of presentation to a benefice or to try title to an advowson; *writ of entry,* to try title to land. The most important writs for the beginning of personal actions are: *debt,* for recovery of a sum of money due; *covenant,* to recover for breach of a promise under seal; *detinue,* for the specific recovery of goods unlawfully detained; *trespass on the case,* for any wrong which could not be redressed by the remedies of covenant or trespass, and out of this writ sprang the actions of *trover* and *assumpsit.* If the defendant did not appear in response to an original writ he was arrested under a judicial writ known as a *capis ad respondendum.* Other writs were the writ of *subpœna,* of *error,* and of *certiorari* for the review of judicial decisions.

HABEAS CORPUS. This most important writ, sometimes known as the bulwark of English liberty, was instituted to enable the friends of a person supposed to be unlawfully imprisoned to compel his keepers to produce him in court in order that it might be determined whether or not he was held lawfully. Its origin and early development are somewhat obscure, but it is believed by eminent authorities that forms of the writ were in use as early as the thirteenth century. However, it was probably used at that time in connection with the writ of *certiorari* to bring a prisoner before the King's Court when the proceeding itself was removed to that tribunal from an inferior court; also with the writ of *privilege* to bring a prisoner into a higher court in which he claimed the privilege of trial. During the sixteenth century, under the name of *habeas corpus cum causa* or *corpus cum causa,* the writ began to be employed to test the legality of an imprisonment. In Howell's case in 1588, the keepers of a prisoner were compelled to inform the court of the cause of his detention, and the court declared that a prisoner should always be produced in court on the return of the writ. This case was followed by the famous *dictum* of the King's Bench, known as the 'Resolution in Anderson,' from the fact that it was reported in *Anderson's Reports* (p. 298). The effect of this was to render the writ of habeas corpus a distinct and positive remedy, independent of certiorari and privilege, and available as a matter of right to all prisoners.

The famous 'Five Knights' Case' in 1627 (3 St. Tr., pp. 1-235) tested the effect of the writ under the existing law. Five gentlemen were committed to prison on a warrant which alleged no particular cause for their arrest, except that it was by 'special command of the King.' On application of Sir Thomas Darnel, one of the prisoners, the Court of King's Bench issued a writ of habeas corpus and the prisoners were brought before the court, but after an exhaustive argument, were again remanded to prison as the court was not able to grant bail under the Statute of Westminster I. This example of the arbitrary power of the King to imprison his subjects without cause led to the introduction of a bill in Parliament in 1628, known as the Petition of Right, which contained a clause abrogating the power of the King to cast a person into prison 'without any cause shewed.' The 'Six Members' Case,' which was decided in 1629, did not follow the spirit of the clause cited, evading its effect by a poorly disguised subterfuge. The return simply alleged the cause of detention as set forth in the writ, which was that the prisoners had committed 'notable contempts' against the King and had 'stirred up sedition' against him. The court refused to release the prisoners and thus practically nullified the effect of the *Habeas Corpus* clause in the Petition of Right by its prejudiced and biased interpretation of its meaning. It remained for the 'Act for the Abolition of the Star Chamber' (1641) permanently to establish the writ as a substantial and effective remedy; and in 1679 the famous Habeas Corpus Act (31 Charles II. C 2) gave the writ its present form and settled many questions which had arisen during the development of the remedy.

The first and perhaps the most important function of the writ was to secure the production of prisoners held on criminal charges. However, during the reign of George III., the remedy was extended to cover other cases than criminal charges, as for example, to obtain custody of a child detained by some one claiming the right of guardianship. The United States Constitution provides that the privilege of the writ of habeas corpus "shall not be suspended unless in case of rebellion or invasion where the public safety may require it." The President is authorized under a Federal statute thus to suspend the writ in the proper cases. The statutes of most of the States provide for the granting of the writ in cases where a person is in prison or restrained in his liberty for any cause or upon any pretense, for the purpose of inquiring into the cause of the imprisonment or restraint, and, in the proper cases, of delivering him therefrom. In general, the writ is issued in two classes of cases: first, where a person is detained without legal process; and second, where a person is held under form of legal process or proceedings, in order to test the validity thereof. The sole purpose of the writ in these cases is to have a competent court pass upon the question of whether the prisoner is lawfully detained. This does not involve a trial of the charges under which a person is held, but merely a determination whether the provisions of the law in regard to the arrest and detention of citizens have been complied with. In some States, the writ of *habeas corpus ad testificandum* is employed to secure the presence of a witness who may be lawfully detained in prison; or in some other restraint which may prevent his attendance. Other variations of the writ are the *habeas corpus ad deliberandum et recipiendum*, to remove for trial a person confined in one county to another where the offense charged was committed; *habeas corpus ad satisfaciendum*, to bring a person from one court to another and there hold him subject to an execution under a judgment obtained in the latter.

The writ is usually obtained by a motion to a judge sitting as a court or at chambers, based upon a petition under oath or an affidavit describing the person in prison, the person detaining him, and such facts in regard to the detention as the affiant has knowledge of. A writ may be issued and served on Sunday in most States, but usually cannot be made returnable on that day. Statutes relating to this remedy usually prescribe a penalty against a judge who refuses to grant the writ in the proper cases. Consult: Pollock and Maitland, *History of the English Law* (2d ed., Boston, 1899); Hurd, *On the Right of Personal Liberty* and on *The Writ of Habeas Corpus* (Albany, 1858; 2d ed. 1876); Hallam, *Constitutional History* (New York, 1872); Blackstone, *Commentaries on the Laws of England;* and the writings of Story, Rawle, and Pomeroy on the United States Constitution; also see FORMS OF ACTION.

WRITER. A term vaguely applied in Scotland to a law practitioner or his clerk; in provincial towns more definitely to a law agent practicing before the sheriff, and acting as factor in the management of private affairs.

WRITERS' CRAMP. See NEUROSIS.

WRITERS TO THE SIGNET. An incorporated Scottish law society of great antiquity. The signet is the royal seal employed for authenticating writs or warrants connected with the administration of justice, and it is probable that the phrase 'writers to the signet' was originally employed to describe the clerks in the office of the Secretary of State upon whom the duty devolved of issuing such writs. However this may be, we find this important duty, from an early period of Scottish history, exercised and monopolized by an exclusive society of legal practitioners, who, though performing a public function, were not subject to public appointment, but regulated admissions to their own ranks by rules of their own framing. Besides possessing this exclusive right to issue such writs as required authentication by the signet, which gave them a certain monopoly of litigation, writers to the signet thus came, in the course of time, to assume very much the place and to perform the functions of the Inns of Court in England, that, namely, of regulating admissions to the bar. While, however, they still retain a certain preëminence at the Scottish bar, not unlike that formerly enjoyed by serjeants-at-law in the sister country, their monopoly of litigation has been destroyed by modern legislation (36 and 37 Vict., ch. 63). See BARRISTER; LAWYER; SOLICITOR.

WRITING. The art of fixing thoughts in a visible and lasting shape, so as to make them intelligible to others and capable of preservation. This may be done in many ways which, however, in general fall into two great classes: picture-writing, where the actual picture or symbol denotes the object or idea as a whole, and phonetic writing, where the characters employed denote the spoken word or the elements contained therein, either syllables or single sounds, such as vowels and consonants. The phonetic signs are usually believed to have been developed from the more primitive pictographic methods. In the widest sense of the term various mnemonic systems might be described as writing, but commonly the term is restricted to markings upon some more or less durable surface. It is, however, rather to the picture that we must look for the origin of the complicated systems which lie at the basis of all human progress into a higher and more complex civilization. In its most primitive form picture-writing is merely a representation of an object or group of objects, which almost of necessity tells its own story. Even here it is not long before a certain degree of symbolism or at any rate conventionality is introduced, and it becomes somewhat difficult for the stranger to interpret the series of pictures. Interesting examples of the conventionalized forms are to be found among the Indians and also in Polynesia, and it is possible that in them lies the key to some of the curious signs and devices which decorate the seals of Mycenæan Crete. Such pictures, are, however, at best limited in scope, and are usually but condensed means of expression. The pictures tend more and more to become *ideograms*, i.e. symbols with a conventionalized meaning, as when an arrow stands for an enemy. Here we have obviously a form of writing intelligible only to the instructed. Naturally the pictures also tend to become conventional rather than natural, and this transformation becomes very rapid when for carving on stone writing with a brush or pen on soft material becomes common. Many of the Chinese characters are good examples of ancient pictures modified by a cursive script. Even the ideogram, however, does not suffice and we therefore advance to the further step where the picture or character derived from it suggests a sound rather than an object; thus the picture of an *eye* would denote I, etc. In a monosyllabic language, like Chinese, the same sound may have many meanings, as the sound *eye* in English in the example above quoted, and therefore to the *phonogram* may be joined an *ideogram* to indicate the sense in which the sound is used.

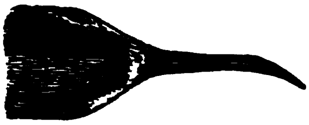
Passing now to the methods of writing in vogue in the great civilizations of the ancient world, we find in Egypt the elaborate pictorial system known as *hieroglyphics* (q.v.). This system might almost serve alone as an example of the various ways in which characters might be used. The signs are all pictures, more or less conventionalized, but these only occasionally indicate the actual object represented. Sometimes they are symbolic, as when an arm holding a whip denotes the abstract idea of 'power.' Then, again, they are real phonograms, where two or more pictures together denote another object whose Egyptian name is a combination of the names of the pictures, as in the modern pictorial rebus. From this use it is but a step to the selection of a limited number of these signs to denote uniformly syllables, or again of a still more limited number to be used as single letters. All of these steps the Egyptians had taken at a very early date, but without giving up the earlier stages, so that they never gained the advantages to be derived from the use of a few alphabetic signs, though it must be admitted that they retained a system well adapted for the decorative effects which Egyptian inscriptions frequently seem designed to produce. In the *cuneiform inscriptions* (q.v.) of Mesopotamia and later of Persia, the peculiar wedge-shaped stroke which gives its name to the system has naturally obliterated all but very faint traces of earlier pictographs, but we find the *ideogram* in common use, often with a determinative prefixed, as when three horizontal strokes precede the names of countries. Simplification is also attempted by the use of syllabaries, and among the Medes we find a definite syllabic system, while the Persians adopted a cuneiform alphabet of thirty-six characters. In the Eastern Mediterranean, and perhaps further west, other systems were also in use, most of which still defy interpretation. The Hittite monuments bear inscriptions in strange pictorial characters. In Cyprus there was in use by the Greeks a peculiar syllabary, first read by the aid of bilingual inscriptions. Crete was the home during the third and second millenniums B.C. of two systems, one apparently hieroglyphic or pictorial, though the pictures finally became decidedly conventional in some cases, the other, described as linear or geometric, apparently syllabic, as the number of signs is more limited. Many of these signs bear a close resemblance to the Cypriote syllabary, and others suggest the early Greek and Phœnician alphabets. These facts, coupled with the discovery in Egypt, Palestine, Caria and even Iberia of similar characters, have led to the theory of a great Mediterranean syllabary of many signs, from which by selection the Phœnicians derived their alphabet, which in turn became the parent of the Greek and other European writing. This theory, however, must be regarded as an unproved hypothesis, as indeed other theories are likely to be until the key to the Cretan tablets or Hittite hieroglyphs is discovered. The subjects touched upon in this article, and the later history of writing are treated more fully in Alphabet, Cuneiform Inscriptions, Hieroglyphics, Inscriptions, Paleography, Picture Writing, and the articles on the separate letters.

WRITING MACHINES. See Typewriters.

WROBLEWSKI, vrô-blĕv'skĭ, Zygmunt Florenty (1845-88). A Polish physicist. He was born at Grodno, Russia, and when a student at Kiev was banished to Siberia for taking part in the Polish insurrection of 1863. Pardoned in 1869 he resumed his studies, and after working at the universities of Berlin, Heidelberg, and Munich, he took his doctor's degree at the last named place in 1874 and became an assistant in the physical laboratory. He then served as assistant or lecturer at Strassburg, Paris, London, Oxford, and Cambridge, and in 1882 he was appointed professor of physics at the University of Cracow. Wroblewski is best known for his work on the liquefaction of gases which he carried on after 1883. (See Liquefaction of Gases.) His first work of importance was *Ueber die Diffusion der Gase durch absorbirende Substanzen* (1874). While working in Paris in the laboratory of Sainte-Claire Deville, he investigated the properties of liquids and gases under heavy pressures and discovered the hydrate of carbonic oxide. With Olszewski he was able to liquefy oxygen, nitrogen, and carbon monoxide and to solidify alcohol and bisulphide of carbon.

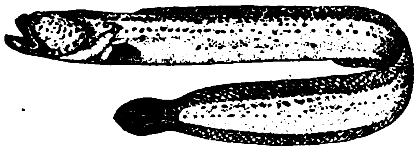
WRONSKI, vrôn'skê, Joseph Marie (1778-1853). A Polish philosopher and mathematician, whose real name was Hoene, born in Posen. He studied mathematics and philosophy in Germany and France, and at first was an enthusiastic follower of Kant, but later advocated a system of his own, *Messianism*, which seeks to prove that the world is governed by reason. He also applied his philosophy to mathematics (analysis, theory of numbers, and theory of probabilities), and contributed to celestial mechanics and various branches of physics. He wrote *Philosophie critique découverte par Kant et fondée définitivement sur le principe absolu du savoir* (1803); *Introduction à la philosophie des mathématiques* (1811); *Prospectus du Messianisme* (1831); *Réfutation de la théorie des fonctions analytiques de Lagrange* (1812); *Critique de la théorie des fonctions générales de M. Laplace* (1819); *Messianisme, union finale de la philosophie et de la religion* (1831-39); and *Nouveau système des machines à vapeur* (1835). Consult: Bobynin, *Hoene-Wronski*, in Russian (Moscow, 1894).

WRYBILL. A New Zealand plover (*Anarhynchus frontalis*), allied to the killdeers, which is unique in having the end of its bill bent to the right. It seeks its food on the seashore, feeding upon small crustaceans and insects which hide under stones; and gets it by running around these stones, always from left to right, and reaching far under them with its bent bill. Consult Buller, *Birds of New Zealand* (London, 1888).



THE WRYBILL.
Head from above, showing normal bend in the beak.

WRYMOUTH. Any one of the large blennies of the family Cryptacanthodidæ. They are slender, lath-like fishes, from two or three feet long, with large oblique mouths, very heavy lower jaws, and the dorsal fins of strong spines hidden in skin. The Eastern species (*Cryptacanthodes maculatus*) is brownish, with dark spots; but an albino form is so frequently seen as to be well known under the name 'ghostfish.' A closely related form (*Delolepis virgatus*) inhabits Puget Sound and northward.



WRYMOUTH (*Cryptacanthodes maculatus*).

WRY-NECK, or TORTICOLLIS. A disease characterized by a spasm of the muscles of the neck, which results in tilting the head to one side and raising the chin, the point of which is directed toward the sound side. Spasmodic wryneck is a nerve disease. The symptoms are pain in the neck and spasm, at first clonic and intermittent, later tonic and fairly persistent. The sterno-mastoid and the uper fibres of the trapezius are the muscles affected. In a rare form both sides are affected and the head is drawn backward. The neurosis involves the bulbar and lower cerebral centres. The disease is rarely cured. A great number of drugs are suggested, including opium, atropine, conium, zinc, asafetida, chloral, bromides, cocaine, gelsemium. The galvanic and faradaic currents are useful, as also massage and systematic exercise. Partial cutting of the tendon of the sterno-mastoid has been the resort in some cases, with a few cures resulting.

WRYNECK. A genus of small birds of the woodpecker family having a short, straight, conical beak; the feet with two toes in front, and two behind; and a short, rounded tail of soft feathers, utterly unlike the tail of a woodpecker. There are several species, one of which, the common wryneck (*Iynx torquilla*), is a summer visitant of Great Britain and the North of Europe. It is seven inches long, of a rusty ash color, irregularly spotted with brown and black. It feeds on caterpillars and insects, and is often seen on the ground near ant-hills, feeding on ants and their 'eggs.' The construction of its tongue resembles that of woodpeckers. The wryneck does not chisel out a nest, but deposits its eggs on fragments of decayed wood in a cavity in a tree. The name 'wryneck' is derived from the bird's habit of writhing its head and neck quickly with an undulating snake-like motion, often accompanied by a hissing noise. See Plate of WOODPECKERS.

WU-CHANG, wōō'chăng'. A *fu* or departmental city of China, capital of the Province of Hu-peh, and the seat of the Governor-General of the combined provinces of Hu-nan and Hu-peh. It stands on the right bank of the Yang-tse River, opposite Han-yang, and diagonally opposite Hankow (Map: China, D 5). Its lofty walls inclose considerable space, and it is a place of much importance, having a college, a government mint, cotton-mills, an ore-crushing mill and other industries, and it has electric lights. Its north gate is surmounted by an imposing tower. The city is included in the port and customs district of Hankow. Population, with its suburbs, 500,000 to 600,000.

WU-CHOW, wōō'chou'. A *fu* or departmental city of the Province of Kwang-si, China, on the left bank of the Si-kiang or West River, about 200 miles west of Canton (Map: China, D 7). It was opened as a treaty-port in 1898, and forms an admirable distributing point for the provinces of Yun-nan, Kwei-chow, and Kwang-si. It lies in a highly cultivated and picturesque region, but is subject to inundations in summer. Its exports include star-aniseed, pearl barley, native coal, firewood, glue, raw hemp, hides, indigo, leather, medicines, tin, sugar, poultry, tea, wood, and aniseed and other oils. The principal imports are kerosene, matches, betelnuts, woolen and cotton goods, aniline dyes, fish, flour, gypsum, and lamps. Population, about 50,000.

WU-HU, wōō'hōō'. A *hien* or district city of the Province of Ngan-hwei, China, which gives its name to a river-port on the Yang-tse opened as a treaty port in 1877. It lies about a mile from the right bank of the river, from which it is reached by a wide creek. It is about 125 miles below Ngan-k'ing fu, the capital of the province, and 60 miles above Nanking (Map: China, E 5). It is walled, is connected by several canals and creeks with productive districts in the interior, and is thus well adapted for foreign trade. Its native industries are represented by its cutlery, and its red cord, for which it is noted; and in the vicinity are several coal mines, in which foreign capitalists are interested. The city suffered greatly during the Taiping rebellion, but under the influence of foreign trade is now reviving and prosperous. Population, about 100,000.

WULFENITE (named in honor of *Wülfen, Wülffen*, an Austrian mineralogist of the eighteenth century). A mineral lead molybdate crystallized in the tetragonal system. It has a resinous lustre, and is yellow to orange and red in color, sometimes passing into green. It occurs in veins with various ores of lead, and is found at various localities in Austria, Hungary, Siberia, Saxony, France, Colombia, Mexico, and in the United States at the lead mines in Massachusetts, Pennsylvania, Nevada, Utah, and New Mexico. A variety containing chromium has been found, to which the name *chromowulfenite* has been given.

WUL'FILA. A bishop of the Goths. See ULFILAS.

WULF'STAN, WULSTAN, or **WOLSTAN.** The name of three Anglo-Saxon prelates and authors. (1) A monk of Winchester in the ninth century, who was author of a Latin poem on the miracles of Saint Swithin. (2) An archbishop of York, in 1003, and the author of two pastoral letters and several sermons in Anglo-Saxon. (3) A bishop of Worcester (c.1007-95), and a saint of the English calendar. He was born at Icentum, in Warwickshire, and was educated at Evesham and Peterborough. He became a priest and afterwards a monk. He was made prior of the monastery of Worcester, and in 1062 bishop of that see. He lived through the troubles of the Norman Conquest, and enjoyed the favor not only of the conqueror, but of William Rufus. He is regarded by some as the author of that portion of the Anglo-Saxon Chronicle which extends from 1034 to the death of the Conqueror.

WÜLKER, vul'kẽr, RICHARD PAUL (1845—). A German philologist, born at Frankfort-on-the-Main. He was educated at the universities of Berlin, Leipzig, and Marburg. In 1875 he was appointed professor of English at Leipzig. He has published: *Das Evangelium Nikodemi* (1872); *Altenglisches Lesebuch* (1874-80); *Kleinere angelsächsische Dichtungen* (1882); Grein's *Bibliothek der angelsächsischen Poesie*, re-edited (1881-99); *Grundriss zur Geschichte der angelsächsischen Litteratur* (1885); *Codex Vercellensis* (1894); *Geschichte der englischen Litteratur* (1896); and *Bibliothek der angelsächsischen Prosa* (1899).

WULLENWEBER, vụl′lẹn-vā′bĕr, Jürgen (1492-1537). A Hanseatic statesman born in Hamburg. Having removed to Lübeck he acquired great influence there during the party-conflicts attendant upon the establishment of the reformation, and, becoming the leader of the democratic-protestant faction, was elected one of the four burgomasters in 1533. In this position he made it his chief aim to restore the political hegemony of Lübeck on the Baltic Sea by the subjection of Denmark and Sweden and the propagation of Protestantism, but was thwarted by the unlucky turn which the campaign against Denmark took and the return to power of the aristocratic party at Lübeck. When, moreover, a writ of execution from the Imperial Chamber at Speyer, issued in June, 1535, threatened the city with the ban of the empire, if the old aristocratic constitution were not restored within forty-five days, Wullenweber resigned his office. On a journey to Hadeln soon after, he was arrested by the Archbishop of Bremen and delivered to that prelate's brother, Duke Henry of Brunswick, a sworn enemy of Lutheranism, who kept him in durance at Steinbrück. Put to the rack the most inconsistent self-accusations were extorted from him, whereupon he was condemned to death and executed in September, 1537. Consult Waitz, *Lübeck unter Jürgen Wullenweber und die europäische Politik* (Berlin, 1855-56).

WÜLLERSTORF-URBAIR, vụl′lērs-tôrf-ụr′bâr′, Bernhard, Baron von (1816-83). An Austrian admiral, born at Triest. He entered the navy in 1833, and after a special course in astronomy at Vienna in 1837-39, was appointed director of the naval observatory and professor at the naval academy in Venice. In 1848 he was intrusted with the reorganization of the latter institution at Triest and made its commandant. In 1857, having in the meanwhile attained the rank of commodore, he was put in command of the Novara Expedition around the world, and after its return in 1859 superintended the publication of its reports. Sent to the North Sea with a squadron, during the Schleswig-Holstein campaign of 1864, he wrested from Denmark the North Frisian islands. In 1865-67 he was Minister of Commerce, and after his retirement was made a life member of the House of Lords. His publications include: *Ueber das Verhalten und die Verteilung der Winde auf der Oberfläche der Erde* (1860); *Ueber die Wichtigkeit des Adriatischen Meers für Oesterreich* (1861); *Bemerkungen über die physikalischen Verhältnisse des Adriatischen Meers* (1863). His *Vermischte Schriften* were published by his widow (1889).

WÜLLNER, vul′nĕr, Adolf (1835—). A German physicist, born in Düsseldorf. He studied in Bonn, Munich, and Berlin, and became docent in Marburg, 1858. In 1862 he was appointed director of the technological school at Aix-la-Chapelle, in 1865 professor of physics in the agricultural school at Poppelsdorf, and was also at the same time assistant professor of physics in the University of Bonn (1867-69). In 1869 he became professor of physics in the Polytechnic Institute at Aix-la-Chapelle. He carried on important investigations in all branches of physics and wrote: *Lehrbuch der Experimentalphysik* (1862; 5th ed. 1895); *Einleitung in die Dioptrik des Auges* (1866); and *Kompendium der Physik* (1879).

WÜLLNER, Franz (1832-1902). A German composer, born at Münster, Westphalia. He studied in his native place, and at Frankfort, Berlin, Brussels, and Munich. In 1856 he was appointed instructor in pianoforte at the Munich conservatory. He held the position of town musical director at Aix-la-Chapelle from 1858 to 1864. In 1867 he became director of the choral classes in the reorganized School of Music at Munich and wrote for them *Chorübungen der Münchener Musikschule.* In 1879 he succeeded Bülow as conductor of the Court Opera and the Academy Concerts. He became Court kapellmeister at Dresden and artistic director of the conservatory in 1877, and director of the Cologne Conservatory and conductor of the Gürzenich concerts in 1884. Among his works are: *Heinrich der Finkler*, a cantata for solo, male chorus, and orchestra; additional recitatives to Weber's *Oberon*, accepted by many of Germany's principal theatres; *Psalm 125*, for chorus and orchestra; *Miserere* for double choir; and *Stabat Mater* for double choir; besides masses, motets, songs, chamber-music, and pianoforte pieces.

WUNDERLICH, vōōn′dĕr-lĭk, Karl August (1815-77). A German physician, born at Sulz-am-Neckar. He was educated at Stuttgart, Tübingen, and Paris. In 1846 he was appointed professor in the University of Tübingen and director of its clinic, and in 1850 he accepted a call to Leipzig, where he carried on his important investigations of temperatures. The *Archiv für physiologische Heilkunde*, founded by him in 1841, became the organ of the most advanced medical thought. Wunderlich published *Versuch einer pathologischen Physiologie des Blutes* (1844); *Handbuch der Pathologie und Therapie* (1846-54); *Grundriss der speziellen Pathologie und Therapie* (1858); *Geschichte der Medizin* (1859); and *Das Verhalten der Eigenwärme in Krankheiten* (1868).

WUNDT, vụnt, Wilhelm (1832—). A German physiologist, psychologist, and philosopher, born at Neckarau, in Baden. He studied from 1851 to 1856 at Tübingen, Heidelberg, and Berlin, specializing in medicine. In 1857 he qualified as privat-docent in physiology at Heidelberg, where he became assistant professor in 1864. After serving one year as professor of philosophy at Zurich, he was finally called to a similar position at Leipzig in 1875. He published the following works: *Die Lehre von der Muskelbewegung* (1858); *Beitrage zur Theorie der Sinneswahrnehmung* (1862); *Vorlesungen über die Menschen- und Tierseele* (1863; 3d ed. 1897: Eng. trans., *Lectures on Human and Animal Psychology*, 2d ed. 1896); *Lehrbuch der Physiologie des Menschen* (1865; 4th ed. 1878): *Die physikalischen Axiome und ihre Beziehung* *zum Kausalprincip* (1866); *Handbuch der medizinischen Physik* (1867); *Untersuchungen zur Mechanik der Nerven und Nervencentren* (1871-76); *Grundzüge der physiologischen Psychologie* (1874; 5th ed. 1903); *Der Spiritismus, eine sogenannte wissenschaftliche Frage* (1879); *Logik, eine Untersuchung der Principien der Erkenntnis und der Methode wissenschaftlicher Forschung* (1880-83; 2d ed. 1893-95); *Essays* (1885); *Ethik, eine Untersuchung der Thatsachen und Gesetze des sittlichen Lebens* (1886; Eng. trans., *Ethics: An Investigation of the Facts and Laws of the Moral Life,* 1897-1901); *Zur Moral der litterarischen Kritik* (1887); *System der Philosophie* (1889; 2d ed. 1897); *Hypnotismus und Suggestion* (1892); *Grundriss der Psychologie* (1896; 2d ed. 1897; Eng. trans., *Outline of Psychology,* 1897); *Völkerpsychologie, eine Untersuchung der Entwicklungsgesetze von Sprache, Mythus und Sitte,* i. (1900). In 1881 Wundt instituted a periodical, the *Philosophische Studien,* for the purpose of publishing the work of the psychological laboratory at Leipzig. Founded by him in 1878-79, this was the first laboratory devoted solely to the experimental investigation of mental processes.

From the foundation of the Leipzig laboratory and of the *Studien* came the effective impulse which has led to the institution of many if not all of the other laboratories for the systematic investigation of experimental psychology in both Europe and America. Wundt is thus not only the leading German representative of what is ordinarily termed 'modern psychology,' but, in a certain sense, its creator. He alone treated it in all its area; he alone had sufficient breadth of outlook, sufficient training, and sufficient sympathy to unite in one science the work of Herbart, Weber, Fechner, and Lotze. In his *Vorlesungen,* but more especially in his classical *Grundzüge,* the standard text-book of the science, he effected the union of the various disjointed movements then existing, the mathematical, the experimental, the psychophysical, and the physiological. Wundt defines psychology as the 'science of immediate experience;' the natural sciences are abstractions from experience. Nevertheless, his psychology starts from physiological facts, and seeks, by variation of external conditions, to discover the elementary psychical facts which are correlated with them; it works from without inward. But the end is to construct psychology. Physiology, however valuable it may be as an avenue of exploration or as a basis for explanation, is but a means toward this end. Consult Ribot, *German Psychology of To-Day* (Eng. trans., New York, 1886).

WURMSER, vo͞orm'zĕr, Dagobert Siegmund, Count von (1724-97). An Austrian field-marshal, born in Strassburg. He entered the French service in 1741 and distinguished himself during the Seven Years' War. In 1762 he entered the Austrian Army as colonel. At the outbreak of the wars of the French Revolution he was given command of the forces beyond the Rhine and prevented the French from relieving Mainz (1793). He took Mannheim (November 23, 1795), and in the summer of 1796 became field-marshal and succeeded Beaulieu in Italy. While attempting to relieve Mantua, which was besieged by the French, the two divisions of his army were successively routed by Napoleon and Wurmser himself was forced to take refuge in the beleaguered city. It fell in 1797 (February 2d) after a siege of nine months, but Wurmser was permitted to go free.

WÜRTTEMBERG, vụrt'tĕm-bĕrk. A kingdom of the German Empire in Southwestern Germany, bounded by Bavaria on the northeast, east, and southeast, by Baden on the south, southwest, west, and northwest, and in addition on the south by Lake Constance, which separates it from Switzerland, and by Hohenzollern, which in an oblong form penetrates the country in the southern part (Map: Germany, C 4). Württemberg has small enclaves in Baden and Hohenzollern, and incloses three enclaves of Hesse. The area is 7528 square miles.

Württemberg is in general a region of hills and mountains. It is a western part of the South German upland. A portion of the Black Forest is in the southwest where the loftiest point of the kingdom is found at its extreme western point—3820 feet. The Swabian Jura or Rauhe Alb crosses the kingdom from southwest to northeast. Its highest elevation is 3327 feet. Southeast is the high Danube plateau, with an elevation of about 2000 feet. The Danube crosses the country from southwest to northeast, leaving it at Ulm. In the north of the kingdom is a fertile lowland country—hills, level valleys, and dales—descending gradually to the north with the Neckar and its numerous tributaries coursing through to the northwest, where the altitude falls as low as 500 feet. About one-quarter of the country is level land. The climate is moderate and agreeable, with a yearly mean of 40° in the mountains and 50°, or a little less, in the Neckar valley. There are nearly 75 mineral springs.

The mining output is not large. Salt and iron are obtained. Württemberg is essentially an agricultural country and about one-half of the population is connected with agriculture. Of the area, 64 per cent. is tilled, and 31 per cent. is in forest (conifers and beech), the forests being thoroughly exploited and forming a prominent part of the wealth. Most of the farms are between 2½ and 25 acres in size. The largest acreages are, in their order, hay, spelt, oats, clover, barley, and potatoes. Fruit-raising and the live-stock interests are prominent. Coöperative dairying is extensively carried on. In 1900 there were 1,017,683 cattle, 112,129 horses, 315,965 sheep, and 512,485 swine. The manufactures have in recent years rapidly developed. There is a large output of sugar, iron, and textiles. Other products are gold and silver work, musical and scientific instruments, bells, chemicals, paper, and wood-carving, and the products of celebrated machine shops at Esslingen. The kingdom leads in book-publishing in Southern Germany. Commerce is lively and is being actively fostered and developed. The transit traffic is important. Grain, cattle, wood, salt, fruit, and manufactured articles of many kinds are exported. The Neckar is navigable by steamboats to Heilbronn, and Ulm stands at the head of navigation on the Danube.

Württemberg is a constitutional monarchy. The Constitution dates from 1819. The Landstände, or Parliament, consists of two Houses ('estates'), which assemble at least every three years. The members of the higher chamber, or

House of Standesherren, are the royal princes, persons named by the King, and the representatives of twenty mediatized houses. Its president is appointed by the King. The deputies of the lower chamber consist of 13 nobles, 6 Evangelical and 3 Catholic dignitaries, the head of Tübingen University, 7 representatives from towns, and 63 from rural districts. The deputies are chosen for six years without property qualification. Citizens voting must be above twenty-five. The Ministry of State comprises six departments—Justice, War, Finance, Interior, Religion and Education, Foreign Affairs, and the Royal House. There is a privy or advisory council, composed of the Ministries and councilors. Administratively the kingdom is divided into 4 circles—Neckar, Black Forest (Schwarzwald), Jagst, and Danube. It sends 4 members to the national Bundesrat and 17 to the Reichstag. The expenditures of the kingdom for 1902-03 were about $22,300,000, the revenues $22,800,000. The chief items of expenditure were Imperial contributions, national debt, and religion and education (over 15 per cent.); the chief sources of income were Imperial receipts, railway revenues, direct taxes, and forests, farms, and mines. The public debt amounts to about $125,000,000, mostly bearing 3½ per cent. However, the debt, with the exception of a small fraction, is for railways, and is accordingly offset by the railroad property of the kingdom. In 1901 there were 1300 miles of railway, 1100 of which were owned by the Government. Stuttgart is the capital.

The population in 1900 was 2,169,480; density per square mile, 288.2. Württemberg ranks fourth in population among the German States. The annual emigration, mainly to the United States, dropped from 6445 in 1888 to 1061 in 1901. The people are mostly Swabians. About 70 per cent. of the population is Protestant. The King is, under the Constitution, the guardian and director of the Evangelical Church. It is administered by a consistorium composed of a president, 9 councilors, and 6 superintendents. The Catholics are under a bishop, who, however, can only act together with a Catholic council named by the Government. The Jews are under a council appointed by the King. In educational matters Württemberg holds high rank. Instruction is compulsory. Practically every person above ten can read and write. The University of Tübingen stands at the head of the educational system. Among other institutions there are the great Polytechnic Institute at Stuttgart, a famous conservatory of music at the same place, and agricultural, industrial, and special schools of every variety, including a school of viticulture at Weinsberg. There are numerous scientific, art, and literary organizations.

HISTORY. The greater part of modern Württemberg was included in the mediæval Duchy of Swabia. About the beginning of the twelfth century history first speaks of a Count of Württemberg. An uninterrupted line of counts may be traced back to the middle of the thirteenth century, when they ruled a district in the valleys of the Neckar and its affluent, the Rems. The dominions of the house were steadily extended. Count Eberhard IV. (1417-19), through his marriage with the heiress of Montbéliard, united that county with Württemberg. Count Eberhard im Bart (q.v.), an able ruler who founded the University of Tübingen, was raised by the Emperor Maximilian in 1495 to the rank of Duke, with the title of Eberhard I. In 1519 Duke Ulrich, in consequence of arbitrary acts of oppression exercised upon the free Imperial city of Reutlingen, was forcibly ejected from Württemberg by the Swabian League and did not recover his throne till 1534. He adopted the Reformation for his dominions. Duke Frederick, having taken part in the war against the French Republic, was compelled to resign Montbéliard in 1796. In 1800 the French occupied the country, which was restored to Duke Frederick (q.v.) in 1801. In 1803 this ruler received large accessions of territory, including Heilbronn, Reutlingen, and other free cities, and was raised to the dignity of Imperial Elector. He reluctantly joined Napoleon in the war against Austria in 1805, and at the Peace of Pressburg (December 26, 1805) Württemberg was further enlarged and erected into a kingdom. On January 1, 1806, Frederick I. assumed the royal title. He joined the Confederation of the Rhine in the same year and received additional territory, and as an ally of Napoleon in the French-Austrian War of 1809 was rewarded with new possessions, including Ulm. Württemberg was required to furnish a quota of 16,000 men for Napoleon's Russian campaign. On November 2, 1813, the King abandoned the cause of Napoleon, and joined the other German princes in their rising against the French power. King Frederick died October 30, 1816, and was succeeded by his son, William I. (1816-64). William reduced the public expenditure, and in 1819 promulgated a constitution. In the revolutionary movement which swept over Germany in 1848 William yielded at first to the demand of his subjects for political reforms, but ultimately the hopes of the Liberals were disappointed. For nearly 50 years William reigned over a people steadily increasing in prosperity, and died on June 25, 1864. He was succeeded by his son Charles, who sided with Austria in the Seven Weeks' War. The troops of Württemberg were beaten and a war indemnity of $4,000,000 was levied by Prussia upon the kingdom. In 1867 Württemberg formed an alliance with the North German Confederation. She supported Prussia against France in 1870, and in 1871 became part of the new German Empire. King Charles died on October 6, 1891, and was succeeded by his nephew, William II.

BIBLIOGRAPHY. *Das Königreich Württemberg. Herausgegeben vom Königlich statistischen Landesamt* (Stuttgart, 1903 et seq.); Hirschfeld, *Württembergs Grossindustrie und Handel* (Leipzig, 1889); Gaupp, *Das Staatsrecht des Königreichs Württemberg* (Freiburg, 1895); Chr. F. von Stälin, *Württembergische Geschichte* (Stuttgart, 1841-73); Schneider, *Württembergische Reformationgeschichte* (ib., 1888); Belschner, *Geschichte von Württemberg* (ib., 1902); Heyd, *Bibliographie der württembergischen Geschichte* (ib., 1895); Schäfer, *Württembergische Geschichtsquellen* (ib., 1894-95).

WURTZ, vụrts, CHARLES ADOLPHE (1817-84). A French chemist, distinguished for his work in the atomic theory and for his discoveries in the organic branch of the science. He was born at Strassburg, and was educated there and at Giessen. In 1845 he went to Paris as tutor in the department of organic chemistry at the Sorbonne. Afterwards he became professor at the Agronomic Institute of Versailles (1851), professor of organic chemistry at the Sorbonne, and professor of toxicology at the school of medicine (1853). He was dean of the Sorbonne medical faculty from 1866 to 1876. Among Wurtz's principal discoveries were those of the ammoniac compounds (1849), of glycol (1856), of aldol ($C_8H_8O_4$), and the so-called process of 'aldolization.' His most important work, however, was in the theoretic side of chemistry in distinguishing the atomic relations of organic compounds. His publications include: *Mémoires sur les ammoniaques composées* (1850); *Traité élémentaire de chimie médicale* (1864-65); *Dictionnaire de chimie pure et appliquée* (1868-78; supplement, 1880-86; 2d supplement by Fridel, 1892); *Progrès de l'industrie des matières coloranites artificielles* (1876); *Théorie atomique* (1878); and *Traité de chimie biologique* (1884).

WURTZITE (named in honor of Charles Adolphe *Wurtz*). A mineral zinc sulphide crystallized in the hexagonal system. It has a resinous lustre, and is brownish-black in color. It occurs in crystals or in massive fibrous varieties. It is found in Portugal, Bolivia, Peru, and in the United States, with sphalerite and quartz, at Butte, Mont. This mineral has been made artificially by fusing equal parts of zinc sulphate with calcium fluoride and barium sulphide.

WURZBACH, vo͞orts′bäk, Alfred, von Tannenberg (1846—). An Austrian art-critic, born at Lemberg, son of the following. He studied jurisprudence in Vienna and entered the civil service, but resigned in 1876 and devoted himself entirely to the study of art-history. In 1881-86 he was art-critic for the *Wiener Allgemeine Zeitung.* Under the title *Zeitgenossen* he published a series of biographical sketches (1871-72), and afterwards the monograph *Martin Schongauer* (1881), a *Geschichte der holländischen Malerei* (1885), besides biographies of Dutch and Flemish painters in Dohme's *Kunst und Künstler* (1876). He also edited the éditions de luxe of *Die französischen Maler des achtzehnten Jahrhunderts* (1879-80), *Die goldene Bibel* (1880), and *Rembrandt-Galerie* (1885), and translated Houbraken's *Groote schouburgh der nederlandsche konstschilders* (1879).

WURZBACH, Constant, von Tannenberg (1818-93). An Austrian biographer, born at Laibach. After studying jurisprudence at Gratz, he served in the army from 1836 to 1844, when he obtained a position in the university library at Lemberg. In 1849 he was appointed librarian in the Ministry of the Interior at Vienna, and afterwards Secretary in the Ministry of State. His writings include: *Die Volkslieder der Polen und Ruthenen* (1846); *Die Sprichwörter der Polen* (1852); *Die Kirchen der Stadt Krakau* (1853); *Joseph Haydn und sein Bruder Michael* (1861); *Glimpf und Schimpf in Spruch und Wort* (1864); *Historische Wörter, Sprichwörter und Redensarten* (1866); *Franz Grillparzer* (1871); *Ein Madonnenmaler unserer Zeit: E. Steinle* (1879); *Feldmarschall Erzherzog Karl* (1880). He is, however, best known for the *Bibliographisch-statistische Uebersicht der Litteratur des oesterreichischen Kaiserstaates* (1856), and his valuable *Biographisches Lexikon des Kaisertums Oesterreich* (60 vols., 1857-92), a unique publication on a gigantic scale, containing about 25,000 critical biographies of notable personages in every walk of life and from all parts of the Austro-Hungarian monarchy.

WÜRZBURG, vụrts′bo͞ork. The capital of Lower Franconia, Bavaria, 81 miles by rail northwest of Nuremberg (Map: Germany, D 4). It is almost wholly situated on the right bank of the navigable Main, which is here crossed by three bridges (two of them new). The fortifications were entirely removed by 1874. The old, or inner, city is separated from the modern and handsome suburbs by broad and agreeable promenades, into which the beautiful Hofgarten blends on the east.

The Hofgarten dates from 1729 and contains an orangery. The handsome new law courts rise a short distance away on the south. The rococo royal palace, formerly the episcopal residence, a splendid edifice of the first half of the eighteenth century, situated in the Hofgarten, is the centre of interest to the visitor. Here are the Residenzplatz, and the elaborate modern Liutpold fountain. West of the palace is the uninteresting cathedral, a Romanesque basilica, tracing its origin back to 862. In its present form it dates from 1240. The exterior was restored in 1882-83. Adjacent to the cathedral is the rococo Neumünster Church, with a red façade, belonging to the eighteenth century. It has a tablet to Walther von der Vogelweide, who was buried in the ancient cloisters here. Near by on the west is the old market place with the beautiful Chapel of Mary. This graceful Gothic structure dates from 1377, and was restored in the nineteenth century.

To the south, beyond the mediæval town hall, rise in the modern quarter the new buildings of the university. (See Würzburg, University of.) The University Church, with Gothic features, belongs to the later sixteenth century, and the Seminary Church to the later part of the eighteenth century. In the northern part of the city are the Ludwigshalle, where expositions are held, and the Julius Hospital, a venerable institution. In the northwest corner of Würzburg, near the river, are the anatomical, physical, pathological, and other institutes belonging to the university.

The fine old Main bridge (1474) leads from the central part of the city to the town on the left bank, where the Saint Burkard Church, with its towers, and the Marienberg fortress command the attention. The former is a Romanesque structure, begun in 1033. The Marienberg, now used as barracks, stands on a hill over 400 feet above the river. There are a royal music school, and schools of agriculture, horticulture, etc. Würzburg is an active industrial town. Machinery, railway cars, pianos, scientific and musical instruments, and tobacco are among the principal manufactures. Famous brands of beer are produced in the city. The wine trade is important, and fruit, coal, and timber also furnish heavy shipments. Population, in 1900, 75,497.

Würzburg became an episcopal seat in the middle of the eighth century. It early grew wealthy and important. The bishops of Würzburg were prominent in their capacity as temporal princes, their domain finally having an area of about 1900 square miles. They bore the title of Duke of Franconia. The bishopric was secularized in 1801 and assigned in 1803 to Bavaria. By the Peace of Pressburg, in 1805, the principality was transferred to Ferdinand III., the dispossessed Grand Duke of Tuscany. In pursuance of the acts of the Congress of Vienna (1814-15), it passed again to Bavaria. The Prussians entered the town on August 2, 1866.

WÜRZBURG, University of. A German university, founded in 1402 by Bishop Johann von Egloffstein and confirmed by a bull of Pope Boniface IX. in the same year. The institution was reorganized in 1582 by Prince Bishop Julius Echter von Mespelbrunn on the mediæval pattern, as a Catholic university. It soon became the Mecca for Catholic students not only of Germany, but of other European countries. The care of the faculties of theology and philosophy was left to the Jesuits, who carried on the instruction until the suppression of the Order in 1773. The faculty of law was reorganized in 1776 and that of medicine in 1807. With the union of Würzburg to Bavaria began a new era for the institution. It soon rose to an eminent position among German universities. Its medical faculty particularly stands high. In 1902 it consisted of the faculties of theology, law and political science, medicine, and philosophy. It had in that year an attendance of 1235. The library, founded by Karl von Dalberg, which includes the original collections, contains over 350,000 volumes.

WURZEN, vo͞orts'en. A town of the Kingdom of Saxony, 15½ miles northeast of Leipzig, picturesquely situated on the Mulde, here spanned by two bridges (Map: Germany, E 3). Its industries include iron casting, bleaching, weaving, and the manufacture of machinery, paper, wall paper, carpet, furniture, and hosiery. Population, in 1900, 16,614.

WÜSTENFELD, vu̧s'ten-fĕlt, Heinrich Ferdinand (1808-99). A German Arabic scholar. He was born at Münden, Hanover, studied at Göttingen and Berlin and was librarian (1838-89) and professor (1842-90) at Göttingen. He published many important Arabic texts and valuable works on Arabic history and literature, including *Geschichte der arabischen Aerzte und Naturforscher* (1840); *Genealogische Tabellen der arabischen Stämme und Familien* (1852); *Vergleichungstabellen der mohammedanischen und christlichen Zeitrechnung* (1854; continuation by Mahler, 1887); *Die Statthalter von Aegypten* (1875-76); *Geschichte der Fatimiden-Chalifen* 1881); *Die Geschichtschreiber der Araber* (1882); *Der Iman el Schāfi'ī, seine Schüler und Anhänger* (1890-91).

WUSTMANN, vu̧st'mån, Gustav (1844—). A German philologist and historian, born in Dresden, where he frequented the Kreuzschule, before studying philology at Leipzig in 1862-66. He then taught at the Nikolai Gymnasium in Leipzig until 1881, when appointed director of the municipal archives and city librarian. From 1879 he was also associate editor of the *Grenzboten* and in 1897 received the title of professor. He published *Apelles' Leben und Werke* (1870) and the valuable contributions to the history of Leipzig: *Der Leipziger Baumeister Hieronymus Lotter* (1875), *Beiträge zur Geschichte der Malerei in Leipzig vom 15. bis 17. Jahrhundert* (1879), *Aus Leipzigs Vergangenheit* (1885), *Quellen zur Geschichte Leipzigs* (1889-95), *Leipzig durch drei Jahrhunderte* (1890), *Der Wirt von Auerbachs Keller, Dr. Heinrich Stromer von Auerbach* (1902). Much opposition was aroused by his publication *Allerhand Sprachdummheiten. Kleine deutsche Grammatik des Zweifelhaften, des Falschen und des Hässlichen* (3d ed. 1903). Besides a collection of poems, entitled *Als der Grossvater die Grossmutter nahm* (3d ed. 1895), he edited a new adaptation of Borchardt's *Die sprichwörtlichen Redemsarten in deutschen Volksmund, nach Sinn und Ursprung erläutert* (5th ed. 1895).

WUTH'ERING HEIGHTS. A novel by Emily Brontë, published in 1847 under the nom de plume of 'Ellis Bell,' in three volumes, of which her sister's *Agnes Grey* formed the third. The scene is laid in Yorkshire. It is a powerful story, in which the hero and heroine love and torture each other in a world of their own quite apart from real life.

WU TING-FANG, wo͞o'tĭng'făng' (1842—). A Chinese lawyer, diplomatic agent, and statesman, born at Singapore. At thirteen he entered Saint Paul's College in Hong Kong, where he remained for seven years, when he entered the service of the Colonial Government as interpreter in the law courts. In 1874 he went to London to study law, entered at Lincoln's Inn, and was called to the bar in 1877. Returning to Hong-Kong, he practiced as a barrister. In 1882 he came under the notice of the Chinese Government at Peking, was called north, and joined the official staff of Li Hung-Chang, then Governor-General of Chih-li and the grand chancellor of the Empire. He was a member of the peace embassy at the head of which was Li Hung-Chang, and assisted in negotiating the Treaty of Shimonoseki. On his return to Peking he was successively appointed vice-president of the Imperial Clan Court, a senior vice-president of the Board of War, and superintendent of Imperial railways; and in the following year (1896) was appointed Minister to the United States. He opposed the reënactment of the Chinese Exclusion Act without some modification, but was unsuccessful. In 1902 he was recalled to act as one of the commissioners engaged in negotiating commercial treaties with the United States and other foreign nations, and in 1903 was appointed vice-president of the 'Board of Commerce,' a new Government department then established.

WUTTKE, vo͞ot'ke, Heinrich (1818-76). A German historian, born at Brieg in Silesia, and educated at the universities of Breslau, Berlin, and Leipzig. He became privat-docent in history at Leipzig in 1841, and was made full professor in 1848. In that year he was a member of the National Assembly at Frankfort, and one of the founders of the Greater-Germany Party. His works include: *Polen und Deutsche* (1847); *Erdkunde und Karten des Mittelalters* (1854); *Die Völkerschlacht bei Leipzig* (1863); *Die deutschen Zeitschriften und die Entstehung der öffentlichen Meinung* (3d ed., 1875); and an unfinished but very valuable *Geschichte der Schrift und des Schrifttums* (1872).

WY'ANDOT (properly *Wandót* or *Wendót*, of uncertain etymology), or Huron. An important tribe or confederacy of Iroquoian stock (q.v.). The original Wyandot were known to the French as Huron; this tribe was made up of the Wyandot proper or Huron and the neighboring and cognate Tionontati, who probably outnumbered the Wyandot when the two tribes united in 1650 and abandoned their country to escape the Iroquois. When first known to the French, about 1615, the Huron occupied a narrow territory between Georgian Bay and Lake Sinicue, Ontario, Canada. They had about 20 villages and a population conservatively estimated at 10,000. Their numbers, however, were greatly reduced about 1625 by smallpox and other pestilence. Adjoining them on the southwest were their kinsmen and allies, the Tionontati. On the invitation of the Huron, the French missionaries entered their country in 1623 and within a few years the Jesuit missions among the Huron became the most important in New France. The Iroquois had long been at war with the Huron and were equally hostile to the French. In 1648 began the final war, and within a year the Huron were compelled to abandon their country and seek shelter in different directions. Most of them fled to the Tionontati, who in turn were immediately attacked by the Iroquois in 1649, and after a short struggle the two tribes abandoned their country and fled together, first to Manitoulin Island in Lake Huron, then to Mackinaw and Green Bay, and finally to the Mississippi. Driven back by the Sioux (q.v.), they halted for a time near the western end of Lake Superior and then returned to Mackinaw, where in 1677 they numbered about 500. In 1702 they removed to Detroit, in Lower Michigan, and were followed by the missionaries. In 1723 they were formally admitted to the friendship of the Iroquois. In 1751 they built a new village at the present Sandusky, Ohio, and under the name of Wyandot soon acquired a new prominence in the Ohio country. They took an active part with the French in the colonial wars and with the English against the Americans in the Revolution and War of 1812. At the treaty of peace in 1815 they were confirmed in possession of a large tract in Ohio and Michigan, most of which they sold three years later, reserving only two small pieces, near Upper Sandusky, Ohio, and on the Huron River in Michigan. In 1842 they removed to Kansas and in 1867 were again removed to a small reservation in the northeastern corner of Indian Territory, where they now reside.

The evidence indicates that on the dispersion of the Huron, the larger body of those who survived were incorporated with the conquering Iroquois, and that only the smaller portion, and these chiefly Tionontati rather than true Wyandot, escaped to the West or found refuge with the French. In 1656 the Huron captives among the Seneca formed a whole village by themselves, while about the same time there were known to be 1000 more among the Onondaga. In all they number now about 800, divided into Hurons of Lorette (Quebec, Canada), 440; Wyandottes of Anderdon (Ontario, Canada), 100; and Wyandots in Indian Territory (United States), 350. Of these last not one is a fullblood.

WY'ANDOTTE. A city in Wayne County, Mich., 12 miles south-southwest of Detroit, on the Detroit River, and on the Michigan Central, the Lake Shore and Michigan Southern, the Grand Trunk, and the Detroit Southern railroads (Map: Michigan, K 6). It has a public library with 6000 volumes. Manufacturing is the leading industry, the most important establishments being chemical works, salt blocks, a steel shipbuilding plant, a trunk factory, breweries, and manufactories of fur coats, robes, sashes, doors, blinds, wagons, wheelbarrows, gasoline engines, etc. Under the charter of 1896 the government is vested in a mayor, chosen annually, and a unicameral council. The water-works and the electric-light plant are the property of the city. Wyandotte was laid out in 1854 and was incorporated in 1867. Population, in 1890, 3817; in 1900, 5183.

WYANDOTTE (from the North American Indian tribal name *Wyandot*). A breed of domestic fowls in high repute for general excellence. It originated about 1875 from a mixture of dark Brahma, silver-spangled Hamburg, and French bred fowls, and possesses the good qualities of the Plymouth Rock breed, with a trifle less weight. Five varieties are recognized, differing in plumage. The 'silver-laced' has a silvery white plumage, with regularly marked white lacing on the breast and a generous distribution of white and black throughout the entire body. The cock has a silver-white head, rose comb, silver hackle, with a black stripe down the centre of each feather; back silvery white; breast black with white centre; tail black; wings black, edged with white, showing a bar when folded; shanks and toes unfeathered and yellow. The 'golden' is golden-bay and black instead of white. The 'white' is white throughout, and the most practical variety. The 'buff' is uniformly deep, clear buff in color, with a coppery bronze tail; and the 'black' variety is wholly black with a greenish sheen. See Fowl; consult books mentioned thereunder; and see Colored Plate of Domestic Fowls with article Poultry.

WYANDOTTE, or The Hulled Knoll. A novel by James Fenimore Cooper (1843). The scene is laid near Otsego Lake, N. Y.

WYANDOTTE CAVE. A remarkable natural formation in Crawford County, Indiana, five miles northeast of Leavenworth. It is second in size to Mammoth Cave, being about 23 miles long, and consists mainly of a series of galleries and large chambers, whose greatest height is about 250 feet and greatest width about 300 feet. It is remarkable for the number and beauty of its crystals, exceeding, it is said, even Mammoth Cave in that respect. Among the most notable features are the 'Pillared Palace,' with clusters of stalactites, and the 'Monument Mountain,' 175 feet high, with three massive stalagmites at its top, standing on the floor of the 'Mammoth Hall,' 350 feet long and 245 feet high.

WY'ANT, Alexander H. (1836-92). An American landscape painter, born at Port Washington, Ohio. After practicing portrait painting in Cincinnati, in 1856, he went to New York, where he came under the influence of Inness. He went abroad, studying for some years under Hans Gude at Düsseldorf, and was much influenced by the works of Turner and Constable in London, returning to New York City in 1864. He was one of the founders of the American Water-Color Society, a member of the Society of American Artists, and of the National Academy of Design. Among his paintings in oil are a "View on Lake George" (1875); a "Scene in the Adirondacks" (1882); "An October Day," and a "Landscape" (1892). In water-color are "Sunset on the Prairie" (1876), and "Reminiscences of the Connecticut" (1878). The Metropolitan Museum in New York possesses four good examples of his work. His color is pure, and he handled his brush in a highly individual manner, by which he secured striking atmospheric effects.

WY'ATT (**WYATE, WYAT**, or **WYET**), Sir Francis (c.1575-1644). A colonial Deputy Governor of Virginia, born in England. In 1621 he was chosen by the Virginia Company to succeed Deputy Governor Sir George Yeardley, and in October of that year arrived at Jamestown with a fleet of nine sails. With him he brought a written constitution, memorable as the first instrument of the kind ever in use in America. With the first year of Wyatt's governorship twenty-one vessels bearing more than 1300 settlers arrived in the colony, but in 1622 occurred a great disaster in the form of an Indian uprising. (See Virginia.) When the charter was annulled in 1624, Wyatt remained Deputy Governor under a royal commission, but in 1625 he returned home. He was again sent out in 1639, but after a stormy administration of about eighteen months was succeeded by Sir William Berkeley.

WYATT, James (1746-1813). An English architect. He was born at Burton Constable, Staffordshire, and at fourteen attracted the notice of Lord Bagot, ambassador to the Pope, who took him to Rome. He remained there for three or four years, and during the two following years studied with Antonio Vicentini at Venice. About 1766 he returned to England. He first attracted popular notice by rebuilding the old Pantheon in Oxford Street in 1772. From this time he was constantly employed on important buildings, using first the Italian style, but after his appointment as surveyor to Westminster Abbey in 1776, the Gothic. He soon made this style popular; was commissioned to restore Salisbury, Lincoln, Lichfield, and Hereford cathedrals; built Fonthill Abbey for Beckford in 1795; and was employed by George III. at Windsor Castle. In 1785 he became a Royal Academician. Wyatt's conception of the Gothic style was somewhat crude and the lack of judgment which he displayed in the restoration of churches must be unreservedly condemned; but since to him was due the widespread interest in the English Gothic style, he scarcely deserved the name "The Destroyer," by which the antiquaries of his day knew him.

WYATT, Sir Matthew Digby (1820-77). An English architect and writer on art. After his apprenticeship and his study for some time at the Royal Academy, he went in 1844 to the Continent and studied the architecture of Italy, France, and Germany, making an especial study of decorative art in its various applications. He returned to England in 1846, and in 1848 published *Geometrical Mosaics of the Middle Ages*. As secretary to the Royal Commissioners he took an important part in the arrangements of the 1851 exhibition. In 1856 he was appointed architect to the East India Company. In 1866 he received the royal gold medal of the Royal Institute of British Architects, and in 1869 he was chosen Slade professor of fine arts at Cambridge. His chief publications are: *Metal Work and Its Artistic Design* (1852); *Industrial Arts of the Nineteenth Century* (1853); *Art Treasures of the United Kingdom* (1857); *Fine Art* (1870); and *Architect's Notebook in Spain* (1872).

WYATT, Sir Thomas (c.1503-42). An English poet and diplomatist, born on his father's estate of Allington, near Maidstone in Kent. His father, Sir Henry Wyatt, of a family originally of Yorkshire, stood high in favor with both Henry VII. and Henry VIII. The younger Wyatt studied at Saint John's College, Cambridge, from 1515 to 1520. In that year he married Elizabeth Brooke, daughter of Lord Cobham, but already he had been the lover of Anne Boleyn (q.v.), and his boyish intimacy was ended only by her death. Through his father's influence and his own personality a career at court was open to him. In this sphere, as one of the most accomplished men of his day, of noble presence and fine manners, of honor and integrity, and skillful in the management of affairs, he was thoroughly qualified to succeed. Wyatt visited Venice, Ferrara, Bologna, Florence, and Rome. In 1529 and 1530 he was high marshal at Calais. The favors of Anne Boleyn having now been sought by the King, Wyatt confessed his relations and tried to dissuade the King on the ground that her character was not beyond reproach. In 1536 the scandal aroused by Anne Boleyn's adulteries threatened to overwhelm Wyatt. In May he was committed to the Tower, but after Anne's death he went free, was endowed with more honors, was made sheriff of Kent, and was sent on an embassy to Spain (1537-39). He was sent to Flanders in 1540 on the fall of his patron at court, Thomas Cromwell. Wyatt was sent to the Tower, accused of treason, but after explanation and confession, he regained the King's confidence and enjoyed it to a greater degree even than before the accusation. Granted lands at Lambeth by Henry VIII., named high steward of the King's manor of Maidstone, elected to Parliament for Kent, all in 1542, death overtook him in the same year.

Wyatt shares with Surrey the honor of introducing the sonnet into English verse; as he was the elder by some years, and a student of Petrarch while Surrey was a mere child, the evidence seems to give him the preference. Under Petrarch's influence he attempted to give England a new kind of verse based not on accent, but on syllabic quantity. Wyatt also tried his hand at the terza rima. Love is the theme of most of his lyrics and Anne Boleyn is the mistress of his song. In his sacred poems Wyatt shows the influence of Dante and of Alamanni. His poems, together with those of Surrey, who was his poetical pupil, were published in London, 1557. A more elaborate edition prepared by Dr. Nott, in two volumes, was issued in 1815-16 in London. Consult: Simonds, *Sir Thomas Wyatt and His Poems* (Boston, 1889); Nott, "Memoir," prefixed to *Works* (London, 1815-16).

WYATT, Sir Thomas (1521?-54). An English soldier, son of Sir Thomas Wyatt, the poet, surnamed "the Younger." He did good service at the siege of Boulogne (1544), displaying considerable military talent; and continued in honorable service on the Continent till 1550. In 1554, when the marriage between Queen Mary and Philip of Spain was under consideration, Wyatt conspired for the elevation of Lady Jane Grey to the throne, and led the Kentish men to Southwark, after gaining considerable success over the royalists. He, however, failed to capture Ludgate, and, becoming separated from the main body of his followers, was taken prisoner, and soon afterwards executed.

WYCHERLEY, wĭch′ẽr-lĭ, William (1640?-1716). An English dramatist, one of the founders of the school of 'artificial comedy,' which reached its complete development in the work of Congreve and his associates and, at a later day, of Sheridan. Wycherley was born at Clive, in Shropshire. He was the son of a well-to-do cavalier squire, who sent him at the age of fifteen to be educated in France. After his return to England he was entered at the Inner Temple in 1659, but literature proved more attractive than the law. His first comedy, *Love in a Wood, or Saint James's Park*, was acted with great applause, and published shortly afterward, probably in 1672. *The Gentleman Dancing-master*, which appeared in the following year, was somewhat less successful, but his two other comedies, *The Country Wife* (1675), and *The Plain Dealer* (1677), which are his strongest works, though in both he is more or less indebted to Molière, became exceedingly popular. About 1680, Wycherley married a rich young widow, the Countess of Drogheda. She did not live long and left him the whole of her fortune; but his succession to the estate was disputed and an expensive lawsuit ensued, the costs of which fairly broke down the unlucky dramatist. He was committed to the debtors' prison and suffered to languish there neglected for seven years. He was partly relieved by the bounty of James II., and upon his father's death he succeeded to the patrimonial estate in Shropshire. This, however, was heavily mortgaged and strictly entailed. He was on bad terms with the heir-at-law, his nephew; and on purpose to injure this relative, he married, at the age of seventy-five, a young girl, on whom he settled a jointure. Eleven days afterward he died. Besides his comedies, Wycherley published a volume of wretched *Miscellany Poems* in 1704, and after his death another volume, *The Posthumous Works of William Wycherley, Esq., in Prose and Verse*, appeared in 1728. His comedies, on which his fame rests, reflect the literary taste, the manners, and the vices of the time in which he lived. They are grossly immoral, but their dramatic construction is excellent, the language is clear and forcible, the dialogues are often witty and lively, some of the characters are vigorously drawn, and the observations and maxims scattered throughout the different scenes are shrewd and sensible and are expressed in a terse, sententious style. Consult: The memoir published with the *Posthumous Works* (1728); Lord Lansdowne, *Memoirs of the Life of William Wycherley, Esq.; with a Character of His Writings* (London, 1718); W. C. Ward, ed., *Best Plays of William Wycherley, with an Introduction and Notes* (ib., 1888); and Hazlitt, *Lectures on the English Comic Writers* (ib., 1819).

WYCH STREET. A street in London, famous as the resort of thieves and loose characters during the seventeenth and eighteenth centuries. Jack Sheppard's special haunt, the White Lion, has long been demolished. In 1554, Bishop Hooper spent the night before his execution at another of its inns, The Angel. Wych Street leads from the Strand, near Clement's Inn, to Drury Lane, and contains the Olympic Theatre and an entrance to New Inn.

WYCKOFF, wī′kŏf, Walter Augustus (1865—). An American teacher and writer, born in Mainpuri, India, where his father was a missionary. He graduated at Princeton in 1888, took a post-graduate course there in 1888-89, and then studied for a year in Europe. For eighteen months after July, 1891, he worked as a day-laborer, making his way from Connecticut to California, in order to study the character and manner of life of the wage-earning class in America. The results of his studies appeared in three volumes: *The Workers—the East* (1897), *The Workers—the West* (1898); and *A Day with a Tramp and Other Days* (1901), which attracted widespread attention and show considerable sympathetic insight and acuteness of observation. Wyckoff traveled twice around the world as a private tutor, in 1893-94; and in 1894 held a fellowship in social science at Princeton, where he became a lecturer on sociology in 1895 and an assistant professor of political economy in 1898.

WYCLIFFE. See Wiclif.

WYCOMBE, wĭk′ŭm, High Wycombe, or Chipping Wycombe. A municipal borough in Buckinghamshire, England, surrounded by beech-clad hills, 28 miles west-northwest of London, on the Wye, a small affluent of the Thames (Map: England, F 5). It is famous for its Roman and Saxon antiquities. The church of All Saints, in the Norman and early English style, is a large and handsome edifice, dating from 1273. There are flour and paper mills, and manufactures of lace and furniture, beechwood chairs being a specialty. Population of municipal borough, in 1891, 13,435; in 1901, 15,532; of parliamentary borough, in 1891, 42,790; in 1901, 46,490.

WYE, wī. A river of Wales and England. It rises on the south slope of Plinlimmon in Wales near the source of the Severn, and flows southeast into Herefordshire, England, then southward, emptying into the estuary of the Severn on the boundary between Monmouth and Gloucester (Map: Wales, C 4). It is 130 miles long, navigable for large vessels to Chepstow, near its mouth, and for small craft 70 miles to Hereford, whence a canal connects it with the Severn at Gloucester. At its mouth the tide rises sometimes 46 feet, a height exceeded in few places on the globe. The lower course of the Wye is celebrated for its beauty, and here on its banks lie the ruins of Tintern Abbey.

WY′ETH, John Allan (1845—). An American surgeon and writer, born in Marshall County, Ala. He studied for a year at La Grange Military Academy, La Grange, Ala., served as a private in the Confederate Army during the Civil War, was captured near Chattanooga, Tenn., in October, 1863, for fifteen months was a prisoner at Camp Morton, Indianapolis, Ind., and was exchanged in March, 1865. He graduated in medicine at the University of Louisville (Ky.), in 1869, and at the Bellevue Medical College in

1873; was assistant demonstrator of anatomy in the latter institution in 1873-74, and later was preceptor to the chair of anatomy and surgery there. From 1880 to 1897 he was surgeon to the Mount Sinai Hospital, New York City. In 1882 he founded the New York Polyclinic, probably the first medical school for practitioners in the United States, and after occupying the chair of surgery in that institution for several years became, in addition, president of the faculty in 1893. He was twice president of the New York Pathological Society, and in 1901 was president of the New York State Medical Association. His publications include: *A Text-Book on Surgery* (1888); *Bloodless Amputation at the Hip Joint* (1890); *Osteo-Plastic Operation for Correction of Deformities of the Nose and Palate* (1892); and a *Life of General Nathan Bedford Forrest* (1899).

WYKEHAM, William of. See William of Wykeham.

WYLIE, wī'lĭ, Alexander (1815-87). An English missionary and sinologist, born in London. He was educated partly in Scotland and partly in London. With Premare's *Notitia Linguæ Sinicæ* and with a New Testament he learned to read Chinese fairly well. In 1847 he went to Shanghai as superintendent of the Mission Press of the London Missionary Society, and there, besides mastering Chinese, he carried through the press the new Delegates' Version of the Bible. In 1860 he became agent in China of the British and Foreign Bible Society. In the prosecution of his new work he traversed 17 of the 18 provinces of China, and naturally had less time for writing, but when in 1877 he retired, worn out with manifold labors and half blind, the list of his writings was a long one. In a year or two he became totally blind, but with the assistance of his daughter he continued his translation of the Han dynasty history and the preparation of the catalogue of his library, which went to the Bodleian at Oxford. He died in London. His industry was enormous and his learning deep and wide. He published in Chinese, *A Compendium of Arithmetic,* with tables of logarithms, etc.; Euclid's *Elements,* books vii. to xv., reprinted by Tsêng Kwoh-fan (in 1865); *A Popular Treatise on Mechanics* (1858); De Morgan's *Treatise on Algebra* (1859); Loomis's *Elements of Analytical Geometry* and his *Differential and Integral Calculus* (1859); and Herschell's *Astronomy,* with the original steel plate illustrations (1859). In 1855 he brought out an English version of a Chinese-Manchu *Grammar,* and in 1859 edited and published the Gospels of *Matthew* and *Mark* in Manchu and Chinese. His best known work in English is *Notes on Chinese Literature* (1867).

WYLIE, James Aitken (1808-90). A Scottish theological writer, born at Kirriemuir. He was educated at Marischal College, Aberdeen, at the University of Saint Andrews, and at the Original Secession Divinity Hall, Edinburgh. In 1846 he became sub-editor of the Edinburgh *Witness* and in 1852 (having joined the Free Church of Scotland) editor of the *Free Church Record.* In 1860 he was appointed lecturer on Roman Catholic and Protestant theology at the Protestant Institute, Edinburgh, and he held this position till his death. All his life he was a zealous upholder of Protestantism and wrote copiously on this topic and other religious subjects. His more important works were: *The Modern Judea* (1841); *Ruins of Bible Lands* (1845); *The Great Exodus* (1863); *The History of Protestantism* (1874-77); *The Jesuits* (1881); *Over the Holy Land* (1883), and *History of the Scottish Nation* (1886-90).

WYLIE, Robert (1839-77). An American artist, born on the Isle of Man, and educated at the Pennsylvania Academy, Philadelphia. In 1863 he was sent by the trustees of that academy to study in France. He lived at Pont-Aven in Brittany, where he founded a little colony of painters. In 1872 he received a second class medal at the Paris salon, but it was not until after his death that his works were exhibited and fully appreciated. One of the best, "Death of a Vendean Chief" (1876), is in the Metropolitan Museum, New York City.

WYMAN, wī'man, Jeffries (1814-74). A distinguished American naturalist and anatomist, born at Chelmsford, Mass. He graduated in medicine at Harvard College in 1833 and at the Medical School in 1837, and two years later was made demonstrator of anatomy and curator in the Lowell Institute, Boston. After studying in Europe, he was elected in 1843 professor of anatomy and physiology at Hampden-Sidney College, Richmond, Va. Four years later he became professor of anatomy at Harvard University, where he remained till his death. He made extensive and valuable collections in comparative anatomy and archæology, and he published nearly seventy scientific papers. His work as a comparative anatomist, a student of American Indian antiquities, and an early champion of evolution was of the first importance.

WYNANTS, wī'nănts (or Wijnants) Jan (c.1620-c.79). A Dutch landscape painter. He was born at Haarlem, and lived there and at Amsterdam. He was one of the earliest landscape painters in Holland, and is intrinsically interesting for his color, though his choice of subjects was poor. Wouverman painted figures in his landscapes while he lived at Haarlem, and Van der Velde, Lingelbach, and others after he removed to Amsterdam. His work is well represented in many of the European galleries, especially in those of Amsterdam, The Hague, Munich, Saint Petersburg, and the National Gallery and Wallace Collection, London.

WYNDHAM, wĭn'dam, Sir Charles (1841-—). A well-known English actor and manager. Educated as a physician, he came to America during the Civil War and was for a time a surgeon in the United States Army. While in this country, too, he made his appearance upon the stage; and after his return to England appeared in London (1868), where he soon became very popular in light comedy. His Charles Surface was much admired, and another of his successes was made in an adaptation of Bronson Howard's *Saratoga,* called *Brighton,* in 1874, which he afterwards played in German at Berlin. In 1876 he became connected with the Criterion Theatre, of which he assumed control in 1879. Among his productions there were *Truth* (1879); *Wild Oats* (a revival in 1886), in which he had already appeared elsewhere in 1873; *David Garrick* (1886); *The Case of Rebellious Susan* (1894), in which his performance of Sir Richard Kato, Q.C., was especially fine; and *The Home Secretary* (1895). He also revisited America several times. In 1899 he opened the splendid new Wyndham's Theatre in London. He was knighted in June, 1902. Consult Scott, *The Drama of Yesterday and To-Day* (London, 1899).

WYNDHAM, George (1863—). An English Cabinet Minister. He was born in London, and was educated at Eton College and at the Royal Military College at Sandhurst, where he graduated in 1882. In 1883 he entered the Coldstream Guards and served through the Suakim campaign and in Cyprus (1885), when he resigned from the army. From 1887 to 1892 he was private secretary to A. J. Balfour. In 1889 he entered Parliament as a Conservative member from Dover, and in 1898 became Under Secretary of State for War. In 1900 he was advanced to the position of Chief Secretary for Ireland, and in 1902 was made a member of the Cabinet. He first became a figure of international interest when, on March 25, 1903, he introduced an Irish land purchase bill more radical in its provisions than any measure heretofore proposed for the relief and pacification of Ireland. His tactful and conciliatory attitude rendered the passage of the bill possible. He published, with elaborate and scholarly introductions, *North's Plutarch* (1894), and *Shakespeare's Poems* (1898).

WYNTOUN, wĭn'tŭn, Andrew of (1350?-1420?). A Scottish chronicler, about whom very little is known except that he was a canon regular of Saint Andrew's and was elected about 1395 prior of Saint Serf's Inch in Loch Leven. His *Oryginale Cronykil of Scotland*, in verse, possesses great linguistic interest as a specimen of early English written in the North. Like Barbour's *Bruce*, the poem is composed in octosyllabic verse. The work was edited by David Laing for the 'Historians of Scotland Series' (3 vols., Edinburgh, 1872-79). A new edition from the Wemyss manuscript is being prepared for the Scottish Text Society.

WYO'MING (corrupted from North American Indian *Maughwauwama*, large plains). A Western State of the United States, situated within the Rocky Mountain region between latitudes 41° and 45° N., longitudes 104° 3′ and 111° 3′ W. It is bounded on the north by Montana, on the east by South Dakota and Nebraska, on the south by Colorado and Utah, and on the west by Utah and Idaho. Wyoming is rectangular in shape, measuring 355 miles from east to west and 276 miles from north to south. Its boundaries are straight lines running along meridians and parallels of latitude. The area of the State is 97,890 square miles, making it the sixth in size among the States.

Topography. The whole State is a lofty plateau including almost the entire breadth of the Rocky Mountain system, and the Continental Divide crosses it from the northwestern corner to the middle of the southern boundary. The plateau consists of a comparatively level floor lying from 5000 to 7000 feet above the sea, and traversed by a number of more or less detached mountain ranges, which divide the vast plains into a number of separate basins. The ranges rise from 3000 to 4000 feet above the surrounding country, their general elevation being 10,000 to 11,000 feet. In the southeastern part of the State the Laramie Plains are inclosed by the Laramie range on the northeast, the Rattlesnake and Seminole ranges on the northwest, and the detached groups of the Snowy and Medicine Bow ranges on the southwest. North and east of the Laramie range the vast plains of the Platte and Cheyenne basins stretch for 150 miles in either direction. They are bounded on the northeast by the Black Hills, which extend across the State boundary from South Dakota. In the southwestern quarter of the State there is another extensive plain-basin known as the Red Desert, but the northwestern quarter is preëminently a region of lofty mountains, having only one basin of considerable size, that of the Big Horn. This is bounded on the east by the magnificent Big Horn Mountains, which extend 100 miles southward from the middle of the northern boundary, and form one of the longest and most continuous ranges in the State. Southwest of the Big Horn Basin are the Shoshone and Owl Creek Mountains, which are separated by the narrow Wind River Valley from the massive and snow-clad Wind River range, extending southeastward toward the Red Desert. This range is the loftiest in the State; it has several peaks over 13,000 feet high, and Fremont Peak, the highest point, has an altitude of 13,790 feet. The Gros Ventre, a spur of the Wind River range, runs westward to the cañon of the Snake River, beyond which, just inside the western State boundary, the Teton range rises in the Grand Teton to a height of 13,671 feet. The extreme northwestern part of the State is a rugged complex of lofty mountains and plateaus cut by numerous cañons, and this region has been set apart as a Federal reservation known as the Yellowstone National Park (q.v.).

Hydrographically Wyoming is divided among three of the greatest drainage systems of the country, those of the Columbia and the Colorado rivers on the Pacific slope, and that of the Missouri on the Atlantic slope. The last occupies by far the largest area. The Yellowstone River flows through the Yellowstone Park, and with its two largest tributaries, the Big Horn and the Powder rivers, drains most of the northern half of the State. The other tributaries of the Missouri, draining the eastern and south central portions, are the Little Missouri and the Cheyenne in the northeast and the North Platte in the southeast. The latter enters the State from Colorado, and makes a great, almost circular, bend around the Laramie Mountains. Its largest affluents within the State are the Sweetwater from the west and the Laramie from the south. The southwestern part of Wyoming is drained by the Green River, the main headstream of the Colorado. It rises on the Wind River range, and flows southward into Utah. Shoshone Lake in Yellowstone Park gives rise to the Snake River, the largest tributary of the Columbia. It flows southward for nearly 100 miles, and then, in a grand cañon, breaks through the gap between the Teton and Salt River ranges, passing into Idaho. The largest lakes in the State are Yellowstone Lake, in the Yellowstone Park, and Jackson Lake, traversed by the Snake River, some distance south of the park.

Climate and Soil. The climate is dry and sunny, and, as a rule, very pleasant and healthful. The average temperature is low, but there may be periods of intense heat and intense cold, the extreme recorded temperatures being 116° and 44° below zero. The mean temperature for January is 18.1° for Sheridan, in the north, and 25.1° for Cheyenne, in the southeast. For July the mean is about 67° in both localities. In most years the maximum rises above 100°, and the minimum falls more than 30° below zero. The winters, though very cold, are not exceedingly severe, as the snowfall is light, and the dry air makes the cold easily endurable. The average annual precipitation for the State is 13 inches, and the records of the various local stations do not vary much from this figure. The largest amount of rain falls between March and June, but irrigation is everywhere necessary, though the mountain ranges receive sufficient rain to feed the numerous streams and support forests. The soil is generally a light sandy loam, becoming darker and richer in the river valleys. In the arid Red Desert region the soil over large areas is strongly impregnated with saline matter and poor in humus, so that even the common sagebrush (*Artemisia*) gives place to the salt sage (*Atriplex*) and greasewood. For other details of flora and for fauna, see Rocky Mountains.

Geology and Mineral Resources. The Medicine Bow, Laramie, Big Horn, and Wind River ranges have their cores of Archæan crystalline rocks exposed along their crests. These outcrops are flanked by narrow bands representing the upturned edges of Paleozoic and Lower Mesozoic strata in a regular series from Cambro-Silurian to Jura-Trias. On the latter rest the Cretaceous strata, which form the surface rock of the Cheyenne, Powder River, Wind River, and Laramie basins. The southwestern plains and the Big Horn Basin are covered with Eocene deposits, and the southern part of the Platte Basin, east of the Laramie range, is covered with the later Tertiary deposits of the Great Plains formation. The Yellowstone region, in the northwest, is volcanic, and consists largely of lava flows. The mineral wealth of Wyoming is very extensive and varied, and gives promise of great future development. Copper and lead ores associated with silver exist in every range, and gold is also found in numerous localities. Red hematite iron ores are deposited on the southeastern slope of the Laramie range, but the most important mineral at present is coal, of which there are a number of large fields, chiefly in the southwestern part of the State. Each field contains several workable veins ranging from pure lignite to good bituminous, and in some localities even to a semi-anthracite. Great bands of bituminous shale exist in the Green River Valley; and in the central part of the State, as well as in several other localities, there are a number of petroleum and natural gas fields, some of which come naturally to the surface as petroleum springs. Large veins of graphite and some asphaltum deposits occur in the oil region. Other minerals are asbestos and gypsum, the latter occurring in great quantities, while building stones exist in immense variety and inexhaustible amounts.

Mining. Mining, thus far, has been limited principally to the production of coal. The output of this mineral increased almost steadily from 6925 short tons in 1868, to 1,170,318 in 1887, and 4,485,374 in 1901. In the last year the output was valued at $6,060,462. Sweetwater and Unita counties lead in coal production. In 1901 Wyoming ranked twelfth among the coal-mining States. The coal resources of the State are enormous and give promise of playing an important part in the future development of the State. The numerous oil fields have begun to be worked. In 1901, 5400 barrels of crude petroleum were obtained, valued at $37,800. In the central part of the State a lubricating oil of superior quality is produced. Lack of transportation facilities has prevented any extensive development in this field.

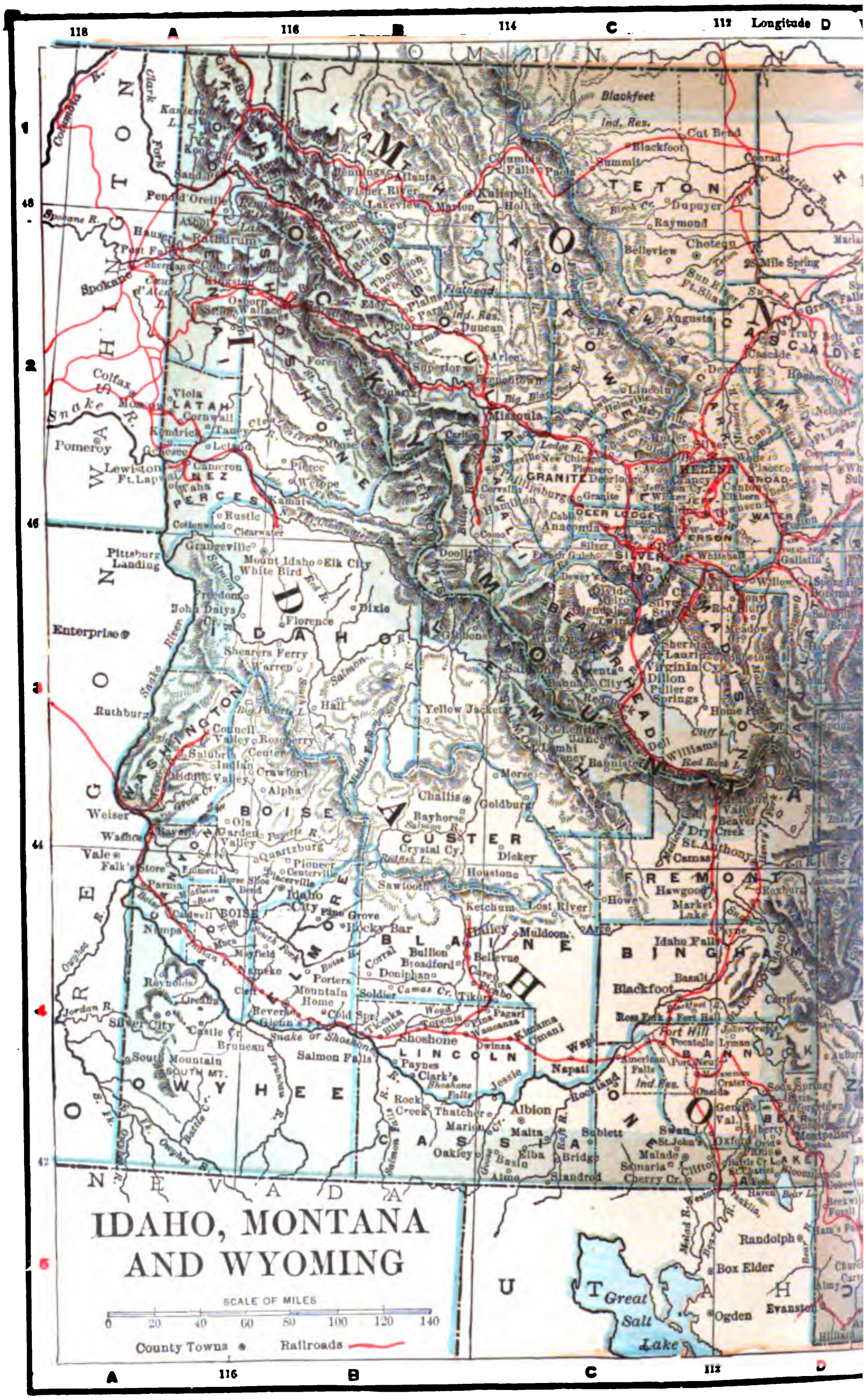
Agriculture and Stock-Raising. Wyoming is one of the most arid States in the Union, and practically no crops can be grown without irrigation. The agricultural land of the State, as a whole, lies at a greater altitude than that of any other State, and the character of agriculture, methods, and products is governed by this fact. The industry was for a long time confined to grains, and this is still of importance. It is estimated that nearly one-half of the total area of the State is adapted to grazing. In the census year 1900, 18.4 per cent. of the gross income of agriculture was accredited to the stock-raising industry. The native grasses are cured naturally by the dry climate. Some difficulty is incurred in the industry, however, because of the severity of the winters. Wyoming in 1900 had 5,541,412 sheep, including lambs. This was more than twice as many as were reported for any other State. The sheep are pastured in the mountains during the summer time, and are then removed to the plains, where they find sustenance during the winter months. It will be seen from the table appended that sheep-raising has developed mainly since 1890. The breed of sheep is of superior quality, the average yield being greater than it is for any other Western State. The average yield of fleeces increased from 7.6 pounds in 1890 to 8.2 in 1900. Cattle-raising is also very important. Wyoming also produces a hardy stock of horses and annually sends considerable numbers to Eastern markets. The large recent development in stock-raising is a result of the growth of the irrigation system, and in no other State is irrigation so intimately related with grazing. Of the 435,862 acres in crops in 1899, 402,099 were irrigated and 90 per cent. of this devoted to hay and forage. The water supply of the State is good, the melting snow of the mountains supplying numerous perennial streams with currents of considerable volume. The irrigated land is well distributed over the State, but over half of the total is in the valley of the North Platte River. In 1900, 8,124,536 acres were included in farms, and 792,332 acres were improved. With the construction of adequate transportation facilities and the creation of a home market through the development of the mining industry, this territory will be brought rapidly into cultivation. The hay crop consists of alfalfa, timothy, and other 'tame' varieties and also the native grasses. The climate is too severe for corn, but oats and wheat grow abundantly. Potatoes are a favorite crop. The hardier fruits and vegetables are successfully raised. The following table shows the number of domestic animals on farms and ranches and the acreage of the leading crops:

AREA AND POPULATION OF WYOMING BY COUNTIES.

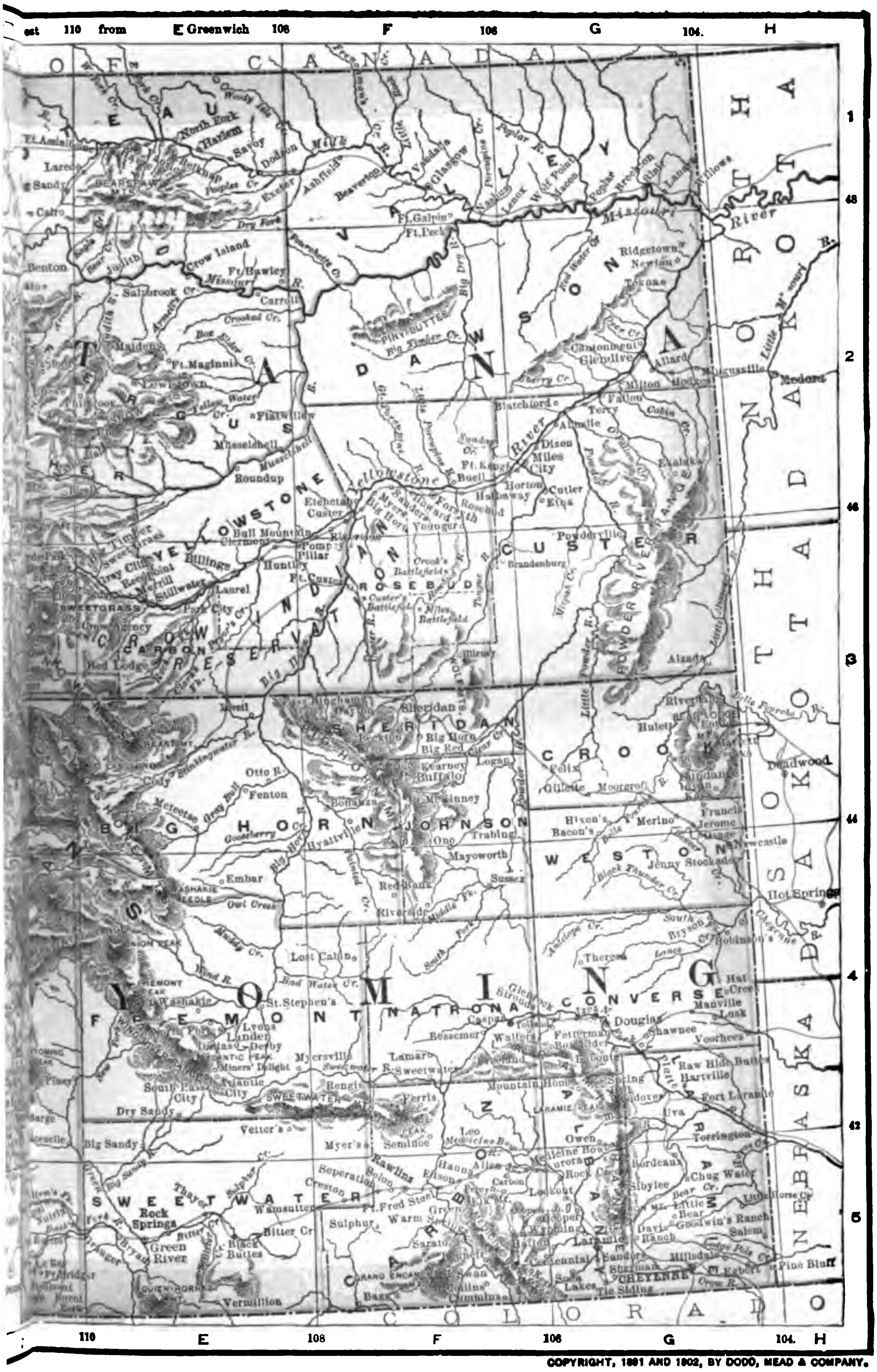
County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Albany	G 5	Laramie	4,300	8,865	13,084
Bighorn	E 3	Basin	12,216	.....	4,328
Carbon	F 5	Rawlins	8,018	6,857	9,589
Converse	G 4	Douglas	6,758	2,738	3,337
Crook	G 3	Sundance	5,435	2,338	3,137
Fremont	E 4	Lander	12,653	2,463	5,357
Johnson	F 3	Buffalo	4,168	2,357	2,361
Laramie	F 4	Cheyenne	6,986	16,777	20,181
Natrona	F 4	Casper	5,388	1,094	1,785
Sheridan	F 3	Sheridan	2,569	1,972	5,122
Sweetwater	E 5	Greenriver	10,510	4,941	8,455
Uinta	D 5	Evanston	15,980	7,881	12,223
Weston	G 4	Newcastle	4,594	2,422	3,203
Yellowstone Park	D 3	....	....	.....	369

AREA AND POPULATION OF IDAHO BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Ada	A 4	Boise	1,177	8,368	11,559
Bannock	C 4	Pocatello	3,123	2,629	11,702
Bear Lake	C 4	Paris	964	6,057	7,051
Bingham	C 4	Blackfoot	4,814	13,575	10,447
Blaine	B 4	Hailey	6,309		4,900
Boise	A 3	Idaho City	4,203	3,342	4,174
Canyon	A 4	Caldwell	1,327		7,497
Cassia	B 4	Albion	4,511	3,143	3,951
Custer	B 3	Challis	4,670	2,176	2,049
Elmore	B 4	Monntainhome	2,431	1,870	2,286
Fremont	C 4	Saint Anthony	6,145		12,821
Idaho	A 3	Mount Idaho	11,074	2,955	9,121
Kooteni	A 1	Rathdrum	5,595	4,108	10,216
Latah	A 2	Moscow	1,114	9,173	13,451
Lemhi	C 3	Salmon	4,455	1,915	3,446
Lincoln	B 4	Shoshone	3,270	4,169	1,784
Nez Perces	A 2	Lewiston	1,421	2,847	13,748
Oneida	C 4	Malad City	2,695	6,819	8,933
Owyhee	A 4	Silver City	7,907	2,021	3,804
Shoshone	A 2	Wallace	4,677	5,382	11,950
Washington	A 3	Weiser	2,908	3,836	6,882



IDAHO, MONTANA AND WYOMING



COPYRIGHT, 1891 AND 1902, BY DODD, MEAD & COMPANY.

AREA AND POPULATION OF MONTANA BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Beaverhead	C 3	Dillon	4,494	4,655	5,615
Broadwater	D 2	Townsend	1,247	.....	2,641
Carbon	E 3	Red Lodge	2,472	....	7,533
Cascade	D 2	Greatfalls	2,764	8,755	25,777
Choteau	D 1	Fort Benton	16,049	4,741	10,966
Custer	G 3	Miles City	20,490	5,308	7,891
Dawson	F 2	Glendive	13.227	2.056	2,443
Deerlodge	C 2	Anaconda	4,252	15,155	17,393
Fergus	E 2	Lewistown	8,928	3,514	6,937
Flathead	B 1	Kalispell	8,419	.....	9,375
Gallatin	D 3	Bozeman	2,583	6.246	9,553
Granite	C 2	Philipsburg	1,543	.....	4.328
Jefferson	C 2	Boulder	1,585	6,026	5,330
Lewis and Clark	C 2	Helena	2,572	19,145	19,171
Madison	C 3	Virginia City	4,443	4,692	7,695
Meagher	D 2	White Sulphur Springs	4,253	4,749	2,526
Missoula	B 2	Missoula	6.385	14,427	13,964
Park	D 3	Livingston	2,788	6,881	7,341
*Powell	C 2	....	....	.....	.....
Ravalli	C 2	Hamilton	2,771	.....	7.822
*Rosebud	F 3	....	...	.....	....
Silverbow	C 3	Butte	1,017	23,744	47,635
Sweet Grass	E 3	Bigtimber	2.887	.....	3,086
Teton	C 1	Choteau	7,588	.....	5,080
Valley	F 1	Glasgow	13,368	.....	4.355
Yellowstone	E 3	Billings	3,710	2.065	6,212
Crow Indian Reservation	E 3	....	5,475	.....	2,660

* Established since the last census was taken.

CATTLE	1900	1890
Dairy cows	18,272	11,684
Other cattle	669,012	674,285
Horses	135,543	87,403
Mules and asses	1,641	1,242
Sheep	3,327,185	712,520
Swine	15,471	6,794

CROPS	1900	1890
Hay and forage	380,769	....
Oats	26,892	14,607
Wheat	19,416	4,584
Corn	1,976	1,977
Barley	1,225	486
Rye	1,006	141
Potatoes	2,809	....

Forests and Forest Products. Merchantable timber of yellow pine is found in the Big Horn and the Medicine Bow Mountains and in the mountains east and south of the Yellowstone Park. The total wooded area is estimated at 12,500 square miles, or 13 per cent. of the area of the State. However, 3500 square miles of this is in the Yellowstone National Park and 5207 square miles is in United States reserves. The value of the timber cut in 1900 was $831,558.

Manufacturing. The manufactures are almost entirely limited to products which are for local consumption. The rich iron and petroleum resources constitute a good basis for the development of industries, but the lack of transportation facilities tends to restrict them. In 1900 the capital invested in manufactures aggregated $2,411,435, and the value of products for the census year aggregated $4,301,240. There were in that year 2241 persons engaged as wage-earners in the industry.

Transportation. There are no navigable streams, and the artificial means of transportation are very inadequate to the needs of the State, and consequently greatly hamper its proper development. The great central and northwestern portions of the State are without railroads. The Union Pacific crosses the southern portion of the State, and the Burlington and Missouri line crosses the northeastern corner. In 1901 there was a total of 1279 miles of line in operation. Only one State, Nevada, has a lower mileage per square mile of area. There are, however, 132 miles to every 10,000 inhabitants. The antiquated system of stage-route transportation is still common in the State.

Banks. The following table, based on the report of the Comptroller of the Currency for 1902, gives the condition of national, State, and private banks in Wyoming for that year:

	National	State	Private
Number	15	11	10
Capital	$935,000	$224,000	$191,000
Surplus	167,000	42,000	15,000
Cash, etc	407,000	53,000	58,000
Loans	4,232,000	1,154,000	1,181,000
Deposits	5,242,000	1,021,000	1,413,000

Government. The Constitution adopted in 1890, when Wyoming became a State, differed from other instruments of its kind then in existence because it granted equal political rights to both sexes. Under it also the State assumed control of all waterways. The executive department is administered by a Governor, Secretary of State, Auditor, Treasurer, and Superintendent of Public Instruction, all elected for a four-year period. The State Treasurer is ineligible for reëlection. The Legislature is composed of a Senate of twenty-three members and a Lower House of fifty members. Each county is entitled to at least one Senator and one Representative. The sessions are held biennially, and are limited to forty days. The Supreme Court is composed of a Chief Justice and two associate justices. The capital is Cheyenne. Wyoming sends one member to the National House of Representatives.

Finance. A bonded debt of $320,000, chiefly to meet expenditures for the Capitol and other public buildings, was incurred when Wyoming entered the Union in 1890. This amount had been reduced on January 1, 1902, to $280,000. The balance in the treasury at the beginning of the fiscal year ending September 30, 1902, was $168,916.37. The receipts for that year were $478,758.12, and the disbursements $294,636.53, leaving a balance at the end of the year of $353,037.96. The chief sources of revenue are taxation, income from public lands, and fees.

Militia. The State had in 1900 a militia-age population of 32,988. The organized militia in 1901 numbered 323 men.

Population. The population by decades has been as follows: 1870, 9118; 1880, 20,789; 1890, 60,705; 1900, 92,531. Only one State in 1900 had a smaller population or smaller density per square mile. In 1900, 52 per cent. of the population was in the basin of the North Platte River. The industrial life results in an excess of males, who numbered 58,184, as against 34,347 females. The foreign born numbered 17,415. The Indians numbered 1686, negroes 940, Chinese 461, and Japanese 393. Cheyenne had a population, in 1900, of 14,087; Laramie, 8207; and Rock Springs, 4363.

Education. It is difficult to provide educational advantages for all in a country that is so sparsely settled, but the State has done much to overcome the difficulty by establishing schools wherever there are as many as five pupils. In 1900 the school term was 89 days, and 14,512 children were enrolled out of an estimated 19,744 who were between the ages of five and eighteen. There were in the same year seven high schools in the State. A university is located at Laramie. The Cody Military College has been established at Cody City.

Charitable and Penal Institutions. A State board of charities and reform has oversight of the charitable and correctional interests of the State. As yet there has been no occasion to provide indoor poor relief. The asylum erected at Cheyenne for the deaf, dumb, and blind, for lack of occupants has been converted into a State soldiers' and sailors' home. There is an insane asylum at Evanston, and a hospital at Rock Springs. The penitentiary, which was formerly located at Laramie, has been removed to Rawlins.

Religion. Only 19 per cent. of the population in 1890 were church members. The Catholics and Mormons are the largest denominations.

The Methodists are the strongest Protestant body.

HISTORY. The territory included within the present State was a part of the Louisiana Purchase of 1803 with the exception of the southwest corner, which was a part of the Mexican cession of 1848. The Territory of Wyoming was directly created by Congress, July 25, 1868, from Dakota, Utah, and Idaho. The stories of Spanish exploration have no foundation. The first white explorers were Sieur de la Verendrye and his sons, who passed through while looking out for situations for trading posts in 1743-44. White hunters visited the Yellowstone in 1804, and in 1807 fur-trading posts were established in Montana and the trappers began to range the country. The first permanent fort was built on the Laramie fork of the Platte in 1834. It was sold to the American Fur Company in 1835, rebuilt by that corporation in 1836, and sold to the United States in 1849. Frémont visited the country in 1842 and in the same year Fort Bridger was built on the Black Fork of the Green River, but was abandoned in 1853 on account of Mormon opposition. The streams of immigration both to California and Oregon passed through the Territory, but few or none of the immigrants settled permanently. A chain of forts was built by the Federal Government to protect the travelers, however, from the Sioux and other Indians, who declared war against the military and the trappers in 1854. In 1867 the discovery of gold led to the founding of South Pass City, and the same year Cheyenne was laid out by the Union Pacific Railroad Company. The surrounding country, which was without government of any sort, was formed into Laramie County, Dak., and a vigilance committee kept order. The Territorial Government was organized in 1869, and the same year woman's suffrage was adopted and has been maintained to the present time. The Indians viewed with suspicion the coming of the whites, and in 1866 refused to grant a right of way through their lands, and until after they had been punished for the massacre of General George A. Custer (q.v.) in Dakota in 1876, they were constantly making trouble. With the cessation of the Indian outbreaks growth in population was rapid, and the State was admitted to the Union July 10, 1890, as the Constitution adopted in November, 1889, had been approved by Congress. In national politics the State voted first in 1892 for the Republican candidates. The free-silver agitation in 1896 carried it into the Democratic column, but in 1900 the Republican electors were again chosen.

GOVERNORS OF WYOMING

TERRITORIAL

John A. Campbell	1869-75
John M. Thayer	1875-78
John W. Hoyt	1878-82
William Hale	1882-85
Francis E. Warren	1885-86
George W. Baxter	1886
Thomas Moonlight	1886-89
Francis E. Warren	1889-90

STATE

Francis E. Warren	Republican	1890
Amos W. Barber (acting)		1890-92
John W. Osborne	Dem. Populist	1892-95
William A. Richards	Republican	1895-99
De Forest Richards	"	1899-

BIBLIOGRAPHY. Wyoming Territory Department of State, *Resources of Wyoming* (Cheyenne, 1889); Bancroft, *History of Nevada, Colorado, and Wyoming* (San Francisco, 1890); Nelson, *The Red Desert of Wyoming and Its Forage Resources* (Washington, 1898); *United States Geological and Geographical Survey Reports* (Washington, 1877 et seq.).

WYOMING, UNIVERSITY OF. A coeducational State institution at Laramie, Wyo., founded in 1887 on the Federal land grants. Its departments include colleges of liberal arts, agriculture, and mechanical engineering, a school of commerce, a school of mines, and normal, graduate, and preparatory departments. It confers the bachelor's degree in arts, sciences, and pedagogy, and gives the master's degree for advanced work. The university receives $15,000 from the Federal Government for researches in agriculture, $25,000 for instruction in the schools of agriculture and mechanic arts, and a State tax of one-quarter mill, producing about $9000, besides occasional appropriations for buildings. In 1903 it had 19 instructors, 200 students, about evenly divided between the academic and preparatory departments, and a library of 16,000 volumes. In that year its income was $70,000; the college property was valued at $250,000 and the buildings and grounds at about $200,000.

WYOMING VALLEY. A beautiful and fertile valley in Luzerne County, Pa., along the north branch of the Susquehanna. It is about 21 miles long by 3 wide, and is supposed to have derived its name from the Indian word *Maugh-Wauwama*—'large plains.' Though early claimed by both Connecticut and Pennsylvania, in virtue of their charters of 1662 and 1681 respectively, it remained unsettled by the whites until 1763, when the Susquehanna Company of Connecticut, which had been formed in 1753, and had purchased the land from the Indians in 1754, sent out a number of settlers, who, however, were either massacred or driven away by the Indians in the same year (October 14, 1763). In 1768 Pennsylvania also bought the tract from the Indians, and dividing it into the 'Manor of Stoke' and the 'Manor of Sunbury,' established a settlement (1769) through two lessees, Ogden and Stewart. Almost simultaneously another party from Connecticut arrived and for two years there was an almost continual conflict, each party being several times ejected by the other, until in 1771, Connecticut's claim having been confirmed by the King, the Susquehanna Company was left in control. In 1773 the valley was erected by Connecticut into a chartered town under the name Westmoreland. In 1775 the militia of Northumberland County, Pa., made an abortive attack on a small settlement along the west branch of the Susquehanna, and in the same year, the Revolutionary War having broken out, the settlers expelled a few of their number, who were Tories, and voted in town meeting "that we will unanimously join our brethren of Connecticut in the common cause of defending our country." The expelled Tories, assisted by an additional white force and 700 Indians—the total force numbering about 1100—marched against the isolated settlements in the summer of 1778. The settlers, warned of their approach, took refuge in 'Forty Fort,' near the present Wilkes-Barre, but on July 3d 400 of them—nearly all the males—attacked the invaders and were completely defeated, two-thirds of their number being killed or captured and the rest taking refuge in the fort. Many of the prisoners were tortured and killed, partly by the Indian squaws, and on the following day the fort surrendered. No more lives were taken, but the settlements were thoroughly devastated, and the inhabitants, endeavoring to reach the nearest settlements, suffered terrible hardships, a hundred women perishing of fatigue and starvation in a swamp since known as the 'Shades of Death.' The settlers returned in small numbers, but after the war the old controversy between Connecticut and Pennsylvania was renewed. In 1782 Congress decided in favor of Pennsylvania, but conflicts continued among the settlers until 1788, when the Pennsylvania Legislature confirmed their various titles. The long conflict between Connecticut and Pennsylvania is sometimes called the Pennamite-Yankee War (or Wars). A granite obelisk opposite Wilkes-Barre marks the site of the battle of July 3, 1778. Consult: Miner, *History of Wyoming* (Philadelphia, 1845); Stone, *Poetry and History of Wyoming* (New York, 1844); and Hoyt, *Seventeen Townships in the County of Luzerne* (Harrisburg, 1879).

WYSS, vēs, JOHANN RUDOLF (1781-1830). A Swiss professor of philosophy and librarian at Bern, where he was born and died. Wyss is remembered chiefly if not solely as the author of *Der schweizerische Robinson* (*The Swiss Family Robinson*, 1813), a juvenile classic, still popular in many languages, the sole survivor of numerous imitations of Defoe's *Robinson Crusoe*. Wyss wrote also *Idyllen, Volkssagen, Legenden und Erzählungen aus der Schweiz* (1815-22); *Reise im Berner Oberland* (1808); and *Vorlesungen über das höchste Gut* (1811).

WYTHE, GEORGE (1726-1806). An American patriot and jurist; a signer of the Declaration of Independence. He was born near Hampton, Va., was educated at William and Mary College, and was admitted to the Virginia bar. He was chosen to represent William and Mary College in the Virginia House of Burgesses, and drew up its remonstrance to the British Parliament against the proposed Stamp Act (q.v.) in 1764. He continued a member of the House of Burgesses up to the outbreak of the Revolution, and in August, 1775, was chosen a delegate to the Continental Congress, in which he was one of the most fearless and outspoken advocates of independence. In the following year he was appointed on a committee with Thomas Jefferson, Edmund Pendleton, and others to revise the laws of Virginia. In 1777 he was Speaker of the Virginia House of Delegates, and shortly afterwards was appointed a judge of the High Court of Chancery. From 1786 until his death he was Chancellor. He was professor of law at William and Mary College from 1779 to 1789, and in 1787 was a member of the convention which framed the Federal Constitution. Subsequently, as a member of the Virginia convention, he aided in securing its ratification by his native State. Late in life he emancipated all his slaves. He published *Decisions in Virginia by the High Court of Chancery* (1795; 2d ed. with *Memoir*, 1852).

WYTHE'VILLE. The county-seat of Wythe County, Va., 131 miles southwest of Lynchburg, on the Norfolk and Western Railroad (Map: Virginia, C 5). It has the McDonald Institute, the Plumer Memorial Female College, and the Wytheville Female Seminary. A short distance from the town is a State fish hatchery. The surrounding country is engaged in farming and lumbering, and also has considerable mineral wealth, including iron, coal, lead, and zinc. Knit goods, woolen goods, flour, and iron and lumber products are the principal manufactures. The preparation of mineral waters for shipment is an important industry. The water-works are owned by the municipality. Population, in 1890, 2570; in 1900, 3003.

WYTTENBACH, vĭt'ten-bäk, DANIEL ALBERT (1746-1820). A Dutch philologist, born at Bern, Switzerland. After studying at Marburg, Göttingen, and Leyden, he became professor of Greek at Amsterdam in 1771, and in 1799 professor of rhetoric at Leyden. In addition to his chief work, a critical edition of Plutarch's *Moralia*, with copious notes, and an *Index Græcitatis in Plutarchi Opera* (1795-1830), he published: *Epistola Critica* (1769); *Præcepta Philosophiæ Logicæ* (1782; new ed. 1821); *Eclogæ seu Selecta Principum Historicorum Capita* (1793 and 1829); *Vita Ruhnkenii* (1800), a masterly biography of his former teacher, ed. by Frotscher, 1846; and an edition of Plato's *Phædo* (1810; new ed. 1825). Posthumously appeared *Opuscula Varii Argumenti* (1821). Consult Mahne, *Vita D. Wyttenbachii* (Ghent, 1823, ed. by Frotscher, Freiburg, 1846).—His wife, JOHANNA (d. 1830), born at Hanau, was a woman of scientific education and author of *Théagène* (1815); *Das Gastmahl der Leontis* (1821); and of the novel *Alexis* (1823).

WYVERN. A charge in heraldry (q.v.).

X

X The twenty-fourth letter and nineteenth consonant in the English alphabet. The form X is probably a Greek variant of *tau* (T). This form (X) had two different values in the alphabets of Eastern and Western Greece. It is from the Western Greek alphabet that the Latin form and value (*ks*) were derived. In native Latin words *x* never occurred initially, but it was employed internally as a representative of *cs, gs,* for example *pax, pacis, rexi, regere.*

Sound and Philological Value. As a phonetic character X is the breathed velar spirant. In forming it the glottis is suddenly opened or closed on the passing of a breath. As a composite sound *x* has usually the value of *ks*, for example in *fixture, Styx, excellent.* Between vowels, the second of which is accented, *x* becomes sonantized (= *gz*), as in *exalt, exhilarate, exotic.* In *anxious, luxurious x* is pronounced *ksh, gzh.* Initially, where it usually indicates a word of Greek origin, its sound is Z, as in *Xantippe, Xerxes, xylophone.* As a philological derivative, English *x* represents Indo-Germanic *ks* (Germanic *hs*) as in Sanskrit *ukṣan*, German *Ochse*, English *ox;* Greek ἕξ; Latin *sex*, German *sechs*, English *six.* X occurs in loan-words from: (1) Latin, *exact, mix, noxious;* (2) from Greek *onyx, calyx, lynx.*

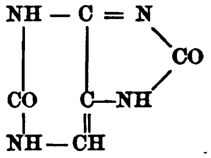
As a Symbol and Abbreviation. As a Roman numeral X = 10; ⋈ = 1000; X = 10,000. In algebra *x* represents an unknown variable quantity; in analytical geometry *x* indicates the abscissa of the rectilinear coördinates.

XALAPA, hȧ-lä′pȧ. Another spelling for Jalapa (q.v.), a city of Mexico.

XALISCO, hȧ-lēs′kō. Another spelling for Jalisco (q.v.), a State of Mexico.

XANTHI, zăn′tē. A town of European Turkey in the Vilayet of Adrianople, situated near an inlet of the Ægean Sea, 200 miles west of Constantinople. It is chiefly important for its trade in a celebrated brand of tobacco. Population, about 14,000.

XANTHIN (from Gk. *ξανθός, xanthos*, yellow), $C_5H_4N_4O_2$. An organic substance found in small quantities in urine and in the substance of the muscles, the liver, the spleen, the brain, etc. It is also found in urinary calculi and in certain vegetable tissues (for instance, in tea). Somewhat large quantities of it are found in meat-extract. It is usually prepared from guanin, a nitrogenous substance allied to xanthin and obtained from guano; guanin is converted into xanthin by the action of nitrous acid and the subsequent reduction with ferrous sulphate in ammoniacal solution. Pure xanthin is a colorless substance, soluble in alkalies, sparingly soluble in water, and acting as a feeble base. By the action of methyl iodide on its lead salt, theobromin—a substance closely allied to xanthin—is obtained. The chemical constitution of xanthin has been shown by Fischer to be represented by the following structural formula:



When oxidized, xanthin yields urea and alloxan, which are also among the oxidation products of uric acid (q.v.). Xanthin may be identified by a reaction similar to the murexid test for uric acid: a little nitric acid is added and a gentle heat applied till a dry residue is obtained; if a drop of caustic soda is added to the latter and heat applied, a permanent reddish-violet coloration is produced, while in the case of uric acid the coloration disappears on warming.

Xanthin is in most cases accompanied by hypoxanthin, a similar substance, from which it may be separated by means of silver nitrate and nitric acid, xanthin-silver-nitrate ($C_5H_4N_4O_2$. $AgNO_3$) being more readily soluble in hot nitric acid than the analogous compound of hypoxanthin.

XANTHIPPE, zăn-thĭp′pē (Lat., from Gk. Ξανθίππη). The wife of the Athenian philosopher Socrates. Her name has become proverbial for a typical termagant, and many stories have come down to us illustrative of her shrewish temper. Several of these, however, may be of later invention, and, in judging her character, some allowance should perhaps be made for the unpractical and unconventional ways of Socrates, which could hardly have been other than exasperating. Her grief and solicitude at the time of Socrates's imprisonment were, it is recorded, great.

XANTHIUM. See Cocklebur.

XANTHOPHYLL (from Gk. ξανθός, *xanthos*, yellow + φύλλον, *phyllon*, leaf). The term applied to the yellow pigment or pigments, associated with the green ones, both being sometimes included in the term chlorophyll (q.v.). The term carotin (q.v.) is replacing xanthophyll, which is now identified with the yellow coloring matter in carrot roots. In the great uncertainty as to its chemistry it has been considered by some as a decomposition product of chlorophyll.

XANTHORRHÆA. See Grass Tree.

XANTHOXYLUM. A genus of plants. See Zanthoxylum.

XANTHUS, zăn′thŭs (Lat., from Gk. Ξάνθος). The capital of ancient Lycia. It lay at the southwest corner of Asia Minor, its site being near the modern village of Gunik. When the Persians under Harpagus invaded Lycia, after the conquest of Crœsus and the Lydians, the inhabitants resisted with desperation, and finally burned their city and fell themselves in a last sally, only eighty families surviving the catastrophe. Though their country was reduced to a Persian satrapy, the Xanthians seem to have remained under their own princes, who waged petty wars against tribes resisting their authority. Xanthus was captured by Alexander and shared the fate of Lycia during the wars of his successors and under the Romans. In B.C. 43 the city resisted Brutus, and few survived. It suffered severely by an earthquake in the reign of Tiberius. The site is now occupied only by a few wretched huts. The ancient ruins were first fully described by Sir Charles Fellows (q.v.), and later English excavations resulted in the transfer of an interesting series of sculptures to the British Museum. One is the Harpy Tomb, so called from figures which were once interpreted as the Harpies with the daughters of Pandarus. It is now recognized that they represent the carrying away of souls to the other world. The other reliefs seem to represent offerings either to the heroized dead or to the powers of the lower world. The sculptures, evidently Greek in origin, are good examples of Ionian art of the sixth century B.C. The other striking monument belongs to a later date. It was a tomb in the form of a lofty pedestal, on which was a *cella*, surrounded by an Ionic colonnade, with four columns in front and six on the sides. Around the base ran two friezes, another decorated the cella, and a fourth was carved on the architrave of the peristyle. The pediments also contained sculptures, and in the intercolumniations stood the statues of so-called Nereids, which have given the monument its name. The friezes represent battles, the storming of a city, sports, and banquets. It has been supposed that the monument was the tomb of Pericles and that the sculptures refer to his wars and especially the capture of Telmessus. As to the probable date, there is much difference of opinion. It was formerly commonly held that the art belonged to the early part of the fourth century B.C., but recent opinion inclines to a date not many years after B.C. 425. The other sculptures in London as well as the remains *in situ* are chiefly connected with tombs; but there is a fairly well-preserved theatre, now much overgrown, remains of the Roman gate, and Acropolis walls of various dates. Of importance for the Lycian language is the inscription on the 'Harpagus stele,' sometimes called the *columna Xanthiaca*, which seems to relate to the exploits of a native ruler in the fifth century B.C. A Greek epigram seems to indicate that he regarded his victories as in some way revenging the Persian defeat at the Eurymedon. See Lycia.

XÁTIVA, hä′tê-vȧ. A city in Spain. See Játiva.

XAVIER, zăv′ĭ-ẽr, *Sp. pron.* hä′vê-âr′, Saint Francis. See Francis Xavier, Saint.

XEBEC (Span. *jabeque*, It. *sciabecco*, *zambecco*, xebec, from Turk. *sumbeki*, sort of small ship). An armed vessel of great speed, formerly used by the Algerine corsairs. It carried three masts, on which square or lateen sails could be set. The bow and stern were remarkable for the small angle they made with the water. The sides were low, and the upper deck of great convexity, that the water might readily flow off through the scuppers.

XENIA, zē′nĭ-*a*. The county-seat of Green County, Ohio, 55 miles southwest of Columbus, on the Cincinnati, Hamilton and Dayton, the Pennsylvania, and the Pittsburg, Cincinnati, Chicago and Saint Louis railroads (Map: Ohio, C 6). It is the seat of the Xenia Theological Seminary (United Presbyterian), opened in 1794, and of the Ohio Soldiers' and Sailors' Orphans' Home. Noteworthy also are the city hall and county court-house. The Public Library is about to occupy a handsome new building, the gift of Andrew Carnegie. At Wilberforce, three miles distant to the northeast, is Wilberforce University, an institution for colored students, opened in 1856. The county infirmary and children's home, also, are outside the city proper. Xenia is the centre of a productive farming section, and is of considerable industrial importance. It is especially known for the manufacture of twine and cordage, and has saw and planing mills, marble and granite works, and manufactories of paper, shoes, automobiles, and carriages. Xenia was settled in 1804 and was incorporated in 1808. Population, in 1890, 7301; in 1900, 8696.

XENIEN. The name given to a series of epigrams by Goethe and Schiller, directed against the self-complacent mediocrity and perverse manifestations in contemporaneous German literature. They were published in Schiller's *Musenalmanach* for 1797, exciting much animosity and calling forth a torrent of rejoinders, but exercising a wholesome purifying influence upon letters. So completely were these couplets the production of a mental alliance, that in many cases the authors themselves were unable to completely determine their own part in the composition. A new edition, with notes by Adolf Stern, entitled "Goethe-Schillers Xenien," was published in Reclam's *Universalbibliothek* (2d ed., 1895). Consult Boas, *Schiller und Goethe im Xenienkampf* (Stuttgart, 1851).

XENOCRATES, zê-nŏk′ra-tēz (Lat., from Gk. Ξενοκράτης) (B.C. 396-314). An ancient philosopher, born at Chalcedon. At an early age he attached himself to Plato, who took great care in developing his mental powers, which were naturally slow. On the death of Speusippus he succeeded to the presidency of the Academy (B.C. 339). He is said to have been the first to distinguish the three parts of philosophy—dialectic, physics, and ethics; he also recognized three classes of essences, the sensible, the intelligible, and the intermediate, which can be grasped by the intellect and perceived by the senses. The sensible he taught was within the heavens, while that which was intelligible lay beyond. The intermediate or heavenly essence was identical with the heavens themselves, for it was possible to perceive these and to contemplate them scientifically. The soul, he held, was self-moving number, and happiness consisted in the possession of that virtue which is proper to the individual. He introduced into the teachings of the Academy the mystic Pythagorean doctrine of numbers more fully than it had been employed before, and combined these numbers with the Platonic ideas. In person he was of irreproachable character, well balanced, and temperate in all things. His integrity was so unanimously known that an anecdote says that he was absolved from the necessity of taking oath when obliged to give evidence, and that Philip of Macedon said that Xenocrates was the only ambassador who had ever come to him whose friendship he was not able to purchase. Famous also were his resistance to the charms of Lais, the celebrated Athenian hetæra, and his success in converting the young roué Polemo into an earnest and virtuous man. Consult: Ritter and Preller, *Historia Philosophiæ Græcæ* (8th ed., Gotha, 1898); Zeller, *Philosophie der Griechen* (4th ed., vol. i., Leipzig, 1901); Ueberweg, *History of Philosophy*, vol. i. (Eng. trans., New York, 1872).

XENOGAMY (from Gk. *ξένος*, *xenos*, stranger, guest + *γάμος*, *gamos*, marriage). Cross-pollination between different individuals. Opposed to geitonogamy. See POLLINATION.

XENON (Gk. *ξένον*, neu. sg. of *ξένος*, *xenos*, foreign, strange, host). A gaseous element found in the atmosphere, in quantities of one part in 20,000,000 parts of air. It was discovered in 1898 by Sir William Ramsay, who obtained it as a residuum in the distillation of liquid argon. Its density is about 64 and its atomic weight 128. According to Ramsay its boiling-point is —109.1° C., and its melting-point —140° C. The spectrum of xenon resembles that of argon. It is also analogous to argon in that its spectrum undergoes a remarkable change when a Leyden jar is put into the circuit, many new blue and green lines appearing, while other lines, mostly red, either disappear or lose much of their intensity.

XENOPHANES, zē-nŏf′a-nēz (Lat., from Gk. **Ξενοφάνης**), (second half of the sixth century B.C.). The founder of the Eleatic school of philosophy. He was born at Colophon, in Asia Minor, about 570, but early removed to Elea, in Lower Italy. He brought over from his home, which had been for many generations the city of the Homeric school of poetry, the practice of rhapsodic recitation; and after the manner of the genealogists he himself had composed a poem on the founding of Colophon (**Κολοφῶνος κτίσις**), and a second on his removal to Elea (**Ἀποικισμὸς εἰς Ἐλέαν τῆς Ἰταλίας**). He also employed poetry to set forth his philosophic views in a work entitled *On Nature* (**Περὶ Φύσεως**). In this he zealously upheld the monotheistic view and charged Homer and Hesiod with ascribing to the gods actions which would be disgraceful for mortals. He seems to have held that whatever is existent must have always existed from eternity without being derived from any prior elements; and that all nature is one, unlimited, and that all the parts of this unity must be similar, otherwise we should have multiplicity; that therefore this unity, which is infinite and eternal and homogeneous, cannot change; and further that God is of the same nature, all-pervasive and comprehending all things within Himself. In another work, the *Satires* (**Σίλλοι**), he attacks the doctrines of other philosophers and poets. The fragments of his work are published by Bergk, *Poetæ Lyrici Græci* (4th ed., Leipzig, 1882); consult also: Ritter and Preller, *Historia Philosophiæ Græcæ* (8th ed., Gotha, 1898); Zeller, *Philosophie der Griechen* (4th ed., Leipzig, 1900); id., *Pre-Socratic Philosophy* (Eng. trans., London, 1881); Ueberweg, *History of Philosophy* (Eng. trans., New York, 1872).

XENOPHON, zĕn′ō-fon (Lat., from Gk. **Ξενοφῶν**) (c.434-c.355 B.C.). An Athenian historian, soldier and philosophical writer, the son of Gryllus, born near Athens. His own writings and the account in Diogenes Laertius are the chief sources for his biography. The legend that Socrates saved his life at Delium in B.C. 424 is incompatible with his representation of himself as quite a young man in 401. Our first authentic glimpse of him is as a disciple or companion of Socrates, at the end of the Peloponnesian War. An opportunity presented itself through his friend Proxenos, a captain of Greek mercenaries, to join or rather accompany the military expedition which Cyrus the Younger was organizing against his brother, Artaxerxes, King of Persia, and Xenophon accepted the invitation. The historic significance of the expedition lies in the exploits of the ten thousand Greek mercenaries of Cyrus's army, who, encompassed by foes and betrayed by friends, after the assassination by Persian treachery of all their chief officers, made their way from the heart of a hostile empire to the shores of the Black Sea and so back to the Bosporus, thus demonstrating the weakness of the Persian colossus and preparing Greek public opinion for the conquests of Alexander. The history of the expedition is given in detail by Xenophon in his *Anabasis* (q.v.) or march up of Cyrus, which in its last six books is rather a Catabasis or march down of the ten thousand. Xenophon takes virtual command and throughout plays the leading rôle, but the work was published some thirty years after the events, and we have no means of verifying his statements. On reaching the Hellespont (399) Xenophon and the Cyrenians, after some more or less creditable adventures, entered the service of the Spartan Thibron and his successor Dercyllidas against the Persian satraps of Asia Minor. Because of this or his participation in the expedition of Cyrus the Athenians passed a decree of banishment against him. We next find Xenophon in the camp of the Spartan King Agesilaus, who in 396 went out to infuse new vigor into the war against the satraps. When the Corinthian War summoned Agesilaus back to Greece Xenophon accompanied him and was present as an eyewitness, if not as a participant, at the battle of Coronea, in which the Spartan King defeated the allied Theban and Athenian forces (394). After a few years' residence at Sparta the Spartans bestowed upon him an estate on the road to Olympia in territory taken from Elis. Here he spent the next sixteen years in the pursuits of literature and the chase. Here his two sons grew to manhood, and here his chief works were written.

The defeat of the Spartans by the Thebans at Leuctra in 371 emboldened the Eleians to repel the Spartan protégé; but though the Athenians, now friendly to Sparta, repealed the decree of banishment, and though he sent his son Gryllus with the Athenian cavalry at Mantinea, Xenophon did not himself return to Athens, but made his home at Corinth, where he died about the year 355.

Besides the *Anabasis*, Xenophon's chief works are: (1) The so-called *Memorabilia*, or recollections of Socrates and Socratic conversations. This was probably called forth by the declamation against Socrates of the Sophist Polycrates (about 394). After ten years of campaigning and adventure Xenophon could not possibly have remembered the details which he professes to give, and a comparison with his other writings shows that much of the material of the book is Xenophontic rather than Socratic. Especially famous are the chapters on the evidences of design in nature, and the apologue of the choice of Herakles, borrowed, so Xenophon tells us, from the Sophist Prodicus. Complementary to the *Memorabilia* are the representation of Socrates's table talk in the *Symposium* or *Banquet*, the relation of which to Plato's *Symposium* is much debated, and the *Œconomicus* or dialogue on the management of a house and family, often quoted for its pleasing picture of the young Greek wife and her education by her husband. (2) The *Hellenica* begins abruptly in 411, as a continuation of Thucydides's unfinished history of the Peloponnesian War. The first two books bring the story down to the overthrow of the 'thirty' in 403. The last five books, composed later, are a general sketch of the history of Greece to the battle of Mantinea in 362. An allusion to the death of Alexander of Pheræ dates the publication after 357. The work suffers by contrast with the philosophic history of Thucydides and has been severely censured for lack of just proportion, particularly to Sparta, and failure to appreciate the greatness of the Theban Epaminondas. (3) The *Cyropædia*, or education of Cyrus, is a philosophical romance embodying in the person of Cyrus the Elder, the founder of the Persian Empire, Xenophon's favorite notions of the sound training of mind and body and the art of commanding men and winning willing obedience. It is quite unreadable as a whole, but the love story of the wedded pair Abradates and Panthea and the dying speech of Cyrus on the immortality of the soul are often quoted.

Minor works are the *Lacedæmonian Polity*, the laudatory biography of Agesilaus, the tract on the *Revenues of Athens*, the *Hiero*, or dialogue on Tyranny, the (probably spurious) *Apology of Socrates*, and the special treatises on *Horsemanship*, *The Chase*, and the *Duties of a Cavalry Officer*.

Xenophon is the perfect amateur. As soldier, orator, philosopher, essayist, historian, he gives us the measure of the ability and versatility of an Athenian gentleman of extraordinary talent, but not of genius. He writes a simple unaffected style, but is not nicely scrupulous for the purity of Attic idiom or vocabulary.

Xenophon may be read in Teubner texts, or in the edition of Sauppe (Leipzig, 1867-70). School editions abound, especially of the *Anabasis* and the *Memorabilia*. There is a good translation by Dakyns (London, 1890 et seq.).

XENY, or **XENIA** (Neo-Lat. nom. pl., from Gk. ξένος, *xenos*, host; so called because the fruit is modified by its host, the hybrid ovule). This term was proposed by Focke for certain alleged hereditary phenomena in plants which are analogous to telegony (q.v.) in animals. Darwin held that the action of foreign pollen on the mother-plant is of the highest theoretical importance, and is in itself a remarkable and apparently anomalous circumstance, for the male element not only affects, in accordance with its proper function, the germ, but at the same time various parts of the mother-plant, in the same manner as it affects the same parts in the seminal offspring from the same two parents. Eminent botanists, such as Focke and De Vries, have expressed doubt as to the interpretation given to xeny, though Romanes accepts Darwin's facts and interpretation. In maize (Zea) this phenomenon is said to occur regularly. The variety with white kernels, fertilized by a kind with yellow, brown, or blue kernels, bears kernels of these colors, the reverse never taking place. Gärtner found that white peas fertilized by colored peas bore colored seeds, and white and colored seeds have often occurred in the same pod. At present xeny is in the same unsettled state as telegony. Consult: Darwin, *The Variation of Animals and Plants Under Domestication* (London, 1888); Focke, *Die Pflanzen-Mischlinge. Ein Beitrag zur Biologie der Gewächse* (Berlin, 1881); Romanes, *An Examination of Weismannism* (Chicago, 1893); Delage, *La structure du protoplasm, et les théories sur l'hérédité* (Paris, 1895).

XEREZ, hā'rāth. A city in Spain. See Jerez de la Frontera.

XEREZ, Francisco de (c.1500-?). A Spanish historian, born at Seville. He became the secretary of Pizarro, and as such wrote an account of the conquest of Peru, *Verdadera relación de la conquista del Perú y de la provincia del Cuzco llamada la Nueva Castilla* (1547). This narrative, translated into French by Ternaux-Compans, and into Italian by Ramusio, is occasionally found appended to Oviedo's history of the Indies.

XEROPHYTES, zĕr'ō-fīts (from Gk. ξηρός, *xēros*, dry + φυτόν, *phyton*, plant). Plants whose structure specially fits them to withstand excessive transpiration, especially plants of deserts and sandy or rocky habitats, to which forms the term was previously restricted. Many recent authors, however, have extended the term to all plants, e.g. those of marshes, peat bogs, etc., which show structures typical of desert plants. Schimper defines xerophytes as plants which inhabit physiologically dry areas, by which phrase the plants' inability to get water from the soil is emphasized rather than the actual quantity of water present. For example, a frozen soil is physiologically dry, as may also be a peat bog and a salt marsh; the first self-evidently, the last two because osmotically acting substances may partially inhibit the natural processes of absorption and conduction of water by plants.

The more prominent xerophytic structures may be defined as follows: First, reduction in surface as compared with plants of other areas. This reduction may be permanent, as in the case of cacti and desert shrubs, or where leaves are entirely absent, reduced to very small dimensions; or temporary, as illustrated by plants which shed their leaves at the beginning of a season, dry because of heat, as in deserts, or cold, as in high latitudes and altitudes. Second, vertical placement of the foliage organs, illustrated not only by the cacti, in which the chlorophyll work is done in the stems, but also by the so-called compass plants, where the leaves assume a profile or vertical position instead of the horizontal. Third, the annual habit is typified by a short life cycle restricted to the rainy season. Fourth, bulb and tuber plants, in which the vegetative development is conspicuous during the rainy season, but ceases during the dry period. Fifth, ligneous tissue. In many xerophytic areas a very high proportion of the plants are trees or shrubs. Sixth, storage organs, as in succulent plants (q.v.) such as cacti, various sedums, and aloes. Seventh, modifications of tissue; for example, hairs as in some alpine plants, such as edelweiss; thick-walled epidermis due to cutinization; waxy deposits, varnish or mineral crusts on the epidermis; cork in woody plants; abundant palisade cells; reduction of air spaces, occurrence of stomata mainly or wholly on the lower surface, away from the light; below the surface, as in the carnation; and protection of stomata by hairs, as in the oleander.

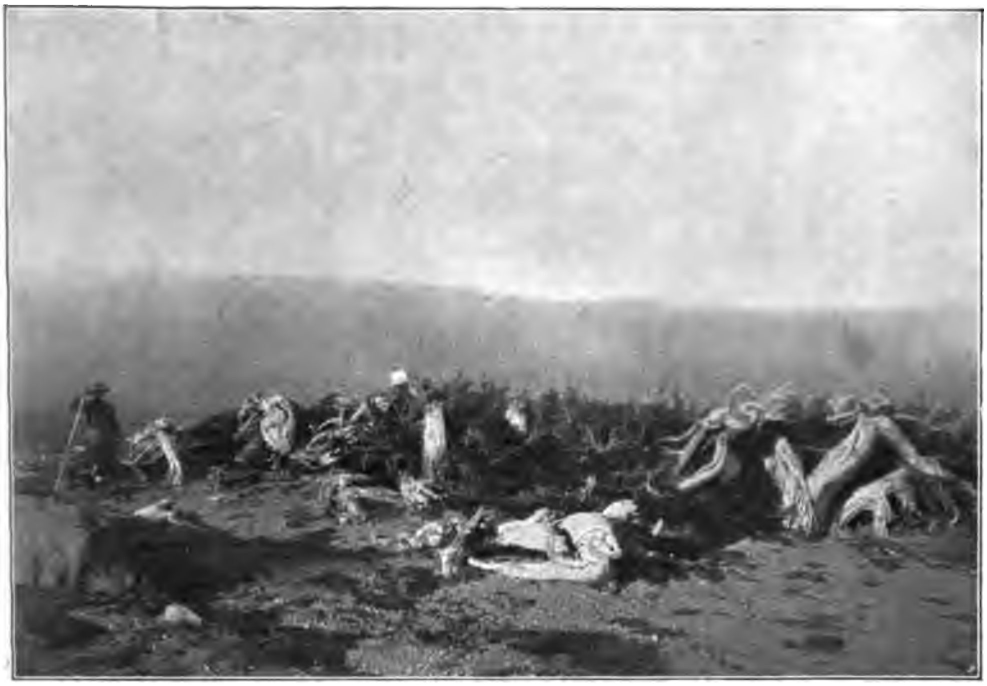
It will be seen that most structures can be regarded as advantageous, since they protect plants against excessive transpiration. For example, if the cork and cutin layers, which are relatively impermeable to water, be removed, the loss of water is tremendously accelerated. Some of these structures can be shown by experiment to be the direct result of xerophytic conditions, although in most cases the exact stimulating cause is not clear. Doubtless the most potent factor is a dry atmosphere. Experiments show that dry air as compared with moist air accelerates the development of cutin, cork, collenchyma, bast, waxy tissue, incrustations, and lignin. These structures may be produced experimentally in mesophytes grown under xerophytic conditions. It seems, therefore, that many plants have a high degree of plasticity, enabling them to adapt themselves in case of need to xerophytic conditions. It must be remembered, however, that such adaptation must be in harmony with physical and chemical laws, and that the plants can in no way overstep the bounds prescribed for them. It is quite likely that the structures whose development has been found to be accelerated in xerophytic conditions are in reality caused mechanically by excessive transpiration, and a consequent deposition of substances such as cutin, suberin, lignin, etc., which might otherwise have been held in solution. This deposition, which is thus due to a mechanical cause, is, however, of direct advantage to the plant. Mesophytes which are transferred to xerophytic conditions approach normal xerophytes in the reduction of leaf and stem surfaces. This reduction, while of advantage to the plant, may also doubtless be referred to mechanical or climatic causes. For example, the available food materials may be less abundant in the xerophytic soil, the absorption may be less, and transpiration may be great. All of these conditions would probably tend to cause reduction. See LEAF.

The xerophytic formations of the world may be subdivided into two great classes: climatic, occurring over wide areas, and edaphic, occurring over limited areas. For examples of the former, see ALPINE PLANT; ARCTIC REGION; DESERT VEGETATION; TUNDRA; FOREST; GRASSLAND; PRAIRIE. For examples of the latter, see BEACH PLANTS; DUNE VEGETATION; HEATH; ROCK PLANTS; SWAMP.

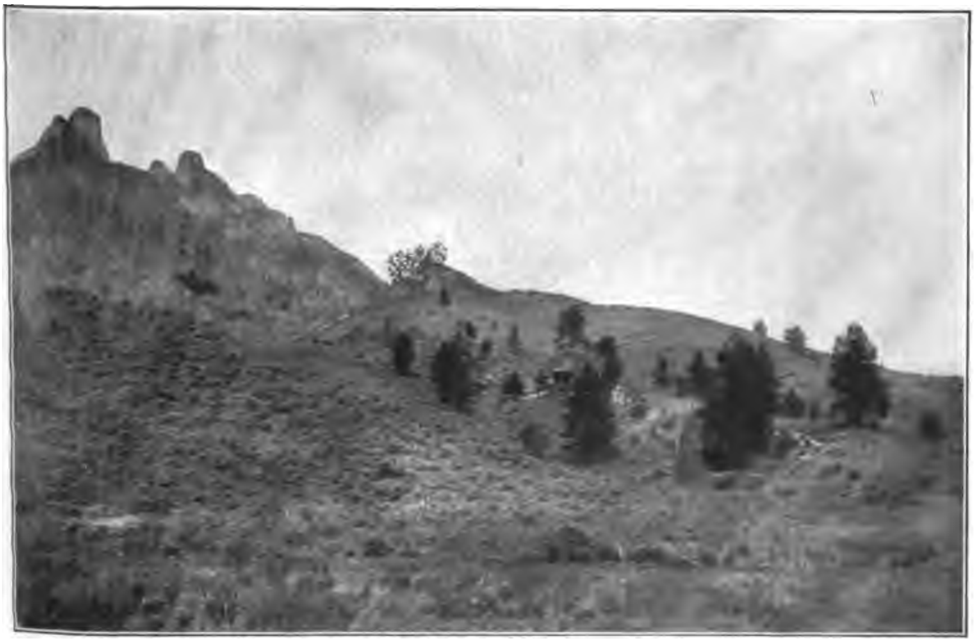
XERXES, zĕrk′sēz (Lat., from Gk. Ξέρξης, from OPer. *Xšayāršā*, mighty hero). Three kings of Persia, the first two of whom belonged to the celebrated Achæmenian dynasty.—XERXES I. (c.519-c.465 B.C.), commonly identified with the Ahasuerus of the Bible, was the son of Darius I. Hystaspis and of Atossa, daughter of Cyrus. Born after the accession of his father, in B.C. 521, Xerxes seized that pretext to supersede three older brothers, and ascended the throne upon the death of Darius in 485. His first act was to subdue the revolt of Egypt. He then spent three years in preparing to punish the Greeks for the humiliations they had put upon his father. Collecting at Critalla, in Cappadocia, an army which has been estimated to number a million, he marched to Sardis (Lydia) and thence set out for the Hellespont in the spring of 480. A fleet of 1200 sail had in the meantime assembled at Doriscus, in Thrace. The fate of this unwieldy expedition, successful first at Thermopylæ, but crushed at Salamis (480) and at Platæa (479), is one of the most familiar stories in history. (See GREECE.) Xerxes, who had fled from Greece after the disaster to his fleet at Salamis, advanced against Babylon, where Samaserba the Chaldean had usurped the royal power. After razing the temples of the city he returned to Persepolis and Susa. He was murdered with his eldest son, Darius, by Artabanus, captain of the guard.—XERXES II. (c.450-c.425 B.C.) was the son of Artaxerxes I. and Damaspia, and the grandson of Xerxes I. He ascended the throne upon the murder of his parents (c.425). After a reign of forty-five days he was himself assassinated and was succeeded by his half brother Sogdianus or Secydianus.—XERXES III. was the name given to Oarses, who reigned in B.C. 337-336. He was controlled by the eunuch Bagoas, by whom he was proclaimed.

XICAQUE, Hē-kä′kȧ. An important Central American tribe, constituting a distinct linguistic stock, occupying the region of the upper Ulua or Sulaco River, in Yoro and Santa Barbara districts, Northern Honduras. They are said to have a compact tribal organization under a head chief, who is elected for life. They number about 6000.

XIMANA, Hē-mä′nȧ. A wild tribe in the forests between the Putumayo and Yapura rivers, northern affluents of the Amazon, in Western Brazil. Although said to be industrious, they are entirely savage in their mode of life. They kill their first-born children, and burn the bones of their dead, mingling the ashes with their drink.



1. ALPINE PLANTS. STUNTED HEMLOCKS ON MOUNT HOOD, OREGON



2. DESERT PLANTS. SEMI-DESERT, SHOWING SAGE BRUSH AND STUNTED PINES

XIMENA, *Span. pron.* hê-mä′nâ. The wife of the Cid in Spanish legend. In Corneille's tragedy she is known as Ximène.

XIMENA, or THE HEROICK DAUGHTER. A tragedy by Colley Cibber, first acted at Drury Lane December 28, 1712, revived November 1, 1718, and printed in the latter year. It is largely drawn from Corneille's *Le Cid* and represents the dilemma of the heroine in choosing between love and family honor.

XIMENES, *Sp. pron.* hê-mä′nâs, FRANCISCO (1436-1517). A Spanish prelate and statesman, born at Torrelaguna in Castile. He was educated at Alcalá, Salamanca, and Rome, where he practiced as an advocate in the Papal courts. He obtained from the Pope a benefice near his native place, but the Archbishop of Toledo refused to recognize the Papal jurisdiction, and imprisoned Ximenes for a number of years. In 1480 he was named vicar-general of Cardinal Mendoza at Sigüenza, but gave up his preferment, and entered the Franciscan Order in 1482. His reputation for piety and learning led Queen Isabella to choose him, in 1492, for her confessor, and three years afterwards to name him Archbishop of Toledo—a dignity which he refused to accept until he received an express command from the Pope. He continued as archbishop the life of mortification and austerity which he had practiced in his monastery, and he applied to purposes of religion, charity, and public utility the whole of the princely revenues of his see. As confessor and confidential adviser of the Queen, Ximenes, during the lifetime of Isabella, was the guiding spirit of Spanish affairs, and on her death in 1504 he held the balance in the Kingdom of Castile between the parties of Ferdinand and Philip of Burgundy, husband of Joanna, the heiress of the crown. On the death of Philip in 1506, Ximenes was appointed Regent of Castile, in consequence of the incapacity of Joanna and the absence of Ferdinand in Italy, and conducted the affairs of the kingdom through a most critical time with consummate skill and success. In 1507 he was created cardinal and Grand Inquisitor. He organized, at his own expense, and himself accompanied as commander, an expedition consisting of 10,000 foot and 4000 horse, for the conquest of Oran, on the African coast (1509). Ferdinand died in January, 1516, and on his deathbed named Ximenes Regent of Spain till the arrival of his grandson Charles. Charles arrived in 1517, but Ximenes was treated coldly by the new monarch. He died at Roa on November 8, 1517. Ximenes was an able statesman and administrator. The social and political revolution which he effected in breaking down the feudal power of the nobles has often been compared with the analogous change wrought in France by Richelieu. He was a munificent patron of religion, of letters, and of art. The celebrated Complutensian Polyglot Bible (q.v.) was printed under his own supervision at Alcalá. The University of Alcalá was his especial care and he was practically its founder. Consult: Fléchier, *Histoire du cardinal Ximenes* (Amsterdam, 1693); Hefele, *Der Kardinal Ximenes und die kirchlichen Zustände Spaniens am Ende des 15, und Anfang des 16, Jahrhunderts* (2d ed., Tübingen, 1851); Prescott, *Ferdinand and Isabella;* Barrett, *Life of Cardinal Ximenes* (London, 1813).

XIMENES DE QUESADA, dâ kâ-sä′dâ, GONZALO (c.1500-c.1579). A Spanish adventurer, born in Granada. He came to South America in 1535 as judge of the Province of Santa Marta. Two years afterwards he led an expedition against the Chibcha Indians, and at the head of 800 men, after great hardships, captured the cities of Iraca and Tunja in New Granada, found a large amount of treasure, and broke the power of the Chibchas. He founded the city of Bogota in 1538, visited Spain the next year, and received the title of marshal, but was refused the Government of New Granada, and returned to South America. Later he went in search of El Dorado. In 1572 he founded Santa Agueda, where he died, probably in 1579.

XINCA, hên′kâ. A Central American tribe of distinct linguistic stock occupying the coast region and valley of Rio de los Esclavos, in southeastern Guatemala. They are of a low grade of culture and appear to have occupied central Guatemala before the coming of the Quiche (q.v.) and Cakchiquel (q.v.), by whom they were pressed southward. They were conquered in 1524 by Alvarado, who found them living in populous villages with houses built of wood.

XINGÚ, shên-gōō′. A large tributary of the Amazon. It is formed by a number of headstreams on the plateau ridge which forms the watershed between the Amazon and the Paraguay, in the State of Matto Grosso, Brazil (Map: Brazil, G 4). Thence it flows in a winding northward course of about 1100 miles till it joins the Amazon at the head of the estuary. The river is interrupted by a number of impassable falls and rapids, the last occurring about 110 miles above its mouth. Near its mouth the Xingú expands into a lake-like sheet of water, whence it communicates with the Amazon and its estuary, as well as with the estuary of the Tocantins, through a vast network of channels and backwaters. The Xingú flows through a practically unexplored and unsettled forest region inhabited only by savages, and the river itself was almost unknown until it was descended by Von den Steinen in 1884.

XIPHOSURA (Neo-Lat. nom. pl., from Gk. ξίφος, *xiphos*, sword + οὐρά, *oura*, tail). That division of the Merostomata which contains the modern representatives of this almost wholly Paleozoic group, namely the genus Limulus. See MEROSTOMATA, and KING-CRAB, and consult the authorities there cited.

XISUTHRUS, zê-zōō′thrŭs (Lat., from Gk. Ξίσουθρος, *Xisouthros*). The hero of the deluge according to the fragments of the Babylonian history of Berosus (q.v.). He is said to have been the tenth and last king of the first Babylonian dynasty, which reigned for a period of 432,000 years; the names of the ten rulers bear some resemblance to those of the ten antediluvian patriarchs, ending with Noah, in Genesis v. See DELUGE; NOAH.

X-RAYS. A radiation proceeding out from the interior of a highly exhausted glass bulb through which a discharge of electricity is taking place. This radiation was discovered in 1895 by

Professor Röntgen (q.v.) of the University of Würzburg, who was performing some experiments involving the discharge of electricity through glass bulbs exhausted until they contained only traces of air. This radiation was discovered, and, as far as could be told, differed in all respects from light and other known radiations. To it Professor Röntgen gave the name of X-rays, signifying that its cause was unknown.

Professor Röntgen discovered that the essential feature in its production was an exhausted bulb or Crookes tube (q.v.) into which entered two metal conductors serving to introduce and to withdraw the electric current. The conductor which introduces the current may be an ordinary wire or it may have at its end inside the bulb a small metal plate; it is called the 'anode.' The conductor by which the current leaves the exhausted bulb consists of a wire carrying at its end inside the bulb a concave metal surface; it is called the 'cathode.' Professor Röntgen found that the centre from which the X-rays proceeded was the points of the solid walls of the bulb which were struck by the cathode rays proceeding out from the cathode, and he therefore devised the plan of introducing in the bulb a square plate of platinum directly facing the cathode so that it received practically all the cathode rays, and served, therefore, as the source of X-rays for all outside points. It was found later that the intensity of the radiation could be increased by joining the anode to this small piece of platinum, which is called the 'anti-cathode.' Röntgen observed that as the electrical discharge was continued through such a tube the intensity and character of the radiation of X-rays varied. This is owing in the main to a change in the vacuum, i.e. in the pressure of the traces of gas left in the bulb, occasioned by the electric current. In order, therefore, to maintain constant conditions in the tube it is necessary to keep the gas at a constant pressure, and the principle involved in the construction of all modern forms of X-ray tubes is to have such side attachments to the main bulb as will permit the evolution of minute amounts of gas whenever the vacuum in the bulb becomes too perfect. Bulbs satisfying all these requirements are furnished by instrument-makers under the name of 'X-ray self-acting tubes.'

The main properties of X-rays were discovered by Professor Röntgen himself immediately after his first observation. These may be described briefly under the following heads:

(1) OPTICAL. X-rays do not experience regular reflection, refaction, diffraction, interference, or polarization; they pass in straight lines through any medium which does not absorb them. It is thus proved that they are not due to trains of waves, otherwise they could be made to interfere and to experience diffraction.

(2) ABSORPTION. The most striking feature of X-rays at first sight is the fact that they penetrate with great ease certain substances which are opaque to light, and, on the other hand, are absorbed by certain substances which are very transparent to light. Thus the X-rays are absorbed largely by glass, but are transmitted most freely by aluminum, by wood, by human flesh, etc. It is owing to these facts, combined with those stated in the preceding paragraph, that photographs may be obtained of many objects hidden from view, by allowing X-rays to cast a shadow picture of them on a photographic plate. In this manner photographs of the bones of the body, of metal objects contained in wooden boxes, etc., may easily be obtained.

When a careful study is made of the absorption produced in X-rays by various substances, it is found that there is a close connection between the intensity of absorption and the density of the absorbing body; and it is a general law that the greater the density of the body, the greater is its absorptive power. This fact is of the utmost importance in the interpretation of photographs of portions of the human body and of other objects taken by the X-rays; the intensity on the photographic plate is in reality a measure of the density of the absorbing substance whose photograph is taken.

(3) PHOTOGRAPHIC AND FLUORESCENT ACTION. X-rays are observed to affect a photographic plate in the same manner as ordinary light, and this fact is made use of in nearly all applications of these rays. It was found also—in fact, it was the fundamental observation of Röntgen—that X-rays excite the fluorescent action of certain substances, so that when excited by the rays they emit light. A careful study has been made of various substances which are affected in this way, and certain of them are used in making so-called fluorescent screens, which may be used to receive the shadows cast by an X-ray tube instead of receiving them on a photographic plate.

(4) PHYSIOLOGICAL ACTION. Röntgen himself observed that if the X-rays were allowed to enter the eye of an observer who is situated in a room entirely dark, the retina of the eye received a stimulus and light was perceived. It is extremely probable that this is due to the fluorescent action of the X-rays on certain portions of the eye. It was observed, a few months after the discovery of the X-rays, that if the radiation is too intense its action on the skin of an observer might produce most serious changes and cause what are known as 'X-ray burns.' Some years later it was found, as a result of careful experiments, that in the case of certain kinds of cancer and of a limited number of skin diseases the action of X-rays was extremely beneficial. See X-RAYS IN MEDICINE AND SURGERY below.

(5) IONIZATION. Röntgen made the important observation that if an electrified body were placed near an X-ray tube, so that the radiations fell upon it, the electrical charge disappeared. This was found to be true of both positively and negatively electrified bodies. It was later shown, however, by Professor J. J. Thomson of the University of Cambridge, England, that the real explanation of this phenomenon was not any direct action of the X-rays on the electrified body itself, but was that in their passage through the air around the electrified body the X-rays 'ionized' the gas, i.e. made it a conductor for electricity. (See IONIZATION and RADIOACTIVITY.) This discovery of Professor Thomson's was, from a scientific point of view, the most important one in regard to the properties of X-rays, for it led at once to a study of the conditions under which ionization can be produced and to the discovery of other methods of causing it. (When a gas is ionized, experiments show that its minute parts are broken up into smaller ones, some charged positively and some negatively, and that it is owing to this fact that the gas becomes a conductor.)

(6) **Diffusion.** It has been stated above that X-rays do not experience ordinary reflection, but many experiments have shown that they are able to penetrate into regions behind obstacles which are opaque to them and where they could not come by any direct path. This led many observers to believe that the rays were reflected diffusely in the same manner that ordinary sunlight is reflected from a white wall. The true explanation, however, seems to be that under the action of X-rays those bodies which absorb them have the power of emitting others, so that they become, as it were, new sources of X-rays. This is called 'secondary radiation,' and plays an important part in practical applications of X-rays to surgery.

When Röntgen made his first observations on X-rays there seemed no obvious explanation of these varied phenomena. They could not be *transverse* waves, because they did not exhibit polarization. The possibility of there being waves at all was not disproved at first owing to the lack of knowledge in the first few months in regard to interference and diffraction; and for some time the prevalent idea was that they were due to longitudinal waves in the ether. Another explanation, however, which was much more satisfactory, and which explains all the phenomena, was advanced almost simultaneously by Professors Stokes and Thomson of the University of Cambridge, England, and by Professor Lehmann of Karlsruhe, Germany. According to this, X-rays are disturbances in the luminiferous ether of the nature of wave-motion, but not consisting of *trains of waves.* It is exactly as in the similar phenomena of sound. A musical note is due to a long continued train of waves produced by the regular vibrations of some musical instrument, while a noise is produced by a series of short disconnected *pulses* in the air. It was shown mathematically by Stokes that pulses, or extremely short disturbances, in the ether would travel in straight lines and would not exhibit refraction, diffraction, polarization, or interference. The explanation of the origin of these pulses is extremely simple. The cathode rays are known to consist of streams of minute material particles which are electrically charged and which are moving at a rate as great in many cases as 40,000 miles a second. If these rapidly moving electrified bodies are suddenly brought to rest by impact on a solid wall, there will be necessarily a great change in the electrical and magnetic properties of the ether at the point where one of the particles of the cathode rays strikes the wall, and this point will therefore serve as a centre of disturbance from which a pulse will be sent out into the ether. It follows also that, since there is no regularity in the cathode rays, there can be no regularity in the emission of these pulses. It is thus seen that all the main properties of the X-rays, at least from a physical point of view, are explained.

Bibliography. All of Röntgen's original papers, together with extracts from the papers of Stokes and J. J. Thomson, will be found in Barker, *Röntgen Rays,* in "Scientific Memoir Series," vol. iii. (New York, 1899). The various scientific journals and *Proceedings* of learned societies also contain a record of many researches in this field. See **Radioactivity.**

X-Rays in Medicine and Surgery. The usefulness of this radioactivity to the physician depends on the power of the X-rays to penetrate various substances of different density and opacity, and the absorptive power of the different tissues of the body. X-ray pictures of parts of the body as seen on the screen, or when photographed, are due to the fact that substances of different chemical composition, molecular grouping, and thickness absorb different amounts of the rays. In experiments or observations with the X-rays the physician needs the following outfit: a static machine (or an induction coil), a vacuum tube and holder, and a fluorescent screen or a fluoroscope. In order to preserve records of his work, he will need, further, a photographic outfit. During an X-ray examination the patient must be properly supported. He must either lie flat on a canvas stretcher or be seated on a high stool with his back against a vertical canvas support. The sitting or the recumbent position is chosen in accordance with the part of the body to be examined. In certain cases he may be examined standing. Examinations with a fluoroscope or screen must be made in a dark room, and the physician must prepare his eyes for the work by previously spending about ten minutes in the dark, or by wearing dark glasses for about twenty minutes before entering the room. At first the operator sees only the green light in the tube; but shortly his retinæ begin to recognize objects in the room. An open fluorescent screen may be used, with a dark cloth covering it and the physician's head, or the fluoroscope may be held, as in using a stereoscope, against the body of the patient. If a radiograph is to be taken, all metal (such as buckles and buttons) and all bone articles, glass, etc., must be removed from the clothing of the patient. While ordinary dressings of gauze and cotton covering a wound do not interfere, iodoform, plaster of Paris, adhesive plaster, and ordinary wooden splints cast shadows that obscure the results. It is customary to take two views of fractures, new growths, and foreign bodies, from different points, to avoid errors.

The physician must first study radiographs of normal structures under normal conditions, before he can hope to interpret properly X-ray appearances on the screen or when photographed. When proficient, the observer may, in most cases, recognize the presence and extent of tuberculosis, pneumonia, pleurisy, hydrothorax, emphysema, and empyema, and the presence of bronchitis may be inferred in some instances from the shortened excursion of the diaphragm and the restricted movement of the lower part of the chest, as well as from collections of secretion when found. Much can be judged concerning the heart, and the inaccuracy of percussion may be corrected, as to size and position. If the heart be displaced, as e.g. by fluid or gas in the pleural cavities, pneumonia, pleurisy, tuberculosis, aneurism or tumor, or if the heart be attached or unusually placed or malformed, the condition may be ascertained by the X-ray examination. Effects of treatment of the organ may be watched. Aneurisms may be clearly defined in many cases, or recognized when no other method is of service. All new growths as well as enlarged glands within the thorax are within the scope of the diagnosing X-ray.

Similar though less complete information may be gained concerning the œsophagus, stomach, and other abdominal organs and viscera. In the pelvic cavity, measurements of the uterus may be made; extra-uterine pregnancy may be diagnosed.

Therapeutically, the X-ray is serviceable in the treatment of lupus, eczema, syphilitic lesions, nævus, sycosis, favus, acne, and psoriasis. In many cases of new growths, such as cancer (both carcinoma and epithelioma) and sarcoma, it has produced amelioration and actual cure. It is claimed by those in a position to know that the X-ray offers far greater possibilities and capabilities than Finsen's light. (See PHOTOTHERAPY.) Pain and itching may be permanently removed by X-ray treatment in certain cases.

In surgery, the Röntgen rays were first used to detect the position or presence of foreign bodies, such as bullets, and to recognize fractures. Development of the methods of their application have led to their successful use in diseases of bone, rachitis, subperiosteal abscess, dental and orthopædic surgery, and the detection of calculi. Much has been added to the anatomist's knowledge of the skeleton, especially of the joints. The value of X-rays in cases of fracture remains preëminent, both to confirm diagnosis and to decide if a fracture has been properly reduced, after it has been put into a retaining apparatus. In military surgery, both English and American authorities earnestly advocate the use of X-ray apparatus in the general base hospital or in the hospital ship. It is also suggested that the X-ray is a valuable adjunct in life insurance examinations, and also in medico-legal cases. In the latter, radiographs, it must be remembered, can be interpreted only by those who are skilled in the use of the Röntgen ray and in the reading of the pictures. No jury is competent to pass upon the value of a radiograph. Consult Williams, *The Roentgen Rays in Medicine and Surgery* (New York, 1903).

XUREL. A fish. See JUREL.

XYLENE (from Gk. ξύλον, *xylon*, wood), or XYLOL, C_8H_{10}. A name applied in chemistry to three compounds of carbon and hydrogen, similar to benzene and found along with it in coal-tar (q.v.). The three xglenes have the name chemical composition; the differences in their physical and chemical properties are due to differences in the arrangement of the atoms within their molecules.

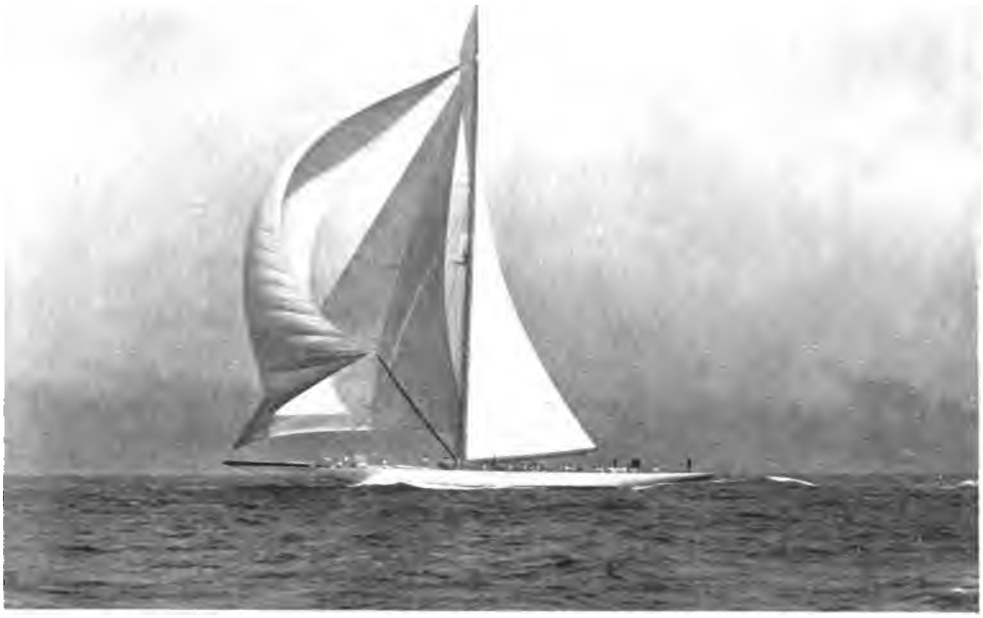
XYLOGRAPHY. See WOOD-ENGRAVING.

XYLOÏDIN (from *xyloid*, from Gk. ξυλοειδής, *xyloeidēs*, like wood, from ξύλον, *xylon*, wood + εἶδος, *eidos*, form). A substance produced by the action of nitric acid on starch. It is a constituent of certain explosives.

XYLOPHONE (from Gk. ξύλον, *xylon*, wood + φωνή, *phōnē*, sound, voice). A musical instrument composed of a diatonically graduated series of wooden keys arranged horizontally upon two cords. It has a compass of about two octaves, and is played by two little mallets held in the musician's hands, the principle being the same as that of the musical glasses. It is a very ancient and widely used instrument, traces of it being found in Europe, Asia, and America.

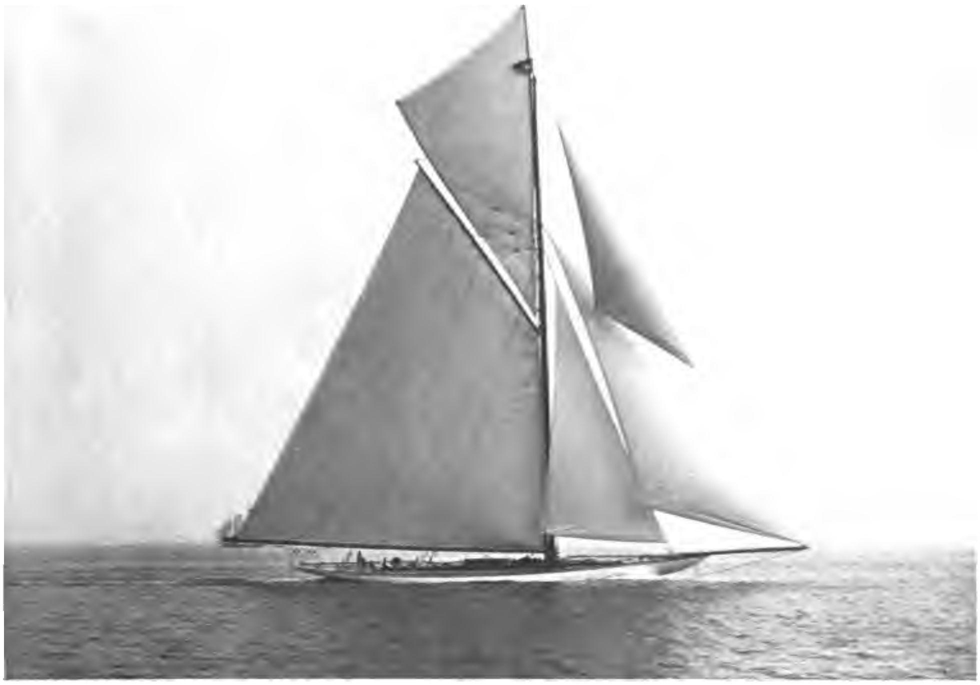
XYS'TUS. The name of two early popes, taken as equivalent to Sixtus (q.v.), so that the later popes named Sixtus are numbered consecutively from them.

X Y Z CORRESPONDENCE. In American history, the name applied to dispatches sent to the United States Government by three special envoys in France in 1797-98. In May, 1797, C. C. Pinckney, John Marshall, and Elbridge Gerry were named as commissioners to the French Republic, between which and the United States strained relations then prevailed. The commission arrived in Paris in October, and attempted to open negotiations with the Directory. Official recognition was refused them; but the secretary of Talleyrand, French Minister of Foreign Affairs, informed the commissioners that, although the Directory was much incensed by certain passages in the President's recent message, some agents would be sent to them to conduct negotiations. On October 18th one of these agents, M. Hottinguer (X), informed Pinckney that in order to gain the favor of the Directory, a 'loan' of 1,200,000 livres would be necessary. A few days later two other agents, M. Bellamy (Y) and M. Hauteval (Z), engaged in the negotiations, and it was then explained that if the United States would buy at par certain stock amounting to 32,000,000 florins (its market value was about half that sum), which France had extorted from the Dutch Republic, the transaction would be considered as equivalent to a loan. The envoys were also given to understand that unless money was forthcoming nothing could be accomplished and a war might result. The commissioners rejected the proposals, and, though they remained, accomplished nothing. Gerry, the only Republican member of the commission, remained for some time after the departure of Marshall and Pinckney and thereby incurred much criticism. (See GERRY, ELBRIDGE.) After seeing the dispatches sent home by the commissioners, President Adams on March 19, 1798, informed Congress that no terms "compatible with the safety, the honor, or the essential interests of the nation" could be obtained. At the request of Congress copies of the dispatches were communicated to that body. In the copies, however, the letters X, Y, and Z were substituted for the names of the French agents, hence the name X Y Z Correspondence. The revelation contained in the dispatches caused a great sensation. All parties joined in making preparations for war, which indeed did break out upon the sea. As a result of the affair the President and his party were for a time exceedingly popular, but soon lost public favor through the Alien and Sedition acts and through the President's sending to France a new commission, composed of Chief Justice Ellsworth, William R. Davis, and William Vans Murray. This commission, however, in September, 1800, arranged a convention that once more put the two nations upon friendly terms. The so-called X Y Z Correspondence may be found in *American State Papers, Foreign Relations*, vol. ii. (Washington, 1832). Consult: Morse, *John Adams* (Boston, 1885); Schouler, *History of the United States* (New York, new ed. 1899); and C. F. Adams, *Works of John Adams* (Boston, 1850-56).



COPYRIGHT, 1903, BY JAMES BURTON, N. Y.

RELIANCE



COPYRIGHT, 1903, BY JAMES BURTON, N. Y.

SHAMROCK III

Y

Y The twenty-fifth letter in the English alphabet. Its form is derived from the Greek upsilon (Υ), which in turn was borrowed from the Phœnician *vau*. Of like derivation are U, V, W. The Romans adopted Y to transliterate the upsilon of Greek words, which they had represented by V previous to the reign of Augustus.

PHONETIC CHARACTER AND PHILOLOGICAL VALUE. As a phonetic character *y* is both consonantal and vocalic. Its vowel usage (like *i*) is seen in such words as *holy, lady, handywork, y-clept* (where it stands for an older palatalized *ig, ge-* cf. Anglo-Saxon *hālig, hand-geweork, ge-clept*), and in *my*, etc., where it was chosen by the penmen and illuminators instead of *i*, and again for upsilon in words of Greek origin, as *myth, syntax* (Greek *μῦθος, σύνταξις*). As a palatalized consonant *y* is found generally in words of Germanic origin, *yield* (Anglo-Saxon *gieldan*), *yard* (Anglo-Saxon *geard*). As a consonant English *y* (through palatalization of Anglo-Saxon *g*) may represent (1) Indo-Germanic *i*, for example, English *young*, Anglo-Saxon *geong*, Latin *juvenis*, Sanskrit *yuvan;* (2) Indo-Germanic *gh*, as English *yesterday*, Anglo-Saxon *giestra*, Latin *hesternus*, Greek *χθές*. In the archaic form *ye olden time*, the peculiar character is really not *y* by origin, but is a substitute for the Anglo-Saxon rune ('thorn'), and it should be pronounced 'the.'

AS A SYMBOL AND ABBREVIATION. In chemistry Y is the symbol for *yttrium*. In algebra *y* stands for the second variable or unknown quantity, and in analytical geometry *y* = the ordinate of the rectilinear coördinate. As a mediæval Roman numeral Y = 150; Y = 150,000.

Y or **IJ**, I (*het Ij*). An arm of the Zuyder Zee immediately north of Amsterdam (Map: Netherlands, C 2). It is now almost wholly drained and reclaimed, except the central portion, which has been dredged to form a part of the North Sea Canal, and is connected through a lock with the Zuyder Zee.

YACHT (MDutch *jacht*, Dutch *jazt*, yacht, chase, from *jagen*, OHG. *jagōn*, Ger. *jagen*, to hunt, chase) AND **YACHTING**. A yacht is a boat used for pleasure. The prehistoric savage who built the first boat and used it for his own pleasure owned a yacht. The dugout with an outrigger was the first 'racing machine.' Ships were built and sailed for pleasure in the days of Homer, and at Rhodes. Ptolemy, the son of Lagus (B.C. 283), had 800 *thalamegi* (pleasure boats), of which some were more than 300 feet long, and were propelled by oars and sails. If the origin of things be considered, modern cruisers are *thalamegi;* modern racers are yachts.

The first British yacht of which there is distinct record was the *Rat* of Wight, built at Cowes in 1588. In July, 1660, a Dutch yacht arrived in the Thames and created such an interest in pleasure ships that the King and the Duke of York each built one. The first formal British yacht race of which there is a record was held between these two on the lower Thames course, on October 1, 1661.

The Water Club of the Harbor of Cork, first of all yacht clubs, was established in 1720. The Royal Yacht Squadron was founded at Cowes in 1812. But yacht-racing was not universally popular until after 1843, when Queen Victoria began to encourage it by giving cups for racing prizes.

In America a Boston yacht built in 1774 by Lord Percy to demonstrate the value of a centreboard on vessels of shoal draught was one of the first on record, though the word yacht, as applied to dispatch boats, was in use much earlier. From the earliest times people living along shore in America used various kinds of small boats for pleasure, but yachts fit for a venture beyond headlands are not recorded until the nineteenth century. The ketch-rigged pirogue *Trouble*, built by John C. Stevens, of Hoboken, N. J., is called the first yacht in the United States. The first American yacht to gain fame as a racer was the schooner *Wave*, built by Stevens in 1832. She was 65 feet long and had a wide V-shaped cross-section.

The schooner *Gimcrack*, also a Stevens yacht, is notable because she had a plate of iron 12 feet long and 4 feet deep fastened to her keel as a fin, to serve as ballast and give lateral plane—the first fin-keel yacht. On July 30, 1844, the New York Yacht Club was organized in her cabin. This is called the first American yacht club. The New York Yacht Club began with eight yachts. Its first home was a wooden structure on the Elysian Fields, Hoboken, N. J. Its first races were sailed on the Hudson. In 1903 its home was in the finest yacht club house in the world, and its fleet numbered 551, of which several were steamers nearly twice as large as any merchant ship afloat in 1844. Its record is illustrative of the growth of yachting in America.

In 1850 an English merchant wrote to friends in America suggesting that one of New York's famous pilot boats be sent to England to take part in certain yacht races that were to be sailed during the time of a great international exposition to be held in London in 1851. In answer to this invitation a syndicate of members of the New York Yacht Club built the schooner *America*, of 170 tons measurement. The *America* arrived at Cowes, England, on July 31, 1851, and on August 22d sailed against 15 yachts belonging to the Royal Yacht Squadron in a race around the Isle of Wight. The fleet included cutters of from 47 to 193 tons and schooners of from 75 to 392 tons, and there was no time allowance for either rig or size. The prize, a silver cup, valued at £100, which the Royal Yacht Squadron had offered for a race free to the yachts of all nations, was won by the *America*. The owner of the *America* presented this cup (July 8, 1857) to the New York Yacht Club, to be held thereafter as the trophy of the yachting supremacy of the world.

With the construction and the victory of the *America* began the evolution of the modern racer. The *America* was designed by George Steers. Her distinguishing features were: A sharp, vertical-wedge bow that showed slight hollows in its lines; the centre of buoyancy well aft; the turn of the bilges high. The sections showed great deadrise with straight lines from the bilges to the garboards; her heel was low under water, and her toe well up; her sails were cut to stand flat and were laced to booms to keep them so. The British yacht of the day had a 'cod's head and a mackerel tail;' the centre of buoyancy was well forward; the under-water body was round like a barrel; the sails were of loose-woven flax that bagged like a purse net. Thomas Waterman, a British designer, had built a yacht, the *Mosquito*, on lines remotely similar to those of the *America*, but his countrymen had ignored him. When the *America* had beaten every yacht they matched against her, however, the British yachtsmen at once began lengthening the bows of their racers and flattening their canvas. But before the improvements then begun could be fully carried out by British yachtsmen, an arbitrary rule of measurement was adopted that greatly influenced yacht-designers.

Because large yachts had obvious advantages in races with small ones, unless the wind was light and variable, the British yachtsmen agreed to handicap the big ones by a number of seconds for each ton of difference in custom-house measurement. The rule for obtaining this measurement was: Subtract the breadth of the hull from the length of the keel, multiply the remainder by the breadth of the hull, that product by half the breadth, and divide the final product by 94.

The rule was fair enough at that time, because the hull was usually half as deep as it was wide, and the length of the interior space that could have been conveniently used for storing cargo was about equal to the length of the keel less the breadth of hull. But a way to evade the rule and build a large ship that should show the tonnage of, and be classed with, a small one, had been found before the rule was adopted. The cutter *Cygnet* (1846) had a water-line length of 51 feet, but, because her sternpost raked forward and her stem aft, her keel was less than 43. The *Cygnet* method of maintaining size and reducing tonnage became popular. The rule was therefore changed, and the length of the yacht was measured from stem to sternpost on deck. Since 1878 the length has been measured on the water line. But while the length was measured on deck, the designers began to build an extension to the hull beyond the sternpost, thus obtaining a long ship that would yet show a small measurement, and that extension, or overhang, is still popular.

Because the rule assumed the depth to be one-half the beam, and thus taxed beam twice and left depth untaxed, the designers, in their efforts to produce large ships that would class with small ones, pinched the beam and added to the depth and length. Thus the 5-ton *Doris* (1885) was 33 feet 8 inches long on the water line, 5 feet 7 inches beam, and 7 feet draught; she spread 1116 feet of canvas and her displacement (the true measure of size) was 12.55 tons. Yet she was classed with the *Diamond* (1873), that was only 25 feet 3 inches on the water line, spread 671 feet of canvas, and displaced 4.92 tons. Models like that of the *Doris*, however, wrought an improvement in ballasting. The designers first substituted iron ore for the shingle of the old times, and then used lead which they bolted under the keel. As the centre of gravity of the hull was thus lowered it was possible to increase the sail area—a decided step in advance.

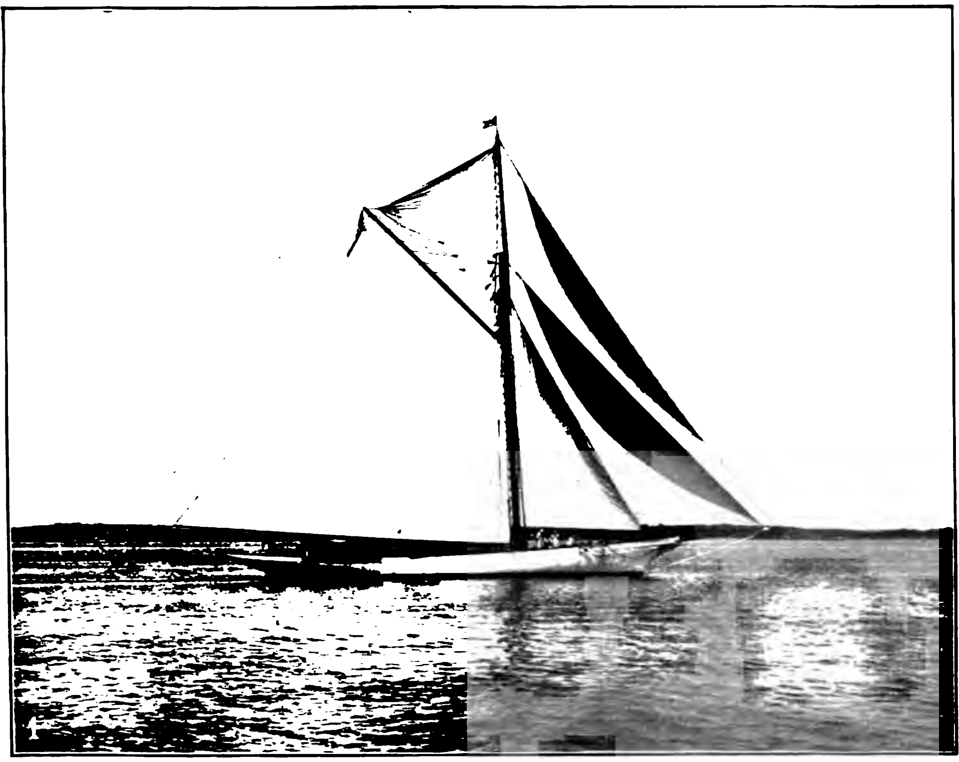
In America the racing model came from the small boat, usually a sloop or catboat, formerly called a sandbagger or skimming-dish. This had great width in proportion to its length, and extremely shoal draught. A centreboard (a plank on edge that could be moved up and down through a slot in the keel) gave lateral plane.

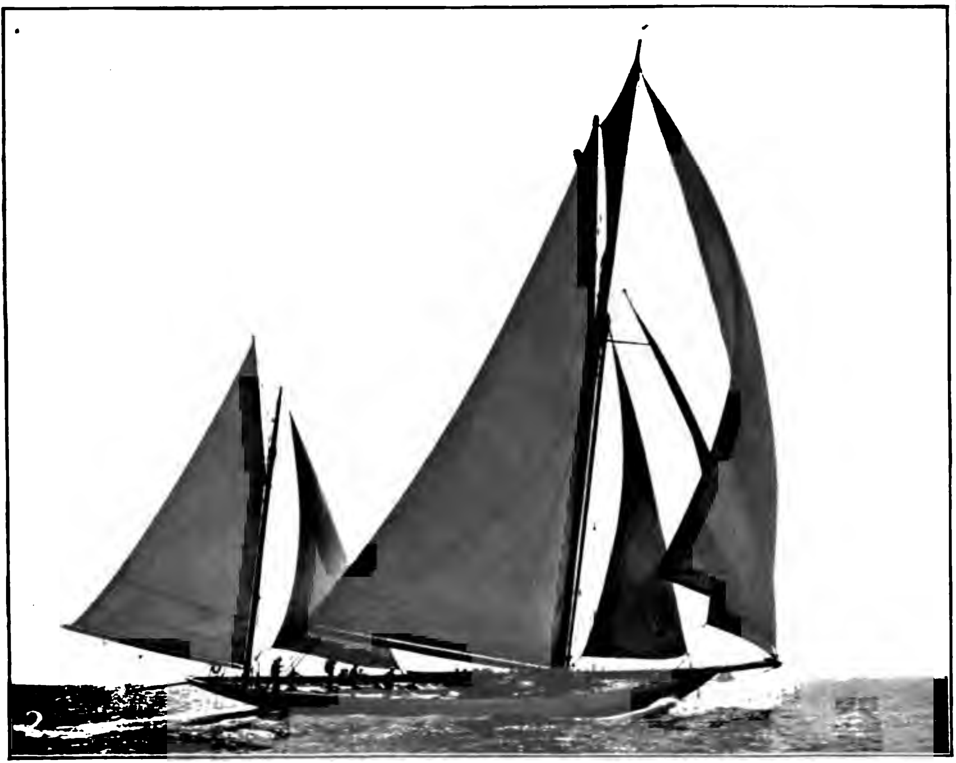
When the first challenger for the America's cup—James Ashbury's schooner *Cambria*—met the fleet of the New York Yacht Club (August 8, 1870), the swiftest of the defenders were yachts developed from the broad and shoal hulls of the sandbagger sloops. The schooner *Magic* led the fleet. She was 79 feet long on the water line, 20.5 feet beam, drew 6.25 feet of water, and measured 92.2 tons. The *Cambria* was 98 feet long on the water line, 21 wide, drew 12 feet of water, and measured 248 tons. Each was a type of its nation, and the race therefore had no direct influence on American racing models. But the race had a tremendous influence on American yachting. As a national sport in America yachting began with these races.

Within ten years after the defeat of the *Cambria* there were three series of races for the *America's* cup without changing the conditions influencing the American type of model. Keel yachts were built in America for cruising, and the *Vindex*, the first American yacht that was laid down without a whittled model, and the first American iron yacht, was built at Chester, Pa., on lines similar to the British *Mosquito*. But for racing the skimming-dish model retained its popularity.

In 1881, however, a British cutter of deep and narrow hull was imported—the *Madge*. She was 46 feet 1 inch long over all, 38 feet 9 inches on

YACHTING





1. SLOOP "VOLUNTEER," AMERICA'S CUP DEFENDER IN 1887 2. YAWL "AILSA"

the water line, 7 feet 9 inches wide, and 8 feet 3 inches draught. She had an enormous displacement in proportion to her sail area, but she won seven races out of eight starts against smart American yachts.

The influence of this yacht was great and lasting. Many yachts of similar design were built or imported. The *Genesta* and the *Galatea*, two British cutters of the extreme narrow design, came as challengers for the *America's* cup (1885 and 1886). They were defeated by the centreboard sloops *Puritan* and *Mayflower*, but their failure did not immediately injure the popularity of the 'knife-blade' model. In fact, after the fashion of the British model, the *Puritan* and the *Mayflower* both carried lead on their keels, and both were of greater depth and displacement than the type American racer of previous years. The *Volunteer*, that defended the cup when the *Thistle* came (1887), was still deeper and of greater displacement, while the *Defender*, built to meet the *America's* cup challenger *Valkyrie III.* (1895), was much like the British type of the day.

The *Defender* was designed by N. G. Herreshoff, of Bristol, R. I. She used a keel instead of a centreboard to obtain lateral plane. She was 85.5 feet long on the water line, 23.25 wide, and 19.33 draught. She displaced 143 tons. *Valkyrie III.*, designed by G. L. Watson, was 26.17 feet wide, to a water-line length of 88.9. She displaced 158 tons. Although her draught was 20 feet, the cross-section of her hull, exclusive of her fin-keel, was something like that of the American *Vigilant*.

These facts are important because the *Defender* was designed to the narrow model through the influence which British cutters had had on American yachtsmen, while the *Valkyrie* was built to the wide model for two memorable reasons: it had become apparent that increase of sail area (or driving power) could be obtained more advantageously by adding to the width of the hull than by increasing the cargo of lead on the keel; the British Yacht Racing Association, seeing the advantage of wide beam, had abolished (1886) the old rule of measurement altogether, and substituted the simple rule that considered the water-line length and sail area only—Rating $= L \times S \div 6000$. This freed the hand of the British designer.

Meantime (1891) an epoch-making yacht appeared—the *Gloriana*, designed by N. G. Herreshoff. The memorable features of her model include a long overhang at each end, and a straight-line bow in place of the hollow vertical wedge. Where the *America* had shown hollow lines the *Gloriana* had convex. The *Gloriana* started in eight races her first year and won them all.

The *Gloriana* was 45.25 feet long on the water line and 70 over all. The advantages of overhangs at each end were: They added to the initial stability; lengthened the fore and aft lines of the hull, thereby refining the angle presented to the water, and thus the heaping up of water under the lee bow in windward work was avoided. As the racer heeled, the overhangs were pressed into the water, thus lengthening the water-line length, and increasing the lateral plane for windward work.

The absurd 'knife-blade' model had been slowly dying since the defeat of the *Genesta* and the *Galatea*. With the advent of the *Gloriana* the illusion that a racer must necessarily have a sharp, vertical-wedge bow with hollow lines vanished.

The *Vigilant*, built (1893) to meet the *Valkyrie II.*, in races for the *America's* cup, was the last of the big American centreboard racers. Centreboards went out of fashion partly because that of the *Vigilant* in one race could not be lowered—something often happening to centreboards—and partly because a fin-keel was supposed to be a better device for giving lateral plane.

The *Vigilant's* centreboard had been heavily weighted in order to lower her centre of gravity, but a fin-keel was found to afford an equally satisfactory lateral plane, while lowering the ballast still further than a weighted centreboard could. Both the *Defender* and the *Valkyrie III.* demonstrated the value of the fin-keel, and they confirmed the good opinion of overhangs that had been created by the *Gloriana*. As there was no tax on beam in the international races, the line of development which followed was inevitable. By successive steps through the *Columbia* and the *Constitution*, the model of the *Reliance*, built in 1903 to defend the *America's* cup, came as a natural growth. The *Reliance* was 25.58 feet broad to a water-line length of 89.9, an over-all length of 143, and a draught of 19.58.

In smaller American racers these proportions have been carried much further. The *Outlook*, a Boston model, was 64 feet long over all to a water-line length of 21 feet, while her beam is 15 feet and her draught was 6 inches. She had the marvelous record of 13 knots an hour.

British designers have not gone so far. They feel that a racer should also be a cruiser. The *Shamrock III.*, designed by William Fife, as the challenger of 1903, was avowedly of the cruiser, or 'wholesome' type. Her hull had plenty of room for storing cargo, but she was defeated by margins wide enough to demonstrate beyond dispute that racers and cruisers are of two distinct classes, and that it is useless to try to pit the cruiser against the racer.

Yacht sails were once made to bag like a purse net. Now they are made as flat as possible save for a slight hollow in the luff.

Lug sails, that were common fifty years ago, have disappeared. So have square topsails set on yards above the fore and aft sail of schooners, sloops, and cutters. Where the *Maria* set a single jib forward of the mast, modern racers carry three in moderate weather, save only when the wind is well aft. Then a single great triangle of canvas, the balloon jib, is spread. Instead of a great square sail spread from a yard when running before the wind there is now a spinnaker, a triangle of canvas that extends from the topmast-head to the deck and out along a boom rigged broad off on either side.

The *Galatea* spread 7387 feet of canvas by the rule of measurement; the *Mayflower*, 8824; the *Shamrock III.* spread 14,337; and the *Reliance*, 16,169. And neither of the racers of 1903 had as much displacement as the *Galatea*. Where the *Diamond* of 1873 carried 671 feet of canvas, the *Outlook* of 1903 carried 1800.

In 1895, to promote the building of yachts fit for cruising—*thalamegi*—British yachtsmen adopted a measurement rule penalizing beam and draught. In 1902 the New York Yacht Club adopted a rule looking to the same end.

In 1895 the Seawanhaka-Corinthian Yacht Club provided an international challenge cup for racers not smaller than the 15-foot class nor larger than the 25-foot class—from a half rater to a two and a half rater, according to the British nomenclature. A British challenger, Arthur Brand, brought the *Spruce IV.*, a yacht 15.83 feet long on the water line and spreading 197 feet of canvas. The *Ethelwynn*, designed by W. P. Stephens, defended the cup successfully. She was 23 feet 4 inches over all, 14 feet 6 inches on the water line, 6 feet 7 inches broad, and 7 inches draught. She carried a metal centreboard that dropped five feet below the keel and weighed 55 pounds. The *Ethelwynn* was a fair type of the half rater of her day. In 1896 the Royal Saint Lawrence Yacht Club won this cup, with a half rater called *Glencairn*. Since then the size of the yachts has increased to the limit allowed by the original conditions, but the Canadians have very well maintained a superiority in the races for this cup.

The crews of the racers in these cup contests are always amateurs. The races are contests between national crews as well as yacht-designers. The start of each race is therefore made with a single gun—the yachts may cross the line with the gun, but not before, and the last yacht to cross is handicapped by her distance behind the leader. In the *America's* cup races, where professional sailors are hired, the test of ships is the object, and the yachts across at will within a two-minute limit, and are timed on the instant of crossing. In 1896 a third international cup was provided by yachtsmen on the Great Lakes. Yachting had been a popular sport there for many years. The Detroit Boat Club was established in 1839. The Royal Canadian Yacht Club of Toronto was organized in 1852. The members of the yacht clubs along the Great Lakes number thousands. In 1896 E. C. Berryman, through the Lincoln Park Yacht Club, of Chicago, challenged the Royal Canadian Yacht Club to a race between 45-footers. The Toledo International Yacht Racing Association gave a cup for the prize. Mr. Berryman sailed the *Vencedor*, the Toronto Club the *Canada*. The *Canada* won, and her cup was then made a perpetual challenge cup for international races on the Great Lakes. The cup has crossed the line several times since then. In the races of 1903 the American challenger, *Irondequoit*, beat the Canadian defender, *Strathcona*. The yachts of the lakes are of the fin-keel type, carrying large sail area. Because of the imperfection of even the best rules for handicapping big yachts in races with little ones, the building of yachts from one design has become popular. The 'Water Wags' of Dublin Bay, Ireland, were the original one-design racers. The type came into use in 1873. Each 'wag' is 13 feet long by 4 feet 10 inches wide, and mast and canvas are precisely the same for all. In the United States there are one-design racers 70 feet long on the water line. While built to develop good seamanship, the one-design yachts, in spite of the greatest care to make them alike, have never been all precisely alike in their sailing qualities—a proof that variations so small as to be invisible affect the speed of racers. The designing of racers is so much a matter of scientific calculation that the new boats of each year commonly beat those built before, but designers cannot yet foretell definitely what a racer will do. Neither have the lines of the swiftest possible wind-driven hull yet been laid down.

Captain R. F. Loper, of Philadelphia, built the first American steam pleasure boat, the *Colonel John Stevens*. She was 92 feet long and carried two low-pressure engines with cylinders 18 × 14 inches. The paddle-wheel *Firefly*, built by the Aspinwalls in 1854, was the first American steamer to be properly classed as one of a fleet belonging to a recognized yacht club.

In Great Britain, the paddle-wheel *Victoria and Albert*, launched for the Queen, April 6, 1843, was the first notable steam yacht. She was 225 feet long, and had a record of 11.5 knots—something remarkable for that period.

Nevertheless the introduction of compound engines (see STEAM NAVIGATION), with their economy of space and fuel, marks the real beginning of steam yachting, and since that time steam yachts have had a wonderful development. The list of the New York Yacht Club alone shows 262 steamers, of which ten register about 1000 tons. W. K. Vanderbilt's *Valiant* is 332 feet long and registers 1823 tons. She is driven by triple-expansion engines and twin screws.

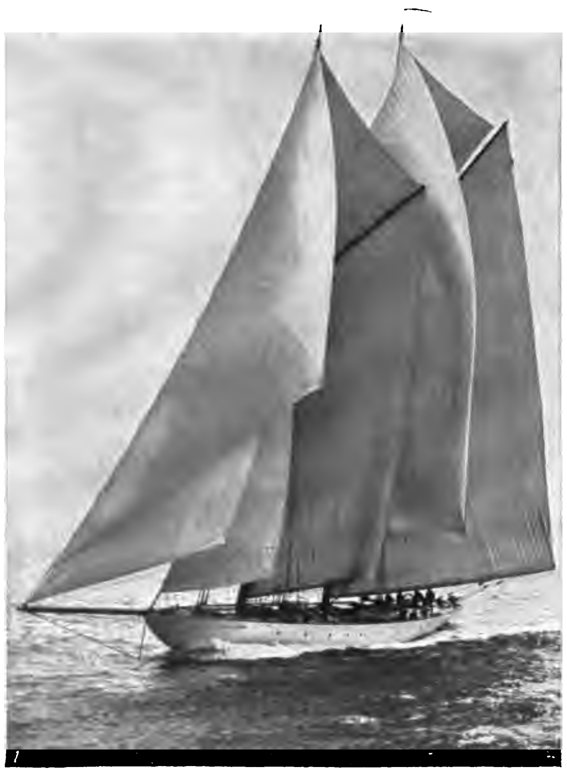
Because of their speed, steam yachts have come into use as transports carrying business men between their country homes and town. The swift steam launch has been developed for this purpose. The *Stiletto*, built by the Herreshoffs, was the first notable launch of this kind in America. Though but 86 feet long and in use for twenty years, she was able (1903) to make 18 knots an hour. The *Miranda*, built by Thornycroft (1872), though but 50 feet long, had a record of 19 land miles an hour, but steamers of that class have much more favor in America than in Europe.

The limit in this class was reached in the *Arrow*, designed by Charles D. Mosher (1900). She is 139.33 feet long and displaces 66 tons, but her record, as given by her designer, is 40 knots. She is fitted with quadruple-expansion engines that take steam at a pressure of 400 pounds from water-tube boilers.

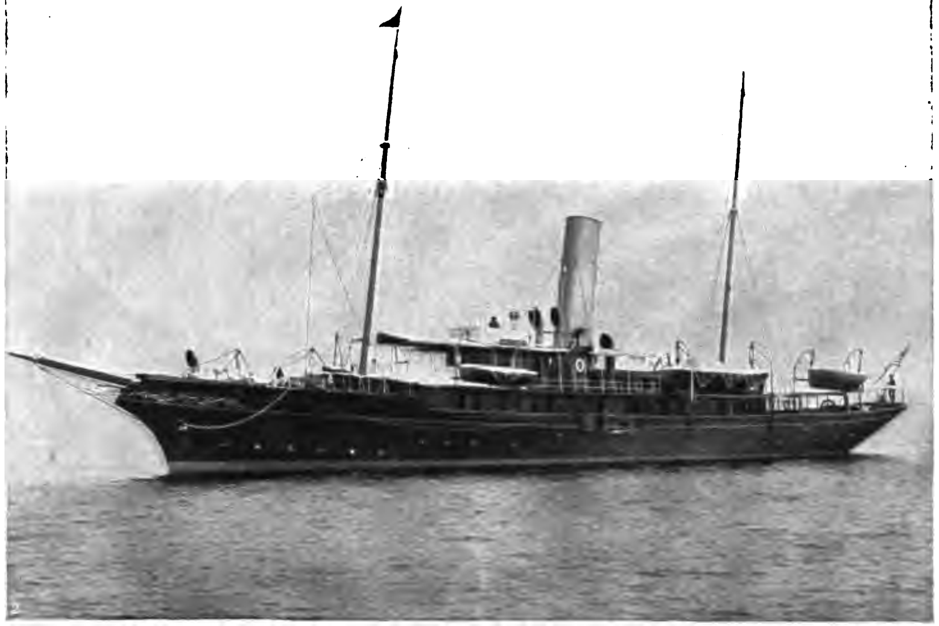
The New York Yacht Club's list for 1903 shows three yachts with turbine engines, all of British design, and there is a fourth, the *Resolution*, that has turbines of American design. Because turbines occupy a relatively small space, cause no vibration, give greater speed with no greater consumption of coal, and require fewer repairs, they are sure to displace reciprocating engines on all kinds of steam yachts. Capt. N. G. Herreshoff, however, who is undoubtedly an authority, states it as his opinion that turbines will displace reciprocating engines in high-speed yachts only. See STEAM TURBINES; STEAM NAVIGATION.

A conspicuous feature of yacht races in 1903 was the fleet of launches propelled by motors that used products of petroleum in place of steam. There are two classes of these motors. In one class fluid naphtha is vaporized in a coiled-tube boiler by the heat of a naphtha flame, and the vapor drives a reciprocating engine. In another class the petroleum product is injected with a volume of air into an engine cylinder and

YACHTING



1. SCHOONER "INGOMAR"



2. STEAM YACHT "ALVINA"

there exploded, when the pressure of the gas drives the piston. Alcohol is used in place of naphtha in some motors.

Naphtha launches first became popular in 1886. Thousands have been set afloat since that date. The *Adios*, built by H. S. Leighton, of Syracuse, in 1902, though but 55 feet long, was driven at a speed of 23 land miles an hour, by a motor of 120 horse power. In a race between naphtha launches, on the Seine, in 1903, the swiftest reached a speed of 22 knots. The *Edithia*, owned by John H. Hanan, is a cruiser 114.9 feet long, and she is driven by motors that aggregate 120 horse power.

Electric storage batteries have been used to furnish power for launches. In 1889 the *Delta*, an electric, 39 feet long, in use on the Thames, England, covered long stretches at more than five miles an hour by using the power stored in 44 cells. Much better results can be obtained now, but the lack of stations for recharging the cells prevents a common use of them.

YAD'KIN RIVER. See GREAT PEDEE RIVER.

YAGUARONDI, yä'gwȧ-rŭn'dē. See JAGUARONDI.

YAHGAN, yä'gän, or **YAPOO,** yä'po͞o. A South American tribe apparently constituting a distinct linguistic stock, occupying the shore of Beagle Channel, in Tierra del Fuego. They are represented as very low in the scale of culture, building only the merest shelter from the wind, having almost no government or ceremonial forms and very little conception of numbers. They go almost naked, anointing their bodies profusely with grease. On the other hand, they are of good physique, expert hunters and fishers, with bow, bola, lance, and various nets, skillful canoe-builders and weavers of water-tight baskets, and have trained their dogs to hunt. Some parts of the Bible have been translated into their language. The race is now nearly exterminated, although about 90 are gathered in the two missionary stations of Ushnaia and Tekenika.

YAHOOS, yȧ-ho͞oz'. The slaves of the noble Houyhnhnms or horse-folk, in Swift's *Gulliver's Travels*. They possess the form of man and all his most brutal passions, mischief, hate, and spite, and are intended as a satire on the human race.

YĀJÑAVALKYA, yȧj'nyȧ-väl'kyȧ. A Hindu sage, the author of a legal work entitled *Yājñyavalkyadharmaśāstra* and cited as the chief authority in the *Satapatha-Brāhmaṇa* (see VEDA), where he is spoken of as the pupil of the renowned teacher Aruni. According to tradition, Yajnavalkya traced his lineage back to Visvamitra (q.v.). He seems to have held a position of influence at the court of King Janaka in Mithila, the capital of Videha, the modern Tirhut, Northern Behar. In importance his code is second only to Manu (q.v.), which it resembles in many ways. It comprises 1009 *ślōkas*, or couplets, and is divided into three books. The date of its composition is about the middle of the fourth century A.D., when the author is now generally believed to have lived. The *Yājñavalkyadharmaśāstra* was edited and translated by Stenzler, *Yājñavalkya's Gesetzbuch, Sanskrit und Deutsch* (Berlin, 1849), and with Vijnanesvara's commentary at Bombay (3d ed. 1892).

YAJUR-VEDA, yȧ'jụr-vā'dȧ (Skt., Veda of sacrifice). The name of the third Veda. See VEDA.

YAK (Tibetan *gyak, gyag*). A species of ox (*Pœphagus grunniens*) found in Tibet, and domesticated there. The wild yak of Central Asia is found only near the limits of perpetual snow, descending into the higher wooded valleys in winter, and ascending in summer to the pastures of short grass and sedges, some of which are at an elevation of 17,000 feet above the sea. It is hunted by large dogs, and is very fierce, falling upon an adversary not only with its horns, but with its chest, and crushing him by its weight. It is generally black. The yak has been domesticated from time immemorial, and forms a great part of the wealth of the inhabitants of the highest and coldest regions of Central Asia. The domesticated yak is about the height of an ordinary ox, which it much resembles also in figure of body, head, and legs. It is covered all over, however, with a thick coat of long silky hair, hanging down like the fleece of a sheep. The head is rather short; the eyes large and beautiful; the horns not very large, spreading, tapering from the base, a little turned back at the tips, a space between them on the forehead covered with a mass of curling hair. The neck is short; the withers high and arched; the rump is low; the legs are short. Over the shoulders there appears a bunch somewhat like that of the zebu, but it consists only of long hair. The tail is covered with a large quantity of long flowing hair, descending to the hock. Black and white are the most prevalent colors.

The yak does not low like an ox, but utters a short grunting sound like a pig, as the expression both of uneasiness and of satisfaction. Its milk is very rich, and the curd made of it is much used by the Tibetans, both fresh and dried, often powdered into a kind of meal. The butter made from yak-milk is excellent, is preserved for a long time in the dry and cold climate of Tibet in bladders, and is an important article of commerce. The flesh of the yak is of the finest quality, and is often dried in the sun and eaten raw. The yak is never used for tillage or draught, but is very much employed as a beast of burden, and travels at a slow pace, twenty miles a day, where no other beast of burden could well be employed. The hair is spun into ropes, and made into coverings for tents. The soft fur on the hump and shoulders is woven into a fine and strong cloth. Caps, jackets, cloaks, and blankets are made of the skin with the hair on. The tails are the *chowries*, or fly-flappers, used in all parts of India, and which are to be seen particularly on all occasions of state and parade. Consult Lydekker, *Wild Oxen, Sheep, and Goats* (London, 1898). See Plate of WILD CATTLE.

YÁKIMA, yä'kē-mȧ (runaway, applied to them in derision by another tribe). An important confederacy of Shahaptian stock (q.v.), formerly occupying a considerable territory on the Yakima and Columbia rivers, eastern Washington, and now gathered with other tribes on the Yakima Reservation in the same country. They call themselves Waptailmim, 'people of the narrows,' in allusion to their principal village, formerly situated at the narrows of the Yakima River, near the present Union Gap. They were called Cutsahnim by Lewis and Clark, who visited them in 1804. They came in contact with traders and missionaries at an early period, and in 1855, with other tribes, made a treaty with the Government by which they ceded most of their territory and agreed to come upon the present reservation. Some of the tribes, as the Palus (q.v.), have never recognized the treaty and steadily refuse to come upon the reservation. In their original condition the Yakima were salmon-fishers, root-diggers, berry-pickers, hunters, and active traders between the tribes east of the Rocky Mountains and those west of the Cascades. Although outside the buffalo range, they sometimes crossed the mountains in large parties to hunt buffalo in the plains, seldom returning without a hostile encounter with the Eastern tribes. They used both the skin tipi and the mat-covered lodge. They are now chiefly farmers and stock-raisers, raising crops by irrigation, and nearly all are self-supporting. The majority are Catholics, through the efforts of the Jesuit missionaries. The entire number of Indians upon the reservation in 1903 was about 2300, of whom the Yakima confederates may number 1500.

YAKOBA, yȧ-kō′bȧ. A large city in British Nigeria, West Africa, the chief town of the tributary State of Bautshi, situated in an elevated and salubrious region about 150 miles south-southeast of Kano (Map: Africa, E 3). It consists of a number of villages surrounded by a wall and has an estimated population of 50,000. The city was founded by the Fulbe at the beginning of the nineteenth century.

YAKSHA, yăk′shȧ (Skt. *yakṣa*). In later Hindu mythology, the name of a class of demigods, who attend on Kubera (q.v.), the god of riches, and are employed in the care of his garden and in the keeping of his treasures. In Sanskrit literature they are generally represented as inoffensive, but in some of the Buddhist legends they are described as demons, who feast on serpents and human corpses.

YAKUT, yȧ-ko͞ot′, ABU ABDALLAH (c.1178-1229). An Arabic geographer, born in Greece. He was taken captive and became slave of a merchant in Bagdad, who gave him a good education and sent him on long business trips. In 1194 he became a free man and traveled much while engaged as a book vendor. In 1213 he gave up business, apparently because of losses in India, and began to travel as a geographer, going as far as the boundaries of Mongolia (1220). With Ibn al-Kisti he published the results of his travels in Asiatic Mohammedan countries. Among his works are the dictionaries of geography, *Mu'jam al-buldān*, edited by Wüstenfeld (1866-73), and *al Mushtarik* (1846); a dictionary of literary biography, *Mu'jam al-udabā*, discovered at Oxford by Ethé (1889); and a history of the Arab dynasties.

YAKUTAT, yȧ-ko͞o′tȧt. The most northern tribe of Kolushan stock (see TLINKIT), occupying the coast about the bay of the same name, south of Mount Saint Elias, Alaska. They are a maritime people, living by salmon and seal catching and trading along the coast and with the inland tribes. They resemble the other Tlinkit in general characteristics, but differ in lacking the clan system, and in eating the flesh of the whale, which among their kindred tribes was tabooed, while their women did not wear the labret. They may number about 300.

YAKUTS, yȧ-ko͞ots′. A people of Turkic stock. They number some 200,000 and inhabit a territory of over a million and a quarter square miles in Northeastern Siberia. Their language gives evidence of being the oldest of the Turkic tongues. It has been a sort of *lingua franca* over large portions of Siberia. The Yakuts have a considerable capacity for poetry and a somewhat extensive mythology. Although they were (nominally, in great part) converted to Christianity in the beginning of the eighteenth century, their original Shamanism still colors their religious life, particularly in the north. The Yakuts are polite, hospitable, and industrious, with an undertone of melancholy coming out in their songs. They dislike to hire themselves for wages and are very fond of an independent life. When the Russians first came into contact with the Yakuts the latter were polygamous, with not infrequent incest. Upon their conversion they gave up polygamy. The Yakut marriage system is exogamous, but there are traces of an earlier endogamy. The state of culture in the northern Yakut country is much more archaic than in the southern. Consult: Müller, *Unter Tungusen und Jakuten* (Leipzig, 1882); Radloff, *Uebersicht der Türkenstämme Sibiriens und der Mongolei* (ib., 1883); Böhtlingk, *Ueber die Sprache der Jakuten* (Saint Petersburg, 1848); Sumner, "The Jakuts," in *Annals of the Anthropological Institute* (London, 1901).

YAKUTSK, yȧ-kṳtsk′. A vast territory in Eastern Siberia, bounded by the Arctic Ocean on the north, the Maritime Province on the east, the provinces of Amur and Transbaikalia on the south, and Irkutsk and Yeniseisk on the west (Map: Asia, M 2). Area, 1,533,000 square miles. The southern part consists largely of elevated plains, thickly wooded and bordered on the south by the Stanovoi Mountains. Several mountain ranges also run through the interior. North of the elevated plains begins the region of tundras which extends to the coast. The chief rivers are the Lena (q.v.) with its great tributaries, the Olenek, the Yana, the Indighirka, and the Kolyma—all flowing into the Arctic Ocean. The climate of Yakutsk is very severe. Verkhoyansk (on the Yana in latitude 67° 34′ N.) is regarded as the coldest spot in the world. Agriculture is impossible, but Yakutsk possesses abundant resources in its forests and mineral deposits. The latter are found principally along the Vitim and the Olekma (tributaries of the Lena), where gold is mined on a large scale. There are also deposits of silver and lead, copper, iron, coal, kaolin, and amber. Stock-raising, hunting, and fishing are the main occupations of the inhabitants. Population, in 1897, 261,731, of whom the Yakuts number over 200,000 and the Tunguses about 10,000.

YAKUTSK. The capital of the Territory of Yakutsk, in Eastern Siberia, situated on a tributary of the Lena (Map: Asia, M 2). It is poorly built and unhealthful on account of frequent inundations. It has a cathedral. Yakutsk was founded by Cossacks in 1632. Population, in 1897, 6534.

YALE, Elihu (1648-1721). An English colonial official, the early patron of Yale College. He was born in or near Boston, Mass., the son of David Yale, of Denbighshire, Wales, who emigrated to New England in 1638, lived for a while in New Haven, and then settled in Boston. David Yale's family returned to England in 1652, and lived in London, where Elihu was educated. In 1672 he entered the service of the British East India Company, and proceeded to India, where he rose at length in 1687 to be Governor of Fort Saint George (Madras). In 1692 he returned to London with a large fortune acquired in private trade. In 1699 he became a governor of the East India Company. He became widely known for his philanthropy and the liberality of his gifts for religious and educational objects. One of the institutions in which he became interested was the collegiate school founded in 1700 at Saybrook, Conn., to which, between 1714 and 1721, he gave books and money to the amount of about £900. After the removal of the school from Saybrook to New Haven in 1718, the new college building was named after him, and in 1745 his name was applied to the whole institution. He lived during the latter part of his life at Wrexham, North Wales, and his body is there buried. Consult Dexter, *Biographical Sketches of the Graduates of Yale College* (1885).

YALE, Linus (1821-68). An American inventor, born at Salisbury, N. Y. He at first turned his attention to portrait painting, but afterwards became an inventor and devised several locks, the excellence of which won general recognition. His best known devices are the combination lock, the clock lock, and the double lock. See Lock.

YALE UNIVERSITY. One of the leading institutions of learning in the United States, situated in New Haven, Conn. The plans of the first settlers of New Haven in 1638 included the establishment of a college, but Massachusetts objected, because there was at that time not enough population in the colonies to support the college already founded at Cambridge, and for sixty years the people of Connecticut sent their sons to Harvard. In 1700-1701 ten of the principal ministers of the colony, all but one of whom were graduates of Harvard, at a meeting at Branford, formally founded a collegiate institution by a gift of books for a library, and on October 9, 1701, the Colonial Assembly granted a charter making the ten ministers and their successors trustees of the Collegiate School of Connecticut. The trustees elected one of their own number, Abraham Pierson, of Killingworth, rector of the school, and, in order to secure the support of the towns on the Connecticut River, voted to establish it at Saybrook, "as the most convenient town for the present." Until the death of Rector Pierson, however, the students and the one tutor lived at Killingworth, probably in the house of the rector. Under the second rector, Samuel Andrew (1707-19), the senior classes were instructed by him at Milford, the other classes by two tutors at Saybrook. In 1716, in the face of much dissatisfaction, the school was removed to New Haven and permanently located there. A wooden building was erected where Osborn Hall now stands, and was formally opened at commencement in 1718, when the name of Yale College was adopted in honor of Elihu Yale (q.v.), who had made large gifts to the school. This building, besides chambers for students and a library, contained a kitchen and dining hall, and for more than 120 years from this time students were required to board together in commons. Timothy Cutler (q.v.) was rector from 1719 to 1722, when, on account of a change in his religious views, he was removed by the trustees. Elisha Williams served from 1726 to 1739, and was succeeded by Thomas Clap (q.v.), who had greater business qualifications than any of his predecessors. He drew up and published in Latin the first code of laws, catalogued the library, and drafted a new charter which was approved by the General Assembly in 1745. By this act the former trustees were incorporated under the name of 'the President and Fellows of Yale College in New Haven.' Clap erected Connecticut Hall (South Middle), then 'the best building in the colony,' and a chapel (the Athenæum). President Clap also successfully defended the college against attempted interference in its management by the Legislature. Naphtali Daggett, professor of divinity, served as president from 1766 to 1777, when he was succeeded by Ezra Stiles (q.v.). President Stiles succeeded in overcoming the opposition to the college which had long existed in the Legislature, and in 1792, by joint action of the Legislature and corporation, certain State funds, valued at $30,000, were applied to the improvement of the college, and the Governor, Lieutenant-Governor, and six senior Senators became members of the corporation.

The administration of Timothy Dwight (q.v.) from 1795 to 1817, begins a new era in the history of the institution. At his accession there were about 100 students, and the instructors consisted of the president, one professor, and three tutors, each of the lower classes being instructed in all branches by one tutor. President Dwight established permanent professorships and filled them with recent graduates of unusual ability and promise. Among the young men appointed at this time were three who served the college together for more than half a century and brought it great honor—Jeremiah Day (q.v.), in mathematics; Benjamin Silliman (q.v.), in chemistry; and James L. Kingsley (q.v.), in language. President Dwight, anticipating the growth of the college, extended the college square, by purchase, so as to include the whole front of the present campus, and continued the brick row to Berkeley Hall (North Middle). He also planned the organization of professional schools under distinct faculties, but the medical school only was established before his death. Jeremiah Day, who became president in 1817, had been selected by Dr. Dwight as his successor, and continued to carry out his plans. The divinity and law schools were organized, and the brick row completed. Under President Day the responsibility for the government of the students was placed upon the faculty, and out of the stricter discipline now enforced grew two unsuccessful revolts known as the 'Conic Sections Rebellion' and the 'Bread and Butter Rebellion.' In 1831 a fund of $100,000 was raised to meet the general expenses of the college, the total productive funds before this time having been less than $20,000. When President Day resigned in 1846 the college had 587 students, of whom about one-fifth were from the Southern States. Under President Theodore D. Woolsey (q.v.), 1846-71, the corps of instructors was greatly enlarged, and the standard of scholarship raised; the Scientific School was established, and the foundation laid for the School of Graduate Instruction; the professional schools were reorganized and the School of Fine Arts was founded. During President Woolsey's twenty-five years of service the number of students increased to 809. Dr. Woolsey proposed the plan, which became effective in 1872, by which six graduates of the college took the place of the State Senators in the corporation. The administration of Noah Porter (q.v.), 1871-86, was one of great material prosperity. At this time a most important change was made in the course of instruction and the modern system of elective studies was adopted. On the resignation of Dr. Porter the student body numbered 1079. He was succeeded in 1886 by Timothy Dwight (q.v.), grandson of the elder President Dwight, under whose administration (1886-99) the growth of the institution was unprecedented. In five years the number of students increased more than 50 per cent., and at the end of President Dwight's term they numbered over 2500. The title of Yale University was authorized by the Legislature in 1887. Under the last three presidents the productive funds were greatly augmented, and more than twenty buildings were erected at a cost of above $2,000,000. Upon the retirement of President Dwight, Professor Arthur Twining Hadley (q.v.) was made president and inaugurated on October 18, 1899. The corporation as now constituted is composed of the president and eighteen fellows, viz. ten Congregational clergymen, the successors of the original ten founders, the Governor and Lieutenant-Governor of Connecticut, who were made members ex-officio in 1792, and six representatives elected by the graduates from their own number, one every year for a term of six years. The corporation alone has power to confer degrees.

The courses of study offered in the university are comprehended in four departments, each department being under the administration of a distinct faculty of instruction: Philosophy and the arts, theology, medicine, and law. Under the first-named department are included two separately organized sections in which instruction for undergraduates is provided, viz. the academical department and the Sheffield Scientific School; also, the School of Fine Arts, the Department of Music, and the Forest School, each with a special organization, and the Graduate School, under the combined faculty of the department. The library, the Peabody Museum of Natural History, and the observatory are organized independently of the special departments, and are designed to contribute in their special spheres to the instruction and advancement of the whole institution. A candidate for the degree of B.A. must complete courses aggregating sixty hours per week through a year. A student is enrolled in the freshman class until he has completed at least twelve hours of work. The sophomore class completes twenty-six hours, the junior forty-one, and the senior sixty. The course is largely elective, and is being freed from the traditional requirements. In the spring of 1903 the college took the important step of abandoning the entrance examination and the required course in Greek. There are several scholarships and fellowships, yielding from $115 to $800, given to undergraduates and graduates of the academical department.

The college campus borders on the New Haven green and occupies half of one of the original nine squares in which the city was laid out. It is bounded by College, Chapel, High, and Elm streets. The modern buildings are arranged to form a quadrangle 850 feet long and 400 wide. At the north corner of the campus is Alumni Hall (1853), used for meetings of the graduates and for examinations; at the west, the Art School (1866); at the east, Battell Chapel (1875, enlarged 1893); and at the south, Osborn Hall (1889), containing recitation and lecture rooms. On the High Street side are the old library (1844); Dwight Hall (1886), devoted to the use of the Yale Y. M. C. A.; and the Chittenden Library (1890). The space on Elm and College streets is filled by the dormitories Durfee (1871), Farnam (1870), Lawrence (1886), the Lampson Lyceum (1904), and Welch (1892) halls. Between the last two is Phelps Hall (1896), mainly devoted to the classical department, with a gateway forming an effective entrance to the campus. Vanderbilt Hall (1894) stands between Osborn Hall and the Art School. In the immediate neighborhood of the campus are the Sloane Physical Laboratory (1883), the Kent Chemical Laboratory (1887), the dormitories Pierson (1896), White, Berkeley (1894), and Fayerweather (1901) halls, and the theological seminary. Further north are the Sheffield Scientific School, the group of bicentennial buildings, and the administration building, Woodbridge Hall.

The Sheffield Scientific School is devoted to instruction in the mathematical, physical, and natural sciences, and furnishes both graduate and undergraduate courses. It was established in 1847 as a school of applied chemistry. The degree of Bachelor of Philosophy was first given in 1852. In 1860 Joseph E. Sheffield, of New Haven, whose gifts to the school have amounted to not less than $1,000,000, provided it with a building and a permanent fund, and the next year the school was reorganized and called by its present name. In 1863 it received from the Legislature $135,000, being the proceeds of the Congressional land grant of 1862, and thus became the College of Agriculture and the Mechanic Arts of Connecticut; but in 1892 this act was revoked and the special relation of the school to the State ceased. The course occupies three years. The graduate instruction of the school, including about 370 courses, leads to the degrees of Bachelor of Philosophy, Civil and Mechanical Engineer, Master of Science, and Doctor of Philosophy.

The graduate school, organized in 1847, is under the direction of the philosophical faculty. The degrees of Ph.D. and C.E. were first offered in 1860, M.E. in 1873, M.A. (previously given without evidence of study) in 1874, and M.S. in 1897. In almost all of these departments voluntary associations of instructors and students meet periodically for purposes of research. Nine fellowships of $400 are open to graduates of all colleges; one of $300 to a graduate of one of the California universities; and fifteen to graduates only of Yale College. There are besides 30 scholarships of $100.

The Art School was established in 1864. It is open to students of both sexes, and provides instruction in drawing, painting, sculpture, architecture, and copper-plate etchings. Its collections include the Jarvis gallery of Italian art, the Alden Belgian wood-carvings of the sixteenth century, and the Trumbull gallery of historical paintings, besides many casts, marbles, porcelains, bronzes, and modern paintings and reproductions. The regular course covers three years. The holder of the Winchester Fellowship is entitled to two years' residence and study abroad.

The earliest professional school organized at Yale was the Medical School. Four professors in medicine were appointed in 1813, and degrees were given the following year. The school was aided in the beginning by a grant of $30,000 from the State, and for seventy years was under the joint control of the college and the State Medical Society, until in 1884 the college authorities assumed full control of the school. The course was extended in 1896 to four years. The school occupies three buildings—Medical Hall, the Laboratory Building, and the University Clinic. Abundant clinical instruction is furnished by the New Haven Hospital, the New Haven Dispensary, and the State Hospital for the Insane at Middletown.

The Divinity School was organized in 1822, but instruction in theology had been given at Yale since its foundation and the first professor in the college was a professor of divinity in 1755. This school is Congregational in doctrine, but students of nearly every denomination avail themselves of its advantages. It possesses a very full reference library, an almost complete historical library of foreign missions, and a valuable library of church music, which formerly belonged to Dr. Lowell Mason. The courses are partially elective and, with the graduate class, cover four years, leading to the degree of Bachelor of Divinity. The school offers two graduate fellowships, a number of general scholarships and prizes, and has a loan fund for the benefit of needy students.

The Law School became a part of the college in 1824, though no degrees were conferred until 1843. Its course of instruction, covering three years, is designed to fit the student for the practice of law in any State, and leads to the degree of LL.B. The graduate course can be completed in one or two years, leading to the degree of Master of Laws or Doctor of Civil Law. The special law library, of about 20,000 volumes, is supported by a permanent endowment established by the Honorable James E. English in 1873.

The Department of Music, founded in 1890, aims to provide adequate instruction for those who intend to become professional musicians, either as teachers or composers.

The Forest School was founded in 1900 by a gift of $150,000 from Mr. and Mrs. J. W. Pinchot and their sons. It provides for instruction and research in forestry at the university and for a summer school of forestry at Milford, Pa. Marsh Hall, the house of the late Professor O. C. Marsh, is used as the school building. Graduates receive the degree of Master of Forestry.

The Peabody Museum of Natural History was founded in 1866 by a gift of $150,000 from George Peabody, the London banker, and the first wing of the museum was completed in 1876. It contains the collections in mineralogy, geology, paleontology, and zoölogy, with several laboratories and work rooms. The buildings of the observatory stand on Prospect Street, about a mile from the college. The principal astronomical instruments now in use are a six-inch heliometer by Repsold of Hamburg, an eight-inch equatorial by Grubb of Dublin, and an equatorially mounted set of cameras for photographing meteors. The late Professor Elias Loomis (q.v.) bequeathed to the observatory a fund of more than $300,000, the income of which is to be used for the promotion of astronomical observations and investigations.

The gymnasium, completed in 1891 at a cost of $200,000, is under expert supervision. The athletic grounds of the university, known as Yale Field, are open to the students of all departments. The grounds, consisting of some 30 acres about a mile from the campus, were purchased in 1882, and when turned over to the corporation in 1902 represented an original outlay of $53,000 secured by subscriptions, to which for maintenance and improvements a sum of nearly $100,000 has been added, the greater part of which has come from the athletic associations in gate receipts. The Bureau of Self Help, under the management of a member of the faculty, is a valuable assistance to students and graduates seeking work, and has charge of the assignment of beneficiary aid to needy students.

In addition to the regular university courses, a public lecture course under the auspices of the university and a large number of lecture courses under the auspices of the various university departments and organizations are carried on. Among the latter are the Lyman Beecher Lectures, the Silliman Memorial Lectures, the Dodge Lectures, and others. The whole number of volumes in the several libraries of the university is (1904) about 371,000. The university library proper, containing about 290,000 volumes and many thousands of unbound pamphlets, shows an annual increase of more than 10,000 volumes.

On October 20-23, 1901, the university celebrated the two hundredth anniversary of the founding of Yale College. The celebration, for which plans had been in preparation for several years, included the publication of a series of volumes by members of the various faculties; addresses by distinguished alumni and others; exhibitions of educational and other material; the dedication of the new university hall; and the completion of a bicentennial fund of $1,500,000, contributed chiefly by the alumni, which has been devoted to the erection of new buildings. These include the Administration Building (Woodbridge Hall), University Hall, Memorial Hall, and Woolsey Hall, in the auditorium of which university functions are conducted. Among other recent buildings are Byers Hall, to serve the social and religious purposes of the Sheffield Scientific School; Kirkland Hall, a laboratory for geology and kindred sciences; a dormitory given to the scientific school by Frederick W. Vanderbilt; and the Lampson Lyceum, containing lecture halls and administration offices for the academic department.

The total student enrollment in 1903-04 was 2963, distributed as follows: Graduate, 333; college, 1250; Sheffield Scientific School, 837; fine arts, 35; music, 82; Forest School, 64; divinity, 97; medicine, 141; law, 259. The faculty consisted of 329 instructors.

YALTA, yäl′tȧ. A district town in the Government of Taurida, South Russia, on the southern coast of the peninsula of the Crimea, 60 miles south of Sinferopol (Map: Russia, D 6). It is a well-known sea-bathing resort. Its situation is picturesque. Population, in 1897, 13,269. Yalta is identified with the Galita or the Yalita of the Arabs. It was held by the Genoese in the fifteenth century.

YA-LU-KIANG, yä′lo͞o′kyäng′. One of the most important rivers of Korea, where it is also known as the Amnok or Apnok (Map: Korea, G 3). It rises in the Paik-tu-san (8000 feet high), the highest of the Shan-a-lin or Changpeh-shan system of Manchuria, latitude 41° 59′ N., and flows in a generally southwest direction into the Yellow Sea near the city of Wiju, forming in its course the northwest boundary of the country. It is navigable by sea-going junks for 30 miles from its mouth, and by smaller craft as far as Wi-wön, 145 miles farther up. In its upper course it is obstructed by some eighteen dangerous rapids, yet immense rafts of fine timber are annually floated down to the sea, chiefly for export to Northern China. Off the mouth of the Yalu a great naval battle between the Chinese and the Japanese was fought in 1894, resulting in the destruction of the Chinese fleet. See Korea.

YA-LUNG-KIANG, yä′lo͝ong′kyäng′. A river of Western China, rising on the southern slope of the Bayan-kara, an eastern extension of the Kuen-lun Mountains in Eastern Tibet, near the headwaters of the Yellow River, latitude 34° N., and longitude 97° E. (Map: China, B 6). Its course is generally south through deep gorges parallel with the Kin-sha-kiang or Yang-tse, which it joins after a course of several hundred miles in latitude 26° 35′ N. It is a very swift stream, much impeded by rapids, and is not navigable except in local stretches.

YAM (from Sp. *ñame, iñame, igname, ignama,* Port. *inhame,* yam, from African *nyame,* yam), *Dioscorea.* A genus of mostly East and West Indian plants of the natural order Dioscoreaceæ, distinguished by an inferior ovary and membranous winged fruit. They have herbaceous twining stems, and fleshy roots which in some species are used as food, like potatoes. They contain much starch, and generally become somewhat mealy and pleasant to the taste when boiled. The tubers of all the yams contain an acrid substance, which, however, is dissipated by boiling, except in the species with compound leaves. The winged yam (*Dioscorea alata*) has roots 1½ to 3 feet long, and often 30 pounds in weight, with a brownish or black skin, juicy and reddish within. They vary exceedingly in form. Small tubers are generally found in the axils of the leaves. This species is the original of most, or perhaps all, of the yams cultivated in tropical Asia, Africa, and America: the common yam of the West Indies (*Dioscorea sativa*), which has a round stem and heart-shaped leaves; *Dioscorea bulbifera,* in which the tubers in the axils of the leaves attain the size of apples; the prickly yam (*Dioscorea aculeata*), which has a prickly stem, and a fasciculated, tuberous root; *Dioscorea globosa,* the most esteemed yam of India, which has very fragrant flowers, and roots white internally; *Dioscorea rubella,* another Indian kind, with tubers sometimes 3 feet long, tinged with red below the skin, etc. The Chinese yam (*Dioscorea divaricata*) is a perfectly hardy sort. Its edible club-shaped roots descend perpendicularly into the ground from two to three feet, and largely on this account it is little cultivated.

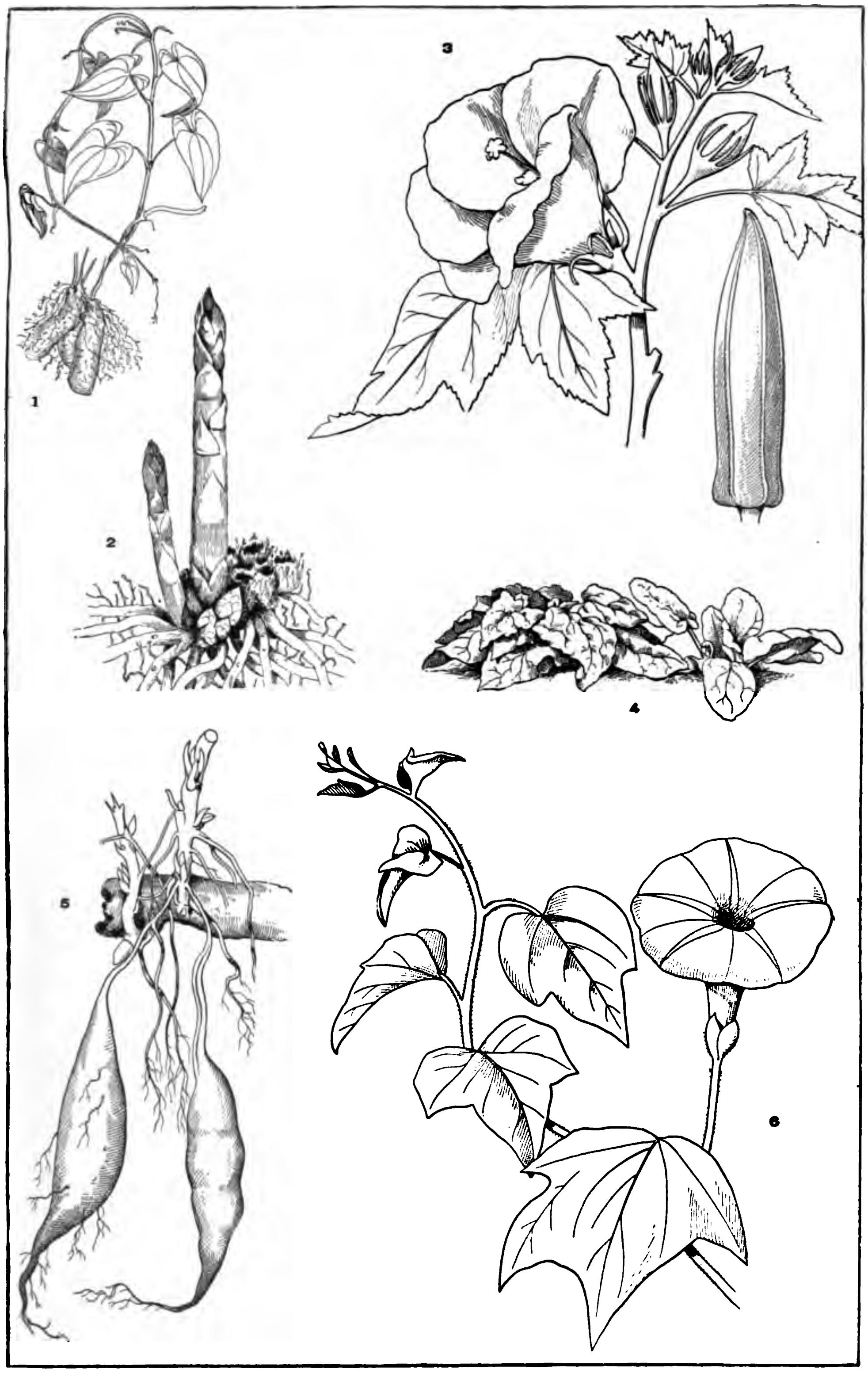
WILD YAM (*Dioscorea villosa*).

YAMA, yä′mȧ (Skt. *yama,* Av. *yima,* twin, but in later Sanskrit literature erroneously regarded as restrainer, punisher, from *yam,* to restrain). In Hindu mythology, a deification of the first mortal that died and thus became king of death, the judge and ruler of souls hereafter. In the Veda Yama is the supreme lord of the blessed dead. His abode is in the sky, in the highest heavens, near the sun. Agni (q.v.), the god of fire, is his friend and conducts the souls of the dead to his presence. Yama, moreover, has two dogs as messengers, and past these all the spirits of the dead must go. As a king in the Veda he is the child of Vivasvat, a personification of the sun and of Saranyu, a sun-maiden. He has also a twin sister named Yami, who desires to become his wife, and a hymn of the *Rig-Veda,* which gives a dialogue between them, contains evidently a protest against such a union.

In the later Hindu mythology, especially in the epic poems and in the *Purāṇas* (q.v.), Yama has assumed wholly the office of judge of the dead and regent of the lower world. His realm is in the south; a number of hells are his, and in them he inflicts punishment upon the wicked. His messengers go about the earth summoning men to death, and drawing the soul out of the body with a noose, although he sometimes performs this office himself.

In Iranian mythology Yima or Jamshid an-

YAM, SWEET POTATO, ETC.



1. YAM (Dioscorea alata). 3. OKRA (Hibiscus esculentus).
2. ASPARAGUS (Asparagus officinalis). 4. SPINACH (Spinacia oleracea).
5 and 6. SWEET POTATO (Ipomœa Batatas).

swers in part to the Indian Yama, but is also the ideal ruler under whose sway the golden age of the world prevailed. Consult Ehni, *Die ursprüngliche Gottheit des vedischen Yama* (Leipzig, 1896).

YAMACRAW, yä′må-krą. A refugee band from the Greek confederacy (q.v.), formerly occupying a village on the south side of the Savannah River at Yamacraw Bluff, now included within the limits of the city of Savannah, Ga. A treaty was made in 1733 between the Georgia colonists and the Lower Creek towns. The Yamacraw afterwards retired to the Chattahoochee River, from which they had originally come. The name appears to be a corruption of Yamassee (q.v.).

YAMADA, yå-mä′då. A town of Japan. See Uji-Yamada.

YAMAGATA, yä′må-gä′tå. The capital of the Prefecture of Yamagata, in Japan, situated in the northern part of the island of Hondo, about 40 miles north of Fukushima (Map: Japan, G 4). It is a former castle town, is well built, and has a considerable trade. Population, in 1898, 35,300.

YAMAGATA, Aritomo, Marquis (1838—). A Japanese general and statesman. He was born in the Province of Coshu, the son of a Samurai or member of the feudal warrior class. He distinguished himself in the suppression of the Shoguns and was given a place in the Ministry of War under the new régime. He was made Minister of War in 1873, at the outbreak of the Satsuma rebellion in 1877. He defeated Saigo and was rewarded with the command of the Imperial Guard and the direction of the general staff. In 1885 he was given the portfolio of the Interior, in 1889 succeeded Kuroda as Premier, and in 1891 became Minister of Justice. In the Chinese War of 1894-95 he swept the enemy out of Korea, crossed the Yalu, and was marching upon Mukden when ill health forced him to retire. For his services he was elevated to the marquisate and appointed field-marshal.

YAMAGUCHI, yä′må-gōō′chē. The capital of the Prefecture of Yamaguchi, in Japan, situated in the southwestern end of the island of Hondo, a short distance from the coast (Map: Japan, B 6). It was formerly the seat of the famous lords of Choshu. A Christian mission was established here by Saint Francis Xavier in 1550. Population, in 1899, 42,786.

YAMAJI, yä′må-jē, Motoharu, Viscount (c.1840—). A Japanese general, born in the Province of Tosa (Shikoku). He is popularly known as the One-eyed Dragon. He won recognition in the Satsuma rebellion; was promoted to be lieutenant-general, and after the reorganization of the nobility in 1884 was created a baron. During the Chinese campaign of 1894-95 he made a brilliant attack on Port Arthur. In acknowledgment of his military services, he was patented a viscount in 1895.

YAMAMAI MOTH. See Silkworm.

YAM′ASSEE (peaceable, hospitable). A tribe of Muskhogean stock (q.v.) formerly holding both sides of the lower Savannah River and extending as far as the Salkiehatchee in South Carolina. They seem also to have had some villages southward almost to Florida. At the time of the settlement of South Carolina they were one of the most important tribes of the coast region and were friendly to the colonists until the exactions of the traders and the raids of slave dealers provoked them to war. They enlisted the Catawba, Cherokee, Congaree, and other tribes almost to the Virginia border in a general rising against the whites, and began the war on April 15, 1715. They were defeated on the Salkiehatchee by Governor Craven a year afterwards and were driven from South Carolina, retiring to Florida, where they were welcomed as friends and allies by the Spaniards. They were finally incorporated into the cognate Creeks and Seminole, among whom they retained their distinct name up to the period of the Creek War.

YAMBOLI, yäm′bô-lē, or Jamboli. A town in Eastern Rumelia, 49 miles west of Burgas, on the Tunja River, here spanned by two bridges (Map: Balkan Peninsula, F 3). The remains of an old mosque and the old fortifications are of interest. There are prominent wine and wool interests. Population, about 14,000.

YAMBU, yäm′bōō, or Yembu. The port of Medina, in Arabia, situated on the Red Sea, about 120 miles west-southwest of that city (Map: Turkey in Asia, P 11). Population, estimated at from 5000 to 7000. Yambu is important for its pilgrims' caravans, being on the route from Cairo to Mecca. It is called the 'Gate of the Holy City.' Its houses are constructed of coral stone and limestone. It carries on a considerable trade with the ports of the Red Sea.

YAMEO, yå-mā′ō. An important tribe, with several subtribes and apparently constituting a distinct linguistic stock, ranging along the Marañon (Amazon) from the Huallaga down to the Javary and also along the lower courses of these two streams, in Northeastern Peru. They are also known as Llameo, Lama, and Lamista, and a part of them at least were anciently known as Motilon, but are not to be confounded with another tribe of the same name formerly living upon Lake Maracaibo in Venezuela. (See Motilon.) Physically the Yameo are small and rather Mongoloid in appearance, contrasting strongly with the other tribes of the region. They were formerly very warlike, but are now agricultural and industrious, as well as enterprising traders and travelers. They had a highly developed clan system and marriage within the clan was forbidden. A part of them were civilized by the Franciscans and settled at Moyobamba and other stations on the Huallaga, where they are now farmers and cotton-weavers. Those farther to the east were also visited by missionaries at a later period, but retain their original character.

YAMUNA, yä′mŏŏ-nå. The Sanskrit name of the River Jumna (q.v.).

YANAON, yå′nå′ôɴ′. A French possession in India, on the eastern coast of Madras, near the mouth of the Godavari River (Map: India, D 5). It is an administrative dependency of Pondicherry (q.v.). Area, about six square miles. Population, about 5000 in 1901.

YAN′CEY, William Lowndes (1814-63). An American orator, lawyer, and political leader, born at Ogeechee Shoals, Ga. He studied law at Greenville, S. C., was admitted to the bar in 1834, and besides practicing his profession edited a Unionist paper and spoke against nullification. In 1836 he removed to a plantation at Oakland, near Catawba, Ala. His slaves having been accidentally poisoned, he reëntered law and journalism, was prominent as an anti-Whig orator in the Presidential campaign of 1840, and from 1841 to 1844 was a member of the State Legislature. From 1844 to 1846 he was a member of Congress, and soon after taking his seat attracted national attention by his participation in a bloodless duel with Representative Clingman of North Carolina. Resigning from Congress, he became a bitter opponent of compromise between the North and the South, was the author of the famous "Alabama Platform" of 1847, fought vigorously against the compromise measures of 1850, anticipated the coming conflict between the sections, and became the recognized leader of the more radical element in the South. In the period immediately preceding the Civil War his remarkable oratory contributed perhaps more than anything else to 'fire the Southern heart,' and he was preëminently the 'orator of secession.' He was a member of the national Democratic Nominating Convention at Charleston in 1860; led from that convention the seceders, who afterwards met at Baltimore; and then made a canvass of the North, speaking to great audiences in the Middle, New England, and Western States. "It was he more than any other," says Woodrow Wilson, "who taught the South what Douglas really meant, he more than any other who split the ranks of the Democratic Party at Charleston, made the election of Douglas impossible, and brought Mr. Lincoln in." Slightly before the outbreak of the Civil War, Yancey was sent by the Confederate Government as the head of a commission, consisting besides himself of P. A. Rost and Dudley Mann, to secure the recognition of the Confederacy by the various European governments; but after vain attempts in London and Paris to accomplish his purpose, he returned in the early spring of 1862, and thereafter until his death was a member of the Confederate Senate. Consult: Du Bose, *Life and Times of William Lowndes Yancey* (Birmingham, 1892); and a chapter in W. G. Brown's *The Lower South in American History* (New York, 1902).

YANG-TSE-KIANG, yăng′tsĕ′kyăng′ (the Yang-tse River). The longest and most important river of China, having a length of over 3000 miles and a drainage area of between 650,000 and 700,000 square miles (Map: China, C 5). It has its origin in a number of small rivulets which at a height of over 16,000 feet above the level of the sea dash down the northern slope of the snow-covered Tang-la Mountains of Tibet, near latitude 33° 45′ N., and longitude 90° E. Under the name of the Murui-usu or 'Tortuous Stream' it flows east and northeast for some distance, receives two important affluents—the Napchi-tai and the Toktonai—from the Kuenlun Mountains in the northwest, and gets the name of Di-chu or Dré-chu. At about 98° E. longitude it takes a southerly course and for several hundred miles—with the Tibetan name of Ngeh-chu or the Chinese name of Kin-sha-kiang, 'River of Golden Sand'—it parallels its great tributary the Ya-lung-kiang (q.v.). In latitude 26° N. it enters the Chinese Province of Yun-nan, bursts through its rocky barriers on the east, takes a northeasterly direction, receives from the north the turbulent waters of the Ya-lung in latitude 26° 35′ and the name of Pei- (or *Pai-*) shui- ('white waters'), forms in part of its course the boundary between Yun-nan and Sze-chuen, enters Sze-chuen, which it traverses in a northeasterly direction. Here it receives from the south the waters of the Hêng or Ta-kwan, the Nan-kwang, the Yungning, the Chih-shui, the K'i-kiang, and from Kwei-chow the Wu or Kung-t'an at the city of Fu-chow, 72 miles east of Ch'ung-k'ing. From the north it receives the Min at Hsü-chow or Sui-fu (taking the name of Min-kiang), the T'o at Lu-chow fu, and the Kia-ling at Ch'ung-k'ing (q.v.) in latitude 29° 34′ N. and longitude 107° 2′ E., all navigable by native craft for hundreds of miles. Between 500 and 600 miles farther east, at a point 15 miles west of I-chang (q.v.), it escapes from the mountains, and with slackened pace and many a bend and detour pursues a generally east and east-southeast course through the very heart of China, receiving the entire drainage of the provinces of Hu-peh, Hu-nan, Ngan-hwei, Kiang-si, and Kiang-su, and near the little island of Sha-wei-shan, in latitude 31° 25′ N., and longitude 122° 14′ E., it pours into the Yellow Sea 770,000 cubic feet of water per second, and annually deposits in it about 6,000,000,000 cubic feet of suspended matter.

From the city of Fu-chow, in Sze-chuen, as far east as Ngan-hwei and beyond, it is known as the *Ta-kiang* or 'Great River,' the *Ch'ang-kiang* or 'Long River,' or simply as *Kiang* or 'The River.' From Ngan-hwei—the old Province of Yang—to the sea, it is properly known as the Yang-tse, but foreigners are in the habit of applying the name to the whole river. With its numerous tributaries and feeders the Yang-tse provides an unrivaled system of internal communication, which is now practically open to foreign commerce. Hankow, 600 miles from the sea, may be reached by the largest ocean steamships trading with the East, and I-chang, 500 miles farther up, by light-draught steamboats. Above this the river presents a succession of gorges and rapids, with a very strong and swift current up which native craft (up to 60 or 70 tons burden) are hauled at great risk and expense, and frequent loss of life, by large crews of native trackers, at the rate of a few miles a day. All attempts to use steam as far as Ch'ung-k'ing have resulted in failure. P'ing-shui-hien, 200 miles above Ch'ung-k'ing, is the limit of native navigation. Toward the end of summer the river frequently rises as much as 50 feet, flooding the fields and towns on its banks over a vast area, and sometimes causing terrible destruction of life.

YANINA, yä′nē-nä. See JANINA.

YANKEE (of uncertain etymology). Yankee was long the popular name given to a New Englander in America, and in Europe has been often applied indiscriminately to the entire population of the United States. One explanation of its origin, which is, perhaps, the most plausible, is that it is a corruption of the word English as pronounced by the Indians (Yenghies, Yanghies, Yankees). As a term of reproach to the New Englanders (who afterwards adopted it themselves), the word seems first to have been used by the British soldiers about 1775. In the War of the Rebellion the South applied it to the North generally.

YANKEE DOODLE. A national air of the United States, the origin of which is unknown. The words, which were in derision of the ill-assorted provincial troops, are said to have been written in 1755 by Dr. Schuckbrugh, who served as surgeon under General Amherst during the French and Indian War. The original title of the song, not the tune, was *The Yankee's Return from Camp*, and several versions are extant. The tune passed through various changes. Its historical association has modified criticism of the melody, which is shallow and shrill. It has been ascribed to various countries, but is probably of English birth. It occurs in Samuel Arnold's opera of *Two to One* (London, 1784), under the name of *Yankee Doodle*. Consult: Johnson, *Our Familiar Songs* (New York, 1881); Fitz-Gerald, *Stories of Famous Songs* (London, 1897).

YANK'TON. The county-seat of Yankton County, S. D., 61 miles northwest of Sioux City, Iowa, on the Missouri River, and on the Chicago, Milwaukee and Saint Paul, the Chicago and Northwestern, and the Great Northern railroads (Map: South Dakota, H 7). It is the seat of Yankton College (Congregational), opened in 1882, and of the South Dakota Hospital for the Insane. The city derives considerable commercial importance from its situation in an extensive farming and stock-raising section, and is known for its large cement works and flouring mills. There are also grain elevators, brick yards, and breweries. Under the revised charter of 1885, the government is vested in a mayor, chosen annually, and a unicameral council. The waterworks are owned and operated by the municipality. Yankton was settled in 1862 and received a city charter in 1883. It was the capital of the Territory of Dakota until 1883. Population, in 1890, 3670; in 1900, 4125.

YAO, you. One of the 'ancient sovereigns' of China. The *Shu-King* or "Book of History"—the oldest historical record the Chinese possess—begins with the reign of Yao (B.C. 2357), and shows him at the head of an elaborate, well-organized governmental system, carefully searching out able and virtuous men to be placed at the head of the different departments, and appointing astronomers to regulate the seasons. In the sixty-first year of his reign (B.C. 2296) occurred the great inundation commonly known among foreigners as 'the Chinese Flood,' whose 'regulation' taxed the energy of one engineer for nine years and his successor for thirteen. In the seventieth year of his reign (B.C. 2287), wishing to retire, Yao, passing over his own son, selected Shun, noted for his filial piety, as his colleague and successor. He died in B.C. 2258. Very little more is known regarding him, except that he was the son of one of the kings who had succeeded Hwang-ti (q.v.). He is the first of the "ancient kings" of China so much lauded by Confucius for their virtues.

YAPOCK (named from the *Oyapok* River, between French Guiana and Brazil). An aquatic opossum (*Chironectes palmatus*) of Central and South America, rather larger than a rat, and differing from the true opossums mainly in its webbed hind feet and aquatic habits. It has capacious cheek-pouches, in which it stows away its food, which consists largely of crustaceans, mollusks, and aquatic insects, until it can retire to a comfortable eating place. Its marsupial pouch is perfect.

YAPON

YAPON, or **YAUPON** (*Ilex Cassine*). An evergreen species of holly native in the coastal States from Virginia to Texas and Arkansas. Generally it is a shrub which forms dense thickets from its suckering roots, but in the Southwest it sometimes becomes arborescent. Its abundant scarlet berries are valued for winter decoration. Popularly it is known as cassena, and South Sea, Carolina, and Appalachian tea.

YAPOO, yä′po͞o. A tribe of Tierra del Fuego. See YAHGAN.

YAPURÁ, yä′pōō-rä′, or JAPURÁ. One of the two largest north tributaries of the Amazon, rising in the Colombian Andes, where it is known under the name of Caquetá (Map: America, South, C 3). It flows through the eastern territory of the Columbian Department of Cauca in a southeastern direction and then enters the Brazilian Province of Amazonas, where, after flowing east for some distance, it divides into a large number of arms which join the Amazon at various points, the western and easternmost mouths being five hundred miles apart in a straight line. The central and principal arm enters the Amazon opposite the town of Teffe, about longitude 64° 40′ W. The total length of the Yapurá is estimated at nearly 1500 miles, of which about 600 are navigable. A considerable portion of its course is still unexplored and the country through which it flows is but sparsely inhabited.

YAQUI, yä′kê. An important and warlike tribe of Piman stock (q.v.), who have numerous villages along the Yaqui River in central Sonora, Mexico. They are a robust, active people, industrious, enterprising, talented in music, and of most determined bravery. At home the men concern themselves chiefly with stock-raising and the cultivation of corn, cotton, beans, tobacco, and the maguey from which the mescal liquor is obtained. The women are expert weavers. Their houses are light structures adapted to the warm climate. Each village has its own chief. They have the clan system and several ceremonial societies resembling those of the Pueblo tribes. In the outlying country the men are employed as miners, cattlemen, teamsters, and pearl divers. They make good soldiers, but their history has been one of almost constant revolt against the Mexican Government. A rising in 1740-41, in which they were joined by the neighboring Mayo (q.v.), was put down by Governor Vildosola, who defeated the Indians in two great battles, and shot their chiefs after the tribes had submitted. The Yaqui remained quiet until 1825, when an attempt at taxation by the newly established Mexican Government led to another revolt under Juzucanea, known as Banderas, from a banner which he carried, claimed to have originally belonged to Montezuma. He proved an able general and organizer, making his own powder, arranging alliances with the neighboring tribes, restraining his people from unnecessary cruelties, and hiring several white soldiers to drill his men. After three years' fighting, said to have cost 3000 lives, the war was brought to a close on the promise of concessions by the Mexican Government, with permission to the Yaqui to retain their captured arms, cattle, and supplies. Banderas was commissioned Captain-General of the tribe with a regular salary.

In 1832 Banderas headed another rising with the purpose of organizing the tribes of Sonora into an Indian State with himself as King. With a thousand Yaqui warriors, reinforced by contingents of Pima (q.v.) and Opatá (q.v.), he marched upon Ures, but was met and defeated by Escalante in a desperate battle. Banderas himself was taken and shot. The war continued for nearly a year longer, but the Indians were finally brought to submission. Another war, begun about 1884, ended in April, 1887, with the capture of the Yaqui chief Cajenie, who was publicly executed in the presence of his people. This war had been brought about by encroachments upon the lands of the tribe, and at its close the Indians were supposed to be completely crushed, but continued inroads of gold-hunters upon the Yaqui territory, with the connivance of the Mexican Government, led to serious disturbances a few years afterwards and culminated in 1900 in a general rising. In one of the first engagements a small detachment of Mexican troops was surprised near Mazatlan and half their number were killed. Soon afterwards General Torres with 700 troops surrounded a large force of Yaqui in a cañon near the same place and killed 124 men, women, and children, and captured 234 women and children, who were at once deported to practical slavery in Yucatan. In 1740 the Yaqui were supposed to number about 40,000, but continued wars have reduced them to about 13,000.

YAQUI. A river of Northwestern Mexico (Map: Mexico, D 4). It is formed by two headstreams, both bearing the name of the main stream, one rising on the plateau of Chihuahua, the other in Arizona. From the confluence the main stream flows southwestward through the mountains of Sonora, and empties into the Gulf of California after a course of 520 miles. Coursing through a rugged mountain valley, it is not navigable to any extent.

YARD. See WEIGHTS AND MEASURES.

YARIBA, yä'rē-bȧ. A former negro kingdom in Africa. See YORUBA.

YARITAGUA, yä'rē-tä'gwȧ. A town of Venezuela, situated in a beautiful mountain valley, 75 miles east of Lake Maracaibo (Map: Venezuela, D 2). It is noted for the production of excellent tobacco, and is a commercial centre of some importance. Population, about 12,000.

YARKAND, yär'känd'. A town of Eastern Turkestan, Chinese Empire, on the Yarkand-Darya, a headstream of the Tarim (q.v.), about 100 miles southeast of Kashgar (Map: Asia, G 5). It lies in a fertile valley and is surrounded by a high wall and a moat. In the northwestern part of the city rises the fort of Yengisher. There are also a citadel in the new Chinese quarter, an old palace of the Emir, numerous mosques, and a fine bazaar. Yarkand is the centre of an agricultural and stock-raising region and manufactures felt and carpets. It also carries on a considerable trade in wool, silk, leather, dyes, sugar, opium, tea, etc. The city was taken by the Dungans in 1864, and became the second capital of Kashgar under Yakub Beg (q.v.), but was recovered by the Chinese in 1877. Its population is estimated at from 70,000 to 100,000, composed principally of Mohammedans of Turko-Tatar descent.

YARMOUTH, yär'mŭth, or GREAT YARMOUTH. A seaport, fishing and sea-bathing town of England, on the east coast of Norfolk, 19 miles east of Norwich, at the mouth of the Yare, on a peninsula about a mile and a half broad, washed on the west by the Yare and Breydon Water, and on the east by the North Sea (Map: England, H 4). The town communicates with the Suffolk suburbs of Southtown, or Little Yarmouth, and Gorleston on the right bank of the Yare, by a bridge. Quays border each side of the river for nearly two miles, and here are the town hall, the council chamber, and several other handsome buildings and many of the finest houses. There are a sailors' home, fishermen's hospital, and military asylum, the principal church being that of Saint Nicholas, founded in the twelfth century, a handsome cruciform building with a tower and spire 168 feet high. The town also has a monumental column, 144 feet high, to the memory of Nelson, several batteries, and a marine drive and promenade two miles long. Vessels of over 200 tons can enter the harbor, which is formed by the Yare. Yarmouth is the principal seat of the English herring fishery. The curing of fish is important, and the 'Yarmouth bloater' is highly esteemed. An extensive export trade in agricultural produce, herrings, and malt is maintained. Shipbuilding is carried on, as well as the manufacture of ropes, sails, nets, and silk goods. There are also foundries, tan works, and flour mills. Population, in 1891, 49,334; in 1901, 51,250.

YARMOUTH. A port of entry and the capital of Yarmouth County, Nova Scotia, Canada, on a small bay of the Atlantic, and the Dominion and Atlantic Railroad, 205 miles southwest of Halifax (Map: Nova Scotia, C 6). It is the chief shipbuilding place in the province. It has also large fishery interests. Population, in 1891, 6089; in 1901, 6430.

YARN (AS. *gearn*, OHG. *garn*, Ger. *Garn*, yarn). The name applied to the thread spun for the purpose of weaving cloths of various kinds. It differs not only in the materials of which it is made, but also in the fineness to which it is spun. The latter quality is of great importance, as upon it depends entirely the evenness and quality of the manufacture. In order that uniformity may be insured, a pound of the material is taken as the standard, and this is divided into *hanks* or *cuts*. Thus, with linen yarn, a hank or cut consists of 300 yards; and if it takes 25 of these hanks to make a pound, the yarn is called 25s; and if 40, 40s; and so on. A hank of wool or cotton consists of 840 yards. See Spinning; Cotton; Wool.

YAROSLAV, yär'ös-läf'. A government of Central Russia (Map: Russia, E 3). Area, about 13,750 square miles. Agriculture is the principal occupation. The household industries are developed in Yaroslav as they are in but few parts of Russia. Linen-weaving is especially important and has for its centre the industrial village of Velikoye. The production of locks, knives, nails, agricultural implements, etc., is considerable. There are besides a number of cotton and flour mills, paper mills, chemical works, etc. The transit trade in grain is important. Population, in 1884, 1,118,130; in 1897, 1,072,478.

YAROSLAV. The capital of the Government of Yaroslav, in Central Russia, situated on the right bank of the Volga, 174 miles northeast of Moscow (Map: Russia, E 3). It is an ancient town with a number of interesting old churches. The manufacturing industries are important, one cotton mill alone employing over 7000 persons. Other important establishments are tobacco factories, flour mills, and paint factories. Population, in 1897, 70,610. Yaroslav was founded in the eleventh century and was the capital of a principality from the beginning of the thirteenth to the end of the fifteenth century, when the principality was absorbed by Moscow. See Russia, section on *History*.

YAROSLAV (?-1054). Grand Prince of Kiev, son of Vladimir (d.1015). Upon his father's death he inherited Novgorod. Soon afterward Svatopolk of Turov gained possession of Kiev, which in 1019 was wrested from him by Yaroslav with Scandinavian aid. After the death of his elder brother Mstislav, in 1039, Yaroslav was ruler of the greater part of what then constituted Russia. He founded, among other towns, the city of Yaroslav. He married Indegerd, daughter of the Swedish King Olaf. His deeds were celebrated in some of the Norse sagas.

YAR'RELL, William (1784-1856). An English naturalist, born in London. He was one of the founders of the Zoölogical Society in 1826. His chief works are: *History of British Fishes*, illustrated by 400 woodcuts (2 vols., 1835-36; 3d ed., with memoir of the author, 1859); and *History of British Birds*, with 520 wood engravings (3 vols., 1839-43; 4th ed. 1881-85).

YAR'ROW. A small stream in Selkirkshire, Southern Scotland, joining the Ettrick, a tributary of the Tweed, near Selkirk. On its banks are the ruins of Newark Castle, and Bowhill, the ducal seat of Buccleuch. The stream and its historic and beautiful surroundings have been celebrated by many poets, among them Scott and Wordsworth.

YARROW. A genus of plants. See Achillæa.

YARUMAL, yä'rōō-mäl'. A town of the department of Antioquia, Columbia, 52 miles northeast of Medellén, on the right bank of the Cauta. In the vicinity are gold mines and extensive pastures. Population, about 10,000.

YASSY, yäs'sē. See Jassy.

YATES, Edmund Hodgson (1831-94). A British journalist and novelist, born in Edinburgh. He was educated at a Highgate school and privately in Germany. At the age of sixteen he entered the general post-office and rose to the head of the missing-letter department. In 1872 he retired from the post-office on a pension of £200 a year that he might devote his time wholly to literature. In that year he came to the United States on a lecturing tour, and in 1873 and 1874 he was London correspondent for the *New York Herald*. Of his numerous journalistic ventures, the most successful was *The World*, a London society paper, which he founded in 1874. For an attack on Thackeray in *Town Talk*, he was expelled from the Garrick Club (1858); and for a libel on the Earl of Lonsdale in *The World* (1883), he was imprisoned for seven weeks (1885). He died in London, May, 20, 1894. Yates's first novel was *Broken to Harness, a Story of English Domestic Life*, which appeared in *Temple Bar* for 1864, a magazine which he was then editing. Among the many novels that followed are *Land at Last* (1866); *The Black Sheep* (1867); *Nobody's Fortune* (1871); and *The Impending Sword* (1874). Besides numberless magazine articles and sketches, Yates also wrote several successful farces, and finally a valuable and interesting autobiography entitled *Recollections and Experiences* (1884).

YATES, Richard (1818-73). An American political leader, the 'war Governor' of Illinois. He was born in Warsaw, Ky.; removed with his parents in 1831 to Springfield, Ill.; graduated at Illinois College, Jacksonville, in 1838; and practiced law in Springfield. He became prominent in local Whig politics, was a member of the State Legislature from 1842 to 1849, and from 1851 to 1855 was a member of Congress. Allying himself with the Republican Party at its organization, he was its candidate for Governor in 1860, and was elected, serving until 1865. The activity and loyalty displayed by him during this time marked him as one of the greatest of the country's 'war Governors.' His advice was constantly sought by President Lincoln in regard to national problems, and in State affairs he overcame and controlled the strong pro-Southern movement that developed great strength in Illinois during the darkest days of the war. From 1865 until 1871 he was a member of the United States Senate, and took a prominent part in reconstruction legislation. His son, Richard (1860—), was elected Governor of Illinois as a Republican for the term 1901-05.

YATES, Robert (1738-1801). An American jurist. He was born in Schenectady, N. Y., was educated in New York City, and in 1760 began the practice of the law in Albany. He sided with the Patriot Party on the approach of the Revolutionary War, and wrote several anti-British essays (signed "The Rough Hewer"), which attracted widespread attention. He was a member of the Provincial Congress from 1775 to 1777, serving on the committee which drew up New York's first Constitution in 1776; was a judge of the Supreme Court of New York from 1776 to 1798; and was Chief Justice after 1790. In 1787, he was one of New York's three delegates to the United States Constitutional Convention, but being an extreme anti-Federalist, soon withdrew, after playing the part of an obstructionist, and in the following year violently opposed the ratification of the Constitution by New York. His notes of the debates in the convention of 1787 were published at Albany in 1821 as *Secret Proceedings and Debates of the Convention Assembled at Philadelphia in 1787*. They were said by Madison to be "prejudiced and full of gross errors."

YA-TUNG, yä'to͞ong' (said to mean 'Hole-in-the-Valley'). A British trading-post in Tibet, near the border of Sikkim, established in 1894 in accordance with the provisions of a convention negotiated in 1890, the necessary buildings being provided by the Chinese Government. It lies due north of Calcutta, 7 miles from the Jelep Pass (14,700 feet) over the Southern Himalayan range, 14 from Gnatong (12,530 feet), in Sikkim, where a British garrison is maintained, and 80 miles from Darjiling (7400 feet), also in Sikkim, the terminus of the Indian railway system in that direction. Yatung is situated in the Chumbi Valley at an elevation of 10,480 feet above the level of the sea, and is reached from Darjiling over the Jelep Pass in seven days. The place is entirely shut in by lofty mountains and a battlemented 'Chinese wall' built across the gorge. The climate, however, is healthful; the highest temperature in 1901 was 70° F., the lowest 10° F. The population consists of a Chinese-Tibetan garrison of 28, the commissioner of Chinese customs, the British resident, and an occasional trader.

YAUCO, yä'o͞o-kō. A town on the southern coast of Porto Rico, 68 miles west of Ponce, in the midst of the important coffee-growing section of the island (Map: Porto Rico, B 2). Population, in 1899, 6108.

YAVAPAI, yȧ-vä'pī (sun people). A North American Indian tribe of Yuman stock (q.v.), originally an offshoot from the Mohave (q.v.) of the Colorado River, and claiming the territory between the Bill Williams fork and the Rio Verde. From their close associations with the Apache (q.v.) they were sometimes known as Apache Mohave. They are now gathered with the Apache on the San Carlos Reservation, Arizona, to the number of 470. In their aboriginal habits and characteristics they resembled the Mohave and the Apache. The majority now wear citizen's dress and earn a fairly good living among the whites, but still prefer the brushwood wikiup, which they always burn when a death takes place, the family then moving to a new location. The dead are buried in crevices of the rocks.

YAVARY, yä'vȧ-rē'. Another spelling for Javary (q.v.), a tributary of the Amazon.

YAWNING (from *yawn*, AS. *gānian*, *ginian*, OHG, *geinōn*, *ginēn*, Ger. *gähnen*, to yawn; connected with Lat. *hiare*, *hiscere*, OChurch Slav. *ziyati*, Lith. *zióti*, to yawn, OIr. *gin*, mouth, Gk. χειά, *cheia*, hole). A long, deep, involuntary inspiration accompanied by unusual expansion of the chest, wide opening of the mouth, and elevation of the shoulders. It is generally an evidence of mental weariness, though it is frequently imitative. This modified respiratory movement is caused by imperfect aëration of the blood and is essentially reflex, the stimulus determining each movement acting on the respiratory centre. It occurs during paralysis of the muscles which raise the shoulder. Yawning occurs in certain animals, as the dog, lion, and horse.

YAWS (probably from African *yaw*, raspberry, so called because of the tubercles characterizing the disease). A contagious disease characterized by an eruption of white or yellowish tubercles, granules, or papules, topped with crusts, and sometimes becoming confluent. This eruption is found on any part of the body. The disease is common in Africa, Central America, Brazil, Guiana, the West Indies, Mozambique, and Madagascar, Java, Ceylon, the Fiji Islands, and Samoa, and is found in any country to which slaves have been taken from Africa, although a tropical disease. It is also called framboesia, pian, bubas, coko, tonga, and many other names. An attack lasts from two to six months, or for many years. Mercury, iodide of potassium, iron, arsenic, sarsaparilla, and sulphur are used in its treatment. Consult Nicholls, "Yaws," in *Reference Handbook of the Medical Sciences*, vol. xvi. (New York, 1899).

YAZOO, yăz'o͞o. A river in the State of Mississippi. It originates in several bayous thrown off by the Mississippi River near Friarpoint, in the northwestern part of the State (Map: Mississippi, D 5). These are reënforced by the Coldwater, Tallahatchie, Yalobusha, and other streams from the northeast, after which the Yazoo proper flows in a sluggish and winding southwest course through fertile bottom lands till it rejoins the Mississippi 12 miles above Vicksburg. Its total length is about 300 miles, and it is deep and navigable throughout the year.

YAZOO CITY. The county-seat of Yazoo County, Miss., 45 miles northwest of Jackson, on the Yazoo River, and on the Yazoo and Mississippi Valley Railroad. Cotton-growing is the leading industry of the adjacent section, and there are also important corn-growing and lumbering interests. The principal industrial establishments include a cotton mill, a cottonseed-oil mill, and a lumber mill. Population, in 1890, 3286; in 1900, 4944.

YAZOO FRAUD. A term commonly applied to the transaction by which the State of Georgia, through an act of the Legislature of January 7, 1795, granted a large portion of her western territory chiefly to four land companies known as the Yazoo Companies from the region thus deeded. The consideration was $500,000, and the area of the tract conveyed was about 35,000,000 acres. The territory was described as extending from the Alabama and Coosa rivers to the Mississippi and from the thirty-fifth to the thirty-first parallel of latitude. It was believed that the Legislature had acted from corrupt motives, as it appeared that every member of that body except one was a shareholder in one or more of the companies. Many of the buyers were notorious speculators, and many were residents of other States. The people of the State were indignant and a party was formed to agitate for the repeal of the sale. A new Legislature was elected, and the repeal was brought about. By the statute of February 13, 1796, the records of the transaction were burned in the presence of the Governor and Legislature, and in 1798 a State convention made the repealing act a part of the Constitution, on the ground that the State had the right to repudiate a contract founded on improper motives. The territory in question was ceded by Georgia to the United States in 1802. In 1803 a commission was appointed by President Jefferson under an act of Congress to investigate the Yazoo claims. Madison as chairman recommended a compromise, but Georgia refused to compensate the claimants. Their claim, however, was sustained by the United States Supreme Court in the case of Fletcher *vs.* Peck, 6 *Cranch.* 87 (1810), Chief Justice Marshall holding that the charge of bribery in 1795 could not be brought before the court as a collateral issue, that the Legislature could not in 1796 declare invalid its own act of 1795, that the grant of 1795 was in the nature of a contract, and that the law of 1796 was unconstitutional as in effect an *ex post facto* law destructive of the vested estate of the grantees under the act of 1795. Accordingly in 1814 Congress ordered the lands to be sold and appropriated $5,000,000 for extinguishing the rights of the claimants. Three years later the Treasury reported a final settlement, which involved the payment of $4,282,151. Consult: Haskin, *Yazoo Land Companies* (New York, 1891); and Henry Adams, *History of the United States*, vols. i. and ii. (ib., 1889-91).

YEAMANS, yĕ'manz, Sir JOHN (c.1610-74). A colonial Governor of South Carolina, born in Bristol, England. In 1665 the proprietors of Carolina appointed him Governor of the county called Clarendon, entending from San Mateo to Cape Fear. In the same year he sailed with three ships from Barbadoes, and at Cape Fear established a short-lived colony. In 1669 he was reappointed Governor, but soon named William Sayle in his stead. In 1671 he was once more given that position. During the next few years many new settlers arrived and negro slaves were introduced. In 1674 the proprietors became dissatisfied with Yeamans's management of affairs and removed him.

YEAR (AS. *gēar*, *gēr*, Goth. *jēr*, OHG. *jār*, Ger. *Jahr*, year; connected with OChurch Slav. *yarŭ*, spring, Gk. *ὥρα*, *hōra*, season, spring, hour, Av. *yārd*, year). In general, a space of time equal in length to the period occupied by the earth in completing a circuit of its orbit around the sun. Astronomers distinguish several different kinds of years. The *tropical* year is the year of chronologists and of the calendar (q.v.), and is defined as the interval of time between two successive passages of the sun through the vernal equinox (q.v.). Its length is 365 days 5 hours 48 minutes and 46 seconds. The *sidereal* year is the actual period of the earth's orbital revolution, and differs from the tropical year on account of the precessional motion of the equinoxes themselves. (See PRECESSION.) It is 365 days 6 hours 9 minutes 9 seconds in length. The *anomalistic* year is the time elapsing between two successive returns of the earth to its perihelion (q.v.) point. It is a little longer than the sidereal year, on account of the motion of the earth's perihelion. (See PERTURBATIONS.) Its length is 365 days 6 hours 13 minutes 48 seconds. The *light* year is a unit of linear measure, used by astronomers in stating the distances of the fixed stars. (See STARS.) It is the linear space traversed by light in one year, and as light moves at the rate of about 186,600 miles per second, the light year furnishes a linear unit large enough to measure even the vast cosmic distances of interstellar space. *Bissextile*, or *leap-year* (q.v.), is a calendar year in which the ordinary number of days has been arbitrarily increased by one, making it contain 366 days instead of 365. The commencement of the year among the Jews and Mohammedans has no fixed position in relation to the sun's course or the seasons, it being a lunar year. See CALENDAR.

YEAR AND A DAY. Under a peculiar rule of the common law, a fraction of a day was not recognized, and the last day of any given period of time was considered to be completed for legal purposes as soon as it began, and therefore, in order to provide for the actual expiration of a full calendar year, it was necessary to add a day. This period was adopted as the limitation of many rights and liabilities.

YEAR BOOKS. A collection of reports of cases decided in the English courts of common law from the reign of Edward I. to Henry VIII. The reports were made by the prothonotaries or chief scribes of the courts and published annually by them at the expense of the Crown. They were written in Norman French and are the earliest reports having any substantial value as precedents. There are somewhat fragmentary memoranda of litigation antedating the Norman Conquest, and there are official records of litigation beginning with the reign of Richard I., but these for the most part constitute a record only of the results of the litigation as determining the rights of the parties, and are consequently of little or no value as legal precedents. The *Year Books* are not now often cited in the opinions of courts, but they are of great historical value and a thorough study of them in recent years has thrown much light on many abstruse legal problems. They were originally published in eleven parts. An edition of the *Year Book* of Edward I.-II. by Maynard, published in 1678, has since been edited and published in English. A translation from manuscript reports of the cases in the various years of Edward I. 11-35 inclusive was published by Alfred J. Harwood (London, 1866).

YEARDLEY, yērd'lĭ (or **YARDLEY**), Sir GEORGE (c.1577-1627). A Deputy Governor of the Colony of Virginia, born in England. He served in the Low Countries; sailed for Virginia as captain of Sir Thomas Gates's expedition; and was wrecked on the Bermudas, but reached Virginia in 1610. He was acting Deputy Governor of the colony from the departure of Dale in 1616 until the arrival of Argall in 1617. In the following year he went to England, and while there was chosen Deputy Governor of the colony for three years and was knighted by King James I. He reached Virginia on April 19, 1619, and by proclamation modified some of the harsh laws under which the colonists had been living. Acting under instructions, he also convoked the famous House of Burgesses, the first legislative body that had ever assembled in America. His administration did not prove satisfactory to the company, so at the end of his term he was succeeded by Sir Francis Wyatt (q.v.). Yeardley remained in Virginia, however, as a member of the council, and in 1626 was again appointed Deputy Governor, this time by King Charles I. He continued in office until his death.

YEAST, or Barm. The mass of vegetable cells produced during the alcoholic fermentation of sugars. Yeast is produced in large quantities in beer brewing, beer yeast being constituted mainly by the minute cells of a species of fungi known as *Saccharomyces cerevisiæ*, or *Torula cerevisiæ*. This plant, which multiplies exclusively by budding, is capable of existing for a time in a pure aqueous solution of sugar. An excellent medium is such a solution with some albuminous matter, or phosphates and ammonia salts, added to it. But the best medium for its existence and growth is constituted by some liquid like wort or grape juice. In such a liquid the formation of yeast, accompanying fermentation, may be induced by exposure to the air in a brewery or some other place where alcoholic fermentation is going on, the air of such places containing the germs that develop into the yeast plant. The temperature at which the plant thrives best is from 15° to 20° C. (59° to 68° F.). Even very intense cold does not kill it, although its vegetation is arrested below 5° C. (41° F.). Heat, in the presence of moisture, kills it at temperatures above 75° C. (167° F.); if dry, the plant may be heated above 100° C. (212° F.) without losing its vitality.

Ordinary beer yeast, owing to its bitter taste, is not suitable for use in baking. Baker's yeast may be readily made by introducing a little yeast previously obtained into a wort made from barley, malt, and rye, skimming off the yeast produced during the violent stage of the fermentation and freeing it from liquid by pressure. It is such a product that, mixed with dry starch and pressed into cakes, is brought into the market as 'dry yeast' or 'German yeast.'

Yeast has been used with considerable success in diabetes, in which it causes a marked diminution of sugar in the urine. Yeast poultices, prepared by gradually warming a mixture of yeast, wheat flour, and water until it rises by reason of fermentation, form a highly useful remedy for various ulcers. Beer yeast is also used for preparing a substitute for koumis, a beverage of high medicinal value extensively used by the Tartars. While the true koumis fermentation is induced by a specific organism in mare's milk, the substitute is prepared, according to Professor Botkin, by adding water and milk sugar to cow's milk and inducing the alcoholic fermentation of this liquid by means of ordinary brewer's yeast. See Bread; Distilled Liquors; Saccharomycetes; etc.

YEAST. A novel by Charles Kingsley, published as a serial in *Fraser's Magazine* in 1848, and in book form in 1851. It sought to enlist sympathy for the English agricultural classes of the time and contains a noted ballad, *The Poacher's Widow*, an attack on game-preserving. It gives a vivid picture of the Chartist agitation.

YEATS, William Butler (1865—). A British critic and poet. He was born in Dublin, Ireland, but passed most of his childhood in Sligo. He took part in founding the Irish Literary Society and the National Literary Society of Dublin, and contributed to the awakened interest in the legends and the literature of Ireland. As a poet he is agreeably Irish in manner and theme. In 1903 he visited the United States and lectured at some of the principal universities. Among his publications are: *Fairy and Folk Tales of the Irish Peasantry* (1888); *The Wanderings of Oisin and Other Poems* (1889); *John Sherman* (1891); *The Countess Kathleen and Various Legends and Lyrics* (1892); *A Book of Irish Verse*, from modern writers (1895); *Poems* (1895); *The Secret Rose*, a series of short stories (1897); *The Wind Among the Reeds*, poems (1899); *The Shadowy Waters*, a blank verse drama in one act (1900); *Cathleen ni Hoolihan* (1902). With E. J. Ellis he edited the *Works of William Blake* (1893), and *Ideas of Good and Evil*, volume of essays (1903).

YECLA, yå′kla. A town of the Province of Murcia, Spain, 72 miles southwest of Valencia (Map: Spain, E 3). Cereals, wine, excellent oil, feather grass, and vegetables constitute the chief productions of the district, with some manufactures of spirits, soap, and leather goods. In the vicinity are many ruins. Population, in 1900, 18,117.

YEDO, or **YEDDO**, yĕd′dô. The former name of the capital of Japan. See Tokio.

YEGORYEVSK, ye-gōr′yĕfsk. A district town in the Government of Ryazan, Central Russia, about 60 miles southeast of Moscow (Map: Russia, E 3). It is an industrial town and has extensive cotton mills with an annual output valued at about $5,000,000. Population, in 1897, 19,241.

YEISK, yā′ĭsk. A seaport in the Territory of Kuban, Northern Caucasia, situated on the eastern coast of the Sea of Azov, 60 miles southwest of Azov (Map: Russia, E 5). It produces leather, flour, and tallow, but a large part of the population is engaged in agriculture and gardening. Population, in 1897, 35,446.

YEKATERINBURG, yĕ-kä′tyĕ-rĕn-bōōrk′. A town of Russia. See Ekaterinburg.

YEKATERINODAR, yĕ-kä′tyĕ-rĕ′nô-där′. The capital of Kuban, Northern Caucasia. See Ekaterinodar.

YEKATERINOSLAV, yĕ-kä′tyĕ-rĕ′nô-slåf′. A town and government of Russia. See Ekaterinoslav.

YELANSK, yĕl′änsk. A town in the Province of the Don Cossacks, South Russia, on the left bank of the Don, 290 miles north-northeast of

Novo-Cherkask (Map: Russia, F 5). It is engaged principally in fishing, farming, gardening, and sheep-raising. Population, in 1897, 11,200.

YELETZ, yĕl′ĕts. A town in the Government or Orel, Russia, 120 miles east-southeast of the town of Orel (Map: Russia, E 4). Lace-making is a widely spread household industry. Population, in 1897, 37,455.

YELIZAVETGRAD, yĕ-lyĕ′zȧ-vĕt-grăt′. A district town in the Government of Kherson, South Russia, situated on the Ingul about 740 miles south of Moscow (Map: Russia, D 5). It consists of a town proper and four suburbs, and is well built, with straight wide streets and avenues of trees. Yelizavetgrad is after Odessa the principal manufacturing town in the government. There are extensive flour mills, tobacco factories, etc. There is a trade in grain and flour, cattle, sheep, wool, horses, crockery, timber, and leather goods. Population, in 1897, 61,800, including 12,300 Jews.

YELIZAVETPOL, yĕ-lyĕ′zȧ-vĕt-pôl′y′, or ELIZABETPOL. A government of Transcaucasia. Russia, bounded by Persia on the south; area, nearly 17,000 square miles (Map: Russia, G 6). It belongs partly to the region of the Little Caucasus and is partly covered with steppes. It is watered chiefly by the Kur and its tributaries. The mountain slopes are thickly wooded and some of the valleys are fertile and well cultivated. There are rich mineral deposits, especially of copper, which is mined on a considerable scale. Agriculture is the chief occupation and considerable quantities of wine are produced. The government is traversed by the Transcaucasian Railway. Population, in 1897, 871,600, of whom about 60 per cent. were Mohammedans.

YELIZAVETPOL, or ELIZABETPOL. A town of Russia, capital of the Government of the same name, situated on an affluent of the Kur, about 120 miles southeast of Tiflis (Map: Russia, G 6). The older portion of the town is occupied mostly by Mohammedans and is ill built with narrow and crooked streets and low-roofed houses. The new portion is built on a modern scale and contains some fine buildings. Yelizavetpol has a mosque dating from the seventeenth century, an ancient mausoleum, and a fine bazaar. In the neighborhood of the city are found numerous ancient remains. The fortifications constructed by the Turks are still in existence. The chief occupation of the inhabitants is agriculture. Population, in 1897, 33,100, consisting chiefly of Tatars and Armenians.

YELLOW BASS. A fresh-water bass (*Morone interrupta*) of the southern Mississippi Valley, about 15 inches long, brassy yellow, with about seven distinct longitudinal black lines, the continuity of which is broken toward the tail. See BASS, and Plate of BASS.

YELLOWBELLY. A common sunfish (*Lepomis auritus*). See SUNFISH; and Plate of DARTERS AND SUNFISH.

YELLOWBILL. A sportsman's name for the American black scoter. See SCOTER.

YELLOWBIRD. Any of many distinctively yellow birds. In the United States the 'common,' 'thistle,' or black-winged yellowbird is the goldfinch (q.v.); the 'summer' yellowbird, or 'wild canary,' is a warbler (q.v.).

YELLOW FEVER, or 'YELLOW JACK.' An acute specific disease, occurring within certain geographical limits and characterized by a fever of short duration, a yellow tint of the skin, gastro-intestinal disturbances, and hemorrhages into the skin and mucous membranes. It is due to the action of a specific virus, the precise nature of which is unknown. The disease was first recognized definitely in 1647, in the West Indies. In 1691 it was very fatal in the Barbadoes, where it was called the 'new distemper.' From this date the disease has been endemic in the West Indies. It is also prevalent along the west coast of Africa at Senegal and Sierra Leone. At times the disease extends southward along both shores of South America, and northward to the south Atlantic and Gulf States. Occasionally it is brought to the large Atlantic seaports by ships sailing from countries where the fever prevails. Severe visitations occurred in the lower Mississippi Valley in the autumn of 1878, the deaths in New Orleans and Memphis alone exceeding 5000. Until the American occupation of Cuba in 1898 yellow fever was practically never absent from that island.

Experiments carried on in Cuba under the auspices of the medical department of the United States Army have proved that this disease, like malaria, is communicated from one individual to another by a species of mosquito (*Stegomyia fasciata*), and by it alone. (See INSECTS AND THE PROPAGATION OF DISEASE.) Since the recognition of the true etiology of yellow fever, and the institution of sanitary reforms in Cuba based on this knowledge, the disease has completely disappeared from that island. Its occurrence in hot and moist areas and at low levels coincides with the distribution of the mosquito. It is more fatal in the summer months, from May to August, and is stopped by the onset of frost. All ages and both sexes are equally affected under like conditions of exposure, but negroes are less susceptible than whites. One attack confers immunity against others.

Attempts to discover the causative germ of yellow fever (if one exists) have been unremitting. Different observers have claimed to have found a bacillus which is constantly present, and the fact that a definite time (twelve days) elapses between infection of the mosquito and the development of its power to communicate the disease to man, points to a germ as the agent. Careful experiments and investigations, however, by the United States Army Commission in Cuba show that no bacterium or protozoan of any kind is present in the blood tissues or excreta of yellow-fever patients; that their blood is capable, when injected into healthy persons, of communicating the disease; and that the serum of the blood, when separated, is also infective. The conclusions are that the specific agent is in the serum, and that it is either ultra-microscopic or it is non-bacterial and probably a toxin.

The period intervening between infection and the onset of the disease is as a rule three or four days, but may be from one to seven days. The attack may come on suddenly with severe chills or rigors or may be preceded by symptoms of languor, headache, and malaria. The temperature rapidly rises and in two or three days may reach 105° F. or even higher. The fever lasts from three to five days and is attended by pains in the back, limbs, and head. The tongue is coated but bright red at the tip and sides; there is tenderness and pain over the epigastrium, with nausea and vomiting. About the second or third day jaundice begins in the conjunctivæ, and quickly spreads over the whole body. In favorable cases the fever abates at the end of the fourth or fifth day, and recovery is complete in two or three weeks. But in severe cases the symptoms continue with increased violence. The skin becomes yellower, small hemorrhages take place into the skin, and vomiting becomes frequent. The rejected material is at first light in color ('white vomit'), but is soon followed by the 'black vomit,' which is rightly considered an ominous symptom, since it betokens an extensive alteration in the blood. Black vomit has somewhat the appearance of coffee grounds, and consists of blood which has been extravasated into the stomach and further altered by the action of the gastric juice. Blood may also be discharged from the bowels and hemorrhages take place from the nose, mouth, or gums. At this stage delirium is apt to set in and the patient soon lapses into unconsciousness. In very violent cases death sometimes takes place within a few hours of the onset of the first symptoms. In these cases jaundice and high temperature are absent. Death is due to hemorrhage, cardiac failure, suppression of the urine, or to the direct effect of the poison on the vital centres. The mortality in different epidemics varies greatly and may be as low as 10 per cent. or as high as 85 per cent. of the individuals attacked. Among alcoholic patients and those who are weakened from hardship or other causes the death rate is exceedingly high, as it is also among unacclimatized persons.

The solution of the problem of preventing outbreaks of yellow fever is one of the most recent and remarkable achievements of sanitary science. The disease is known to be favored by heat, moisture, bad drainage, house and communal uncleanness, and generally unhygienic conditions, and these must be remedied as a first step in stamping out the malady. Chief attention, however, is paid to the mosquito, and its breeding places should be destroyed. During an epidemic the greatest care is exercised to prevent yellow-fever patients from being bitten by mosquitoes; special pains are taken to disinfect houses and rooms in which a case has occurred and to kill all mosquitoes in them. People residing in infected districts should be careful to guard against being bitten by these insects, both indoors and out. It is proposed to inclose patients suffering with yellow fever in large wire cages with meshes so fine that mosquitoes cannot penetrate them. It is customary to enforce a strict quarantine against vessels sailing from ports where it is known that yellow fever exists. (See QUARANTINE.) Sanitary scientists predict confidently that the world will soon be rid of this scourge. Preventive inoculations of specially prepared serums have been tried, but not found generally effective. Serums also have been used for treatment, but with indefinite results.

Yellow fever is a self-limited disease, but is likely to be attended by serious lesions of important organs. Absolute rest in bed, from the first appearance of symptoms until convalescence is well established, is imperative. In no other disease is rest so important, and disregard of this precaution fraught with such serious danger. Sudden death has occurred from too early exertion when the patient was apparently on the high road to recovery. Careful nursing, fresh air, proper, ventilation, and scrupulous cleanliness of bedding and clothing are all necessary. At the outset of the attack a mild emetic such as ipecac or warm water and mustard may be given to empty the stomach, and the bowels should be evacuated quickly by means of castor oil, or an effervescent saline cathartic, as citrate of magnesia or a seidlitz powder. During the following days one or two daily bowel movements should be obtained, preferably by enemas of sulphate of magnesia in warm water. Fever is best controlled by means of cold sponging. Baths, while effective in lowering the temperature, are dangerous on account of the movement they entail. Antipyretic drugs have to be given with caution because of their tendency to depress an already weakened heart. Internally alkaline carbonated waters, vichy and apollinaris, are useful in allaying nausea and vomiting, and to cleanse the stomach and promote the action of the skin and kidneys. Warm drinks will serve the same purpose. To overcome severe vomiting, blisters to the epigastrium, small doses of cocaine, or larger ones of subnitrate of bismuth may be necessary. Threatened suppression of the urine is a grave complication and is combated by wet or dry cups over the region of the kidneys, intravenous or intracellular injections of normal saline solution, or high rectal injections. Restlessness and sleeplessness are relieved by suitable doses of morphine or chloral. No remedy will certainly check the hemorrhage, but ergot, acetate of lead, and adrenalin may do so. Free stimulation with whisky and strychnine is necessary at times to counteract the tendency to collapse and heart failure. The conduct of attendants and nurses should be such as to allay fear and quiet excitement. Many yellow-fever patients die of fright. If possible, attendants should be immune. Contrary to the practice in other fevers, no food should be allowed yellow-fever patients for the first three or four days, or longer in severe cases, and then only the blandest and most easily digestible liquids may be taken. Milk and lime water, or vichy, barley water, or buttermilk, may be continued well on into convalescence. Solid food cannot be absorbed by the patient and it may work serious harm.

YELLOWFISH. See NIGGER-FISH.

YELLOWHAMMER (from *yellow* + *hammer*, from AS. *amere*, *amore*, OHG. *amero*, Ger. *Ammer*, bunting, yellowhammer). A name popularly, but very erroneously, given in some parts of the United States to the common flicker (q.v.). The name properly belongs to a fringilline bird of Europe, the yellow bunting (*Emberiza citrinella*), which is one of the most common of small birds in Great Britain and in most parts of Europe. It is about seven inches long, and the male is a bird of brilliant plumage. The head and nape of the neck are bright lemon yellow, with a few dusky black patches; the upper part of the back and wings are reddish brown, tinged with yellow; the wing and tail quills are dusky black, with narrow external edges of bright yellow or bright brown; the upper tail-coverts reddish chestnut, edged with yellow; the throat, and whole under surface, bright lemon yellow, clouded on the breast and flanks with reddish brown. The female is much less vivid. The yellowhammer frequents hedges and low trees, and generally makes its nest on the ground, forming it of moss, roots, and hair. The song of the male is very sweet, and consists of few notes, which have been jocularly set to music with the words "*A little bit of bread, but no-o cheese.*" In Italy great numbers of yellowhammers are caught, and fattened like ortolans for the table. See Plate of BUNTINGS AND GROSBEAKS.

YELLOW-HEADED BLACKBIRD. See BLACKBIRD.

YELLOW JACK. A popular name for the yellow fever (q.v.) by transfer of meaning from the yellow flag used to announce the presence of contagion in naval hospitals and quarantined vessels.

YELLOWJACKET. Any of several species of the smaller yellow-marked social wasps, particularly *Vespa Germanica* and *Vespa cuneata.* See WASP.

YELLOWLEGS. The popular name of two species of American snipes inhabiting the entire hemisphere; in summer North America is their home, while in winter they wander clear to Patagonia. The common or summer yellowlegs (*Totanus flavipes*) is about ten inches long from the tip of the bill to the end of the tail, with wings about six inches long. Its flesh is delicious. The greater yellowlegs (*Totanus melanoleucus*) is larger, being fourteen inches long, wing eight inches, but similar in appearance, with ashy color above, under parts whitish, with transverse spots and stripes on breast and sides. The two species resemble each other so closely not only in color, but in habits, call-notes, nest and eggs, and haunts, that the size is almost the only constant difference; both are very generally known as 'tattlers' or 'yelpers,' because whenever they discover a gunner they raise such a hue and cry as to warn all other birds. See Plate of BEACH BIRDS.

YELLOW PERCH. See PERCH.

YELLOWPLUSH PAPERS. A series of articles by Thackeray, portraying the meteoric rise and fall of a stock-dabbling London flunky, first published in *Fraser's* in 1838. They afterwards appeared among the author's *Comic Tales and Sketches.* The character of Deuceace, Yellowplush's early master, is said to be the portrait of a gambler who had cheated Thackeray at Cambridge out of his patrimony, and Bulwer is ridiculed under the name of Bulwig.

YELLOW RIVER. A river of China. See HOANG-HO.

YELLOW-RUMPED WARBLER. See MYRTLE-BIRD.

YELLOWS. See PEACH, paragraph on *Diseases.*

YELLOW SEA, or HWANG-HAI. A large gulf of the Pacific Ocean penetrating 600 miles inland in a northerly direction between Korea and the east coast of China (Map: China, F 4). Its northern shore belongs to Manchuria. It is over 300 miles wide in the south, where it opens widely into the Eastern Sea, which is separated from the Pacific Ocean by the Loo-choo Islands. South of Korea the Korea Strait connects the Yellow Sea with the Sea of Japan. In the north the large Shan-tung Peninsula cuts off the partly land-locked Korea Bay and Gulf of Pe-chi-li. The Yellow Sea is nearly everywhere less than 300 feet deep. The Korean shore is lined with numerous small islands, and near the Chinese shore there are large sand banks. The sea receives the two great rivers Yang-tse-kiang and Hoang-ho, and derives its name from the yellow mud discharged into it by the latter stream.

YELLOWSTONE LAKE. The principal lake in the Yellowstone National Park (q.v.).

YELLOWSTONE NATIONAL PARK. A United States Government reservation set apart as a public pleasure ground and game preserve. It occupies a rectangular area in the northwestern corner of Wyoming, overlapping the territory of the States of Montana and Idaho on the north and west by strips of land about two miles wide (Map: Wyoming, D 3). The park measures 54 miles from east to west, and 62 miles from north to south; its area is about 3350 square miles. The Yellowstone Park Forest Reserve, occupying a strip 24 miles wide adjoining the park on the east and a strip 10 miles wide on the south, is practically a portion of the park, and increases the area to 5500 square miles.

Yellowstone Park lies in the very heart of the Rocky Mountains. It consists of an elevated plateau basin with a mean altitude of 8000 feet, and surrounded on all sides by lofty, snow-clad, and exceedingly rugged mountain ranges. On the eastern boundary runs the Absakora range, a northern extension of the Shoshone Mountains, whose spurs cover the eastern forest reserve with an almost impassable complex of peaks, ranges, and deeply eroded river valleys. Several peaks in the reserve are more than 11,000 feet high, and the Fortress and Dead Indian Peaks rise respectively to altitudes of 12,073 and 12,253 feet. The southern forest reserve is occupied by northern outliers of the lofty Wind River and Teton ranges, the latter running also up the western boundary. The Gallatin range on the northwest and the Snow Mountains on the north complete the barrier. The central basin itself consists of more or less level or undulating lava fields, but spurs from the surrounding mountains run into it from all directions, volcanic cones and other peaks as well as small isolated mountain groups project from the plateau floor in numerous places, while most of the larger streams have cut their way through the lava in yawning cañons, so that the surface is extremely diversified, and the plateau cut up into a number of separate fields, basins, or peaks. There are 24 peaks within the park proper whose altitude exceeds 10,000 feet. The loftiest as well as the most rugged portion lies east of Yellowstone Lake, where Mount Humphreys and Turret Mountain rise respectively to altitudes of 11,000 and 11,142 feet. Directly on the northern boundary, however, Electric Peak towers to a height of 11,155 feet, and affords one of the widest views of the park and its surroundings to the north.

The Continental Divide crosses the park in an irregular line from the middle of the western boundary to near the southeastern corner, so that the waters of the park are sent to both oceans. South of the Divide the upper course of the Snake River receives some of its headstreams from Shoshone, Lewis, and Heart Lakes. North of the Divide all the streams are tributary to the Missouri. The most important is the Yellowstone (q.v.), which traverses the park from the southeastern corner to the middle of the northern boundary, and expands into Yellowstone Lake, one of the central features of the region. The Madison River, one of the headstreams of the Missouri, rises on the central plateau, while the eastern mountains give rise to the Shoshone, an affluent of the Big Horn.

The original geological structure of the park is almost completely hidden by a great Tertiary lava flow, the easternmost extension of the Snake River basalt plains, which are connected to the westward with the vast Oregon lava fields. The underlying sedimentary rocks are chiefly Cretaceous, probably with some upturned Paleozoic strata and Archæan rocks, but the present plateaus and mountains, with the exception of the Gallatin range, are composed of lava, and though there have been no recent outpourings of molten rock, the whole region is still actively volcanic. See *Hot Springs and Geysers* below.

Owing to the high elevation, the climate is rigorous, but not excessively cold compared with the lower surrounding regions. The summer is short and characterized by great diurnal extremes of temperature, frosts occurring at night even in midsummer. The mean temperature for July is 62°, and the average maximum 78°, the mercury rising occasionally as high as 96°. The growing season does not begin until May, and vegetation reaches its greatest luxuriance near the end of July. At the end of August there is an abrupt change from summer to winter, and snow begins to lie on the ground by the middle of September. In January the mean temperature is about 20°, and the average minimum about 12°, with an occasional fall to 30° below zero. The average annual rainfall on the plateau is about 20 inches, sufficient to support the forests and mountain vegetation.

Nearly nine-tenths of the area of the park is under forest. Dense forests cover the mountains up to an altitude of 9400 to 9700 feet, but on some of the basin floors there are scattered open, park-like spaces covered with grass or incrustrations from the hot springs. The forests are almost wholly coniferous, although birches, willows, and poplars (*Populus tremuloides*) are not uncommon. The most common tree, and the only one monopolizing extensive forest areas, is the black pine (*Pinus Murrayana*), and the second in distribution is the balsam (*Abies subalpina*), chiefly confined to the higher and moister regions. Engelmann's spruce and the Douglas fir are also common, but the trees do not nearly reach the size attained in western Oregon and Washington, and the forests can scarcely be called grand, though they add in some places a remarkable charm to the scenery. The herbaceous vegetation is chiefly that of a mountain flora, though the sage brush occurs on some of the plateaus, and the alpine species above the timber line include nearly all of those common to the Rocky Mountains. The regions immediately surrounding the hot springs have a peculiar flora, partly resembling the xerophytes of the desert, partly allied to plants found on the seashore.

Owing to the protection afforded them, the wild animals in the park are increasing in number. Elk or wapiti abound, and can be seen in large bands of several hundred or even thousand. Moose, deer, antelopes, and mountain sheep can also be seen in winter, though in summer they generally retreat to the less frequented mountain regions. Until 1902 there were about 25 head of buffalo (bison) roaming wild in the park, but in that year 22, as many as could be found, were corralled, and 18 others were brought from distant parts of the country. It is the intention to improve the breed by this infusion of new blood, and, when the new herd becomes sufficiently accustomed to the sight of human beings, again to let them loose in the park. Mountain lions (pumas) were seen in the park in 1899, and bears, especially the black and the brown bear, are increasing in numbers. Beavers have also increased, and their dams and houses can be seen on the streams throughout the park. Birds are scarce, almost the only game birds being a few blue and ruffled grouse. Trout of several varieties are so plentiful in nearly all the streams that with the existing regulations and the hatching and planting of many thousand eggs annually, it will be impossible for the tourists to deplete them.

There is probably no region on earth of equal area which excels the Yellowstone Park in the variety of its natural scenery. For the exhibition of the beautiful as well as of the grand and merely curious and interesting effects of volcanic forces the region has been unapproached since the destruction by a volcanic eruption of the White Terrace in New Zealand. Besides the two chief natural features described under separate subheads below there are a number of minor objects of interest, such as cliffs of obsidian or volcanic glass along the shores of Beaver Lake, the petrified forests found on some of the plateaus, and the curious freaks of erosion seen in the mushroom-shaped stone pillars in the 'Hoodoo Region' and in the natural bridge spanning one of the creeks flowing into Yellowstone Lake.

YELLOWSTONE LAKE AND CAÑON. The Yellowstone River enters the park at its southeastern corner in a marshy valley, and soon flows into the southeastern arm of Yellowstone Lake. The lake lies at an altitude of 7741 feet above sea level, being the largest lake at that altitude in North America, and one of the most beautiful mountain lakes in the world. It is 20 miles long and 10 miles wide, but of a shape so irregular that it has a shore line of over 100 miles, having several finger-like arms extending west and southward. Its shores are densely forested, and on the east towers a group of numerous lofty peaks including the highest within the park. Ancient beaches indicate that the lake was formerly much larger and deeper than now, and that instead of discharging into the Yellowstone River and the Atlantic Ocean, it formerly sent its waters to the Pacific Ocean. After leaving the lake at the northern end the river is broad and tranquil for several miles. Then it becomes narrow, rapid, and broken by huge rocks, and, after turning to the northeast, it falls over a precipice 110 feet high, and is narrowed to a width of 100 feet. A half mile below this cataract, which is known as

COPYRIGHT 1902 BY DETROIT PHOTOGRAPHIC CO.

THE GREAT FALLS OF THE YELLOWSTONE

the Upper Falls, the river plunges again over a ledge of trachyte, and falls 310 feet into the Grand Cañon. Here it rushes for 20 miles as an emerald green and foaming stream shut in by precipitous or exceedingly steep walls of lava 1200 to 1500 feet high, which are brightly colored with red, yellow, and green incrustrations, and crowned by dark green spruces above. Turning again to the northwest, the river passes through another cañon whose walls are lower and less definite, and then emerges from the park.

Hot Springs and Geysers. Springs of all kinds abound throughout the park. There are countless springs of cold pure water and some cold mineral springs, but the peculiar feature which has especially made the park famous are the hot springs due to the volcanic heat still present beneath the surface. There are hot springs everywhere, in the valleys and on the mountain summits, on the plateaus and at the bottoms and on the sides of the cañons, and even at the bottoms of the rivers and lakes. They range in size from a few square inches to several acres, and most of them are highly charged with mineral matter, mostly siliceous, while many emit sulphurous fumes, and some are distinctly poisonous. The ground for many acres around the principal hot springs and geyser regions is covered with white incrustrations of silica or calcareous minerals, often streaked with bright coloring matter, and the larger springs have built up small cones of these materials. Of the non-eruptive springs the most famous are the Mammoth Hot Springs, situated near the northern entrance to the park. They are charged with calcareous matter derived from the Cretaceous limestone beneath the lava, and have deposited this material in a dazzling white cone several hundred feet high and consisting of semicircular basins arranged in terraces on the hill slope. The basins are one to eight feet in diameter and one to two feet deep, and their walls are beautifully scalloped, ornamented with natural beadwork, and streaked with bright red and yellow. The water issues at a boiling temperature in the large basin at the summit, and cools gradually as it descends into the successive basins below. There are several extinct basin cones in the neighborhood covered with humus and vegetation, such as Terrace Mountain, which is much larger than the present Mammoth Springs.

There are at least seventy eruptive hot springs or geysers in the park, including the largest geysers in the world. (See Geyser.) These are grouped in six basins, the Norris Basin in the north central part of the park on the Madison River, the Lower, Middle, and Upper Basins on the Firehole River between the Central and Madison Plateaus, and minor basins near Shoshone and Heart Lakes. Among the most celebrated individual geysers is the Giant, which at somewhat uncertain intervals throws up a column of hot water five feet in diameter and over 200 feet high, and maintains it for over an hour. Old Faithful is the most regular in its intervals, spouting every sixty-five minutes a column 125 feet high. Excelsior Geyser has very long periods of quiet, but its eruptions are extremely violent, the bed rock being sometimes torn up for many feet around it, while the volume of water ejected is enormous. Castle Geyser is one of the most beautiful, having a regular white cone situated in a glade surrounded by dark green pine trees. Most of the geysers are irregular in their periods, Old Faithful being nearly the only one whose eruptions can be safely predicted. Some are doubly periodic, having a smaller and a larger eruption at more or less regular intervals. New geysers occasionally burst forth, while others become extinct; thus one of the large geysers in the Norris Basin was formed suddenly in 1878. See Plate with article Geyser.

Government and Artificial Improvements. The park is under the sole jurisdiction of the Federal Government, and is administered by the Secretary of the Interior. It is directly in charge of a superintendent, who is an army officer, and who is aided by a detachment of Federal troops in enforcing the regulations. Hunting, trapping, or killing any animal except to prevent it from doing serious injury is prohibited, but fishing for pleasure or food is permitted. All private commercial enterprises are excluded except that small plots of land may be leased to private parties for hotel purposes, and all hotels are thus privately conducted, but under Government inspection. Licenses are also issued to private parties to provide traveling facilities within the park. Good carriage roads now give access to all the principal objects of interest, and a small steamboat plies on the Yellowstone Lake. The park is as yet accessible for ordinary visitors at only two places, through the valley of the Yellowstone River on the north, where a branch of the Northern Pacific Railroad has a terminus just outside the entrance, and through the Madison Valley on the west. Several trails and less used roads, however, lead through the mountain passes on the east and south.

The Yellowstone region was originally occupied by peaceful Sheepeater Indians. There are evidences that white trappers had entered the region as early as 1808, but the rumors of its wonders, which from time to time reached the civilized world were given little credence until General Washburne, Surveyor-General of Montana, published the first real account of it in 1870. In 1871 the region was explored and mapped by the United States Geological Survey of the Territories, and in 1872 Congress made it a Federal reservation. The Forest Reserve was added by Presidential proclamation in 1891.

Consult: *United States Geological Survey* (Washington, 1880 et seq.); and Chittenden, *Yellowstone National Park,* with bibliography (Cincinnati, 1895).

YELLOWSTONE RIVER. A tributary of the Upper Missouri. It rises in the Shoshone Mountains in the northwestern part of Wyoming, and, after traversing the Yellowstone National Park, flows in a general northeast direction through the State of Montana to its junction with the Missouri immediately beyond the boundary in North Dakota (Map: Wyoming, F 3). Its length is about 1000 miles. (For a description of its upper course, see Yellowstone National Park.) After emerging from the mountains the river flows for the rest of its course over a wide, rolling plain; and it is navigable for light vessels about 300 miles. The greater part of its course is followed by the Northern Pacific Railroad. The principal tributaries of the Yellowstone are the Big Horn and the Powder River, both from the south.

YELLOWTAIL. The name of several marine fishes, specifically one of the amber-fishes (q.v.). (See Plate of Horse Mackerels.) A related species (*Elegatis bipinnulatus*), one of the runners (q.v.), is called 'yellowtail' in the West Indies.

YELLOWTHROAT. See Maryland Yellowthroat.

YELLOW WEED. See Weed.

YELLOW WOOD. See Oxleya; Cladrastis.

YEMAS'SEE, The. A colonial romance of South Carolina by William Gilmore Simms (1835). It aroused interest among the reading public, and is generally considered to represent the author's best work.

YEM'EN. A region in the southwestern corner of Arabia, extending along the coast of the Red Sea from Hedjaz to the Strait of Bab-el-Mandeb, and bounded by the desert and Hadramaut on the east and by the Gulf of Aden on the south. It forms part of the Turkish Empire (Map: Turkey in Asia, Q 12). Area, about 75,000 square miles. In its most extended sense the name Yemen has been used to designate practically all Arabia south of Syria. The southern section of Yemen, east of the Strait of Bab-el-Mandeb, is now practically in the British sphere of influence, as is also the island of Kamaran off the coast. Yemen, the present territory, is the southern and most favored part of the ancient *Arabia Felix*, or 'Happy Arabia.' It is a mountainous country, some of the greatest elevations in Arabia being in its southern portion. From the coast a series of arid terraces rise to the mountains from 30 to 50 miles away. There are many valleys rich in all kinds of tropical and subtropical vegetation. These districts have been terraced with great labor for the purpose of increasing the productive area. The high plateau extending north and south along the central region is scarred by black, ugly volcanic formations.

The climate of Yemen is hot on the coast, and is described as ideal in the higher regions, a daily mist rising there and protecting the land from the scorching, vertical rays of the sun. The rainfall is ample except in the north. Coffee is the main crop. Hodeida is now the leading port. Sana and Mocha are other prominent towns. Transportation is effected by camel caravans over the difficult mountain roads. Yemen has recently been divided into four vilayets—Azir, Hodeida, Sana, and Tais. Population estimated at about 750,000. In ancient times the Sabæans (q.v.) held sway in Yemen. The country passed under the dominion of the Turks in the sixteenth century. In 1630 the Arabs drove out the Turks, and later the Imam of Sana became a powerful potentate ruling over an extensive domain. In 1872 the land came under control of the Turks again, but their troubled rule has become scarcely more than nominal.

YEN (Jap., from Chin. *yuen*, round object). A Japanese coin minted in both gold and silver. The gold yen is worth about $0.997; the silver yen about $0.528.

YENIKALE, yĕn'ē-kȧ-lā', Strait of. A narrow passage connecting the Sea of Azov with the Black Sea and separating the Crimean Peninsula from the western extremity of the Caucasus (Map: Russia, E 6). It is 25 miles long and from 2½ to 23 miles wide, an expansion in the middle forming the harbor of Kertch (q.v.). Irregular shoals render the navigation of the strait difficult.

YENISEI, yĕn'ē-sā'ē. One of the three great rivers of Siberia, and one of the four or five longest rivers in the world. It rises on the southern slope of the Sayansky Mountains in the northwestern part of Mongolia, and flows in a general north-northwest direction across Siberia and within the Territory of Yeniseisk until it empties into the Arctic Ocean in longitude 80° E. through the Gulf of Yenisei (Map: Asia, H 2). The gulf is a large estuary 10 to 100 miles wide and about 250 miles long, separated from the estuary of the Ob by a peninsula 175 miles wide in the south, but only about 10 miles wide in the north so that the two great rivers may be said to have a common embouchure. The length of the Yenisei proper, excluding the estuary, is about 2500 miles, but measuring from the source of the Selenga, which flows into Lake Baikal and thence through the Angara to the Yenisei, the length is 3250 miles. This length is about equal to that of the Ob-Irtysh and the Yangtse-kiȧng, and is exceeded only by that of the Amazon, the Nile, and the Mississippi-Missouri. After breaking through the Sayansky Mountains in a series of falls and rapids, the Yenisei pursues a swift course for several hundred miles until it receives the Angara, after which it flows through the great Siberian plains with a sluggish course, though its eastern bank is flanked by highlands and mountain ranges almost to its mouth. Along its middle course the banks are generally covered with forests of pine, birch, and larch, but the extreme lower portion passes through the Arctic tundras. In its lower reaches the river sometimes has a width of four miles during the floods, and near the estuary it divides into parallel branches inclosing a number of islands, while the upper part of the estuary itself is filled with a large archipelago, which has given it the name of the Liman of the Seventy Islands.

The Yenisei receives three great tributaries from the east, the Angara, or Upper Tunguska, which drains Lake Baikal, the Stony Tunguska, and the Lower Tunguska. Through these and its smaller western tributaries it approaches so closely to its two great neighboring rivers, the Ob and the Lena, that it forms a link in a practically continuous waterway through the whole length of Siberia. A canal was completed in 1891 between the Kas, a tributary of the Yenisei, and the Ket, flowing into the Ob, but, owing to the shallowness of the two connecting streams, it is passable only by small vessels. The main stream of the Yenisei is navigable to the base of the Sayansky Mountains at Minusinsk, 1850 miles above the estuary, and about a dozen steamers ply on it regularly. The river is frozen for only three months in the south, but in the north it is ice-bound the greater part of the year, navigation at the mouth being open scarcely more than six weeks, and being moreover rendered dangerous by severe northern gales. Nevertheless sea-going vessels can ascend the river as far as Yeniseisk, near the mouth of the Angara, and ships from Europe have for a number of years regularly carried supplies for the mines along the river, by way of the Arctic Ocean, a good harbor having been found in the estuary. The Trans-Siberian Railroad crosses the river at Krasnoyarsk.

YENISEISK, yĕn'ê-sā'ĭsk. A government of Siberia extending from the Arctic Ocean to Mongolia and bounded on the east by Yakutsk and Irkutsk and on the west by Tobolsk and Tomsk (Map: Asia, J 2). Area, estimated at over 988,000 square miles, or nearly half of European Russia (excluding Finland). The region has a greatly varied surface. In the south the Sayansky Mountains extend in parallel chains inclosing deep and narrow valleys and rising in their highest peaks to over 5000 feet. North of the Sayansky Mountains the surface is mostly undulating or hilly and is densely wooded. The entire portion north of the Tungus Mountains consists of tundras varied to a slight extent by hilly patches east of the Yenisei. The region belongs largely to the basin of the Yenisei (q.v.), which receives many tributaries. In the northern part there are also a number of rivers flowing directly into the Arctic Ocean, such as the Khatanga, the Taimur, and the Pyassina. The lakes are comparatively small. The climate is on the whole continental and extremely severe. In the northern part the soil remains frozen at a depth of two feet even in the summer, and the winter temperature in that part is lower than in Nova Zembla. The mean annual temperature ranges from 8° at Tolsty Nos (latitude 70° 5′ N.) to 31° at Minusinsk (latitude 53° 43′ N.) Yeniseisk is not rich in minerals, although gold is found in the extreme south. In 1899 the output of gold amounted to nearly 81,800 ounces. There is an abundance of agricultural land in the south, but labor is very scarce. The land belongs almost entirely to the Crown. The extensive and valuable forests are utterly unprotected by the Government and are suffering greatly from conflagrations. Fishing is carried on extensively in the north. The Trans-Siberian Railway runs through the southern part of the government. Population, in 1897, 559,902, of whom the non-Russians (chiefly Tunguses, Yakuts, Samoyeds, Ostyaks, and Tatars) numbered about 50,000. The Russian population includes over 57,000 exiles and a large number of dissenters. Capital, Krasnoyarsk (q.v.).

YENISEISK. A town in the Government of Yeniseisk, Siberia, on the Yenisei, about 220 miles north of Krasnoyarsk. It has a cathedral. The town was founded in 1618. Population, in 1897, 11,539.

YEO, Sir James Lucas (1782-1818). A British naval officer, prominent in the War of 1812. He was born at Southampton, and entered the British Navy in 1793. In 1800 he was present at the siege of Genoa and then served in the Adriatic, entering the harbor of Cesenatico, at the head of a small force, and destroying thirteen merchant vessels on August 26th. In 1809, at the head of about 400 English and Portuguese, he captured Cayenne, the capital of French Guiana, securing about 1000 prisoners. On February 3, 1812, in command of the frigate *Southampton*, he captured a superior piratical frigate, the *Amethyste;* and early in 1813 he was made commodore and commander-in-chief of the British naval force on the Great Lakes, where he was opposed by Commodore Chauncey, commanding the American fleet. At the outset the two fleets seem to have been about equal in fighting strength. Yeo took formal command at Kingston, on Lake Ontario, in May, and on the 29th, the American fleet being at the west end of the lake, united with Sir George Prevost (q.v.) in a half-hearted and unsuccessful attack on Sackett's Harbor, where the Americans were building two new vessels. On August 10, 1813, in an indecisive engagement with Chauncey's fleet off Fort Niagara, Yeo captured two small American vessels, the *Growler* and the *Julia;* and on September 11th an unimportant engagement occurred off the mouth of the Genesee River, Chauncy gaining a slight advantage. In another engagement, on September 28th, in York Bay, Yeo was somewhat crippled, and thereafter for some time was blockaded by Chauncy in Kingston Harbor. On May 6, 1814, Yeo, with a strengthened fleet, captured Oswego, which, however, was immediately reoccupied by the Americans; and from May 29th to June 6th he blockaded Chauncy at Sackett's Harbor. Thereafter until the close of the war neither officer felt strong enough to attack his opponent, and both avoided a general engagement. In 1815 Yeo became commander-in-chief of the British naval forces on the west coast of Africa, and in 1818 died while returning to England.

YEOMAN (probably from AS. *gā*, *gē*, Goth. *gawi*, OHG. *gowi*, *gouwi*, Ger. *Gau*, district, province + *man*, man). A term in early English history applied to a common menial servant, but after the fifteenth century denoting a class of small freeholders, forming the next grade below gentlemen. The term yeoman is sometimes considered identical with the freeholder, possessed of the elective franchise.

YEOMANRY. The mounted branch of the British volunteers (see Volunteer) up to the Boer War were described as Yeomanry Volunteers, owing to the fact that they were recruited from the yeomanry classes, and thus were financially able to support the necessary cavalry charger and equipment. In the Boer War these troops served with considerable success, so that (April 17, 1901) the title was changed to Imperial Yeomanry, and the strength of the force very considerably increased. The organization into regiments of four squadrons with a regimental staff and machine-gun section and fixed rates of pay and allowances was also provided. It was the intention of the War Office in 1902 to establish a force of yeomanry aggregating 35,000 men, divided into 24 regiments, and in November of that year 26,000 had been enlisted. The Imperial Yeomanry were designed primarily as mounted forces for home defense, while Colonial Yeomanry for Imperial defense were also enlisted. The yeomanry come under the same classification and regulations as the volunteer infantry.

YEOMEN OF THE GUARD. An English company forming a part of the Royal Household and serving on State occasions as the bodyguard of the sovereign. The yeomen of the guard wear a picturesque uniform which dates back to the fifteenth century, the corps being formed by Henry VII. in 1485. It consists of old soldiers and is officered by a captain, who is usually a member of the Ministry and a peer, a lieutenant, an ensign, a clerk of the cheque and adjutant, and four 'exons.' These appointments are usually awarded to retired officers and are much valued. There are also non-commissioned officers and 100 yeomen or privates. The yeomen of the guard, though uniformed similarly to the Tower Warders, well known to visitors to London, are a distinct corps. They are armed with partizans, a form of long-handled cutting weapon. Consult Preston, *Yeomen of the Guard* (London, 1887). See BEEFEATER.

YERKES, CHARLES TYSON (1837—). An American capitalist, born in Philadelphia, Pa. He was educated in the Quaker School and the Central High School in Philadelphia, was a clerk for a time in a flour and grain commission house there, opened a money and stock-broker's office in 1858, and from 1861 to 1886 was in the banking business, making a specialty of dealing in bonds. In 1871 he was forced to make an assignment, and as he refused to give any preference to the city of Philadelphia, to which he was in debt for bonds sold on its account, he was tried on a charge of having misappropriated public funds, was convicted, and for a short time, until pardoned, was imprisoned. In 1873-74, at the time of the Jay Cooke failure, he reëstablished himself financially by a series of fortunate investments, and he gradually became identified largely with the development of the street railway system in Philadelphia. In 1881 he removed to Chicago, where after 1886 he secured virtual control of the city's street and elevated railway systems, which he greatly extended. In 1892-93 he was an influential member of the board of directors of the World's Fair in Chicago, and devoted his attention particularly to the fine arts department, to which he lent his own notable collection of paintings. In 1892 he endowed the famous Yerkes Observatory (q.v.), which was completed in 1896. He took an active part in the construction and extension of the new London underground railway system.

YERKES OBSERVATORY. The astronomical observatory of the University of Chicago, located at William Bay, Wis. It is named after its founder, Charles Tyson Yerkes (q.v.), who supplied the funds for buildings and instruments. This institution contains the largest refracting telescope in existence. It is of 40 inches diameter. It is used principally for the observation of close or faint double stars, the planets and satellites, and spectroscopic work.

YERMAK TIMOFEYEFF, yĕr′măk tē′mô-fā′yĕf (?-1584). Conqueror of Siberia. He was chief (hetman) of the 'Don Cossacks,' and, in consequence of his depredations, was defeated and outlawed by Ivan the Terrible, but he was subsequently pardoned. In 1579 the family of Stroganoff, to whom the Czar had granted lands on both sides of the Urals, applied to Yermak for assistance against Kutchum, Khan of Sibir, who ruled the country between the Tobol and Irtysh rivers, and whose tribesmen had interfered with the operation of the great Stroganoff salt works. Yermak invaded the country, took the town of Sibir (Isker) in October, 1581, and subjugated the people as far as the Irtysh. The conquered country he gave to the Czar Ivan, who made him Prince of Siberia. Conflicts, however, were renewed with Kutchum in 1584. In September of that year Yermak was drowned in the Irtysh, and it was not until 1587 that the Khanate of Sibir was definitely conquered by the Russians. Yermak's deeds are celebrated in Russian folk-songs and in Khomyakoff's *Yermak*, a drama in verse (1832).

YEW (AS. *īw, ēow, ēoh*, OHG. *īwa, īha*, Ger. *Eibe*, Swiss *Iche, Ige*, yew; connected with OIr. *éo*, Welsh, *yw*, Corn. *hivin*, Bret. *iven, ivinen*, yew, OPruss. *invis*, Lith. *jëvà*, Lett. *ēva*, black alder, OChurch Slav. *iva*, willow), *Taxus*. A genus of coniferous trees of the natural order Taxaceæ. The species are widely distributed in the Northern Hemisphere and some are large and beautiful evergreen trees. The common yew (*Taxus baccata*), a tree of 30 to 40 feet and a trunk sometimes of great thickness, is a native of Middle and Southern Europe and of Siberia. It often attains an age of 300 years. Its wood has been much used for making bows, for which it is preferred to every other kind of wood. It is very hard, and reckoned almost equal to boxwood for fine work. The fruit is red, and was long reputed poisonous. There are numerous varieties in cultivation. In North America there are three species, *Taxus Canadensis*, a low straggling shrub; *Taxus Floridana*, the Florida yew, and *Taxus brevifolia*, the Pacific yew, both trees of considerable size. The Pacific yew attains a height of 75 feet and diameter of 5 feet or more, and its light yellow wood is of considerable value. Torreya Californica is sometimes called stinking yew. The name Japan yew is sometimes given to Podocarpus macrophylla, a close relative. It is a large and stout tree, a native of Japan; its wood is much valued for cabinet work.

YEW (*Taxus baccata*).

YEZD, yĕzd, or **YAZD**, yäzd. The capital of the Province of Yezd, Persia, 165 miles east by south of Ispahan on the route between that city and Kirman (Map: Persia, E 5). The chief features are the ruins of the old walls, numerous mosques, and a large bazaar. The manufactures of silk and felt goods are important, and there is a considerable trade in opium and sugar. Population, estimated at 50,000. Yezd is the leading centre of Zoroastrianism in Persia.

YEZDEGERD, yĕz′de-jĕrd. The name of three Persian kings of the Sassanidæ (q.v.) dynasty.

YEZĪDĪS, yĕz′ē-dēz. The name given to a sect known as 'Devil-Worshipers' found in Kurdistan, Armenia, and the Caucasus. They speak of themselves rather as Dasni, after the name of certain tribes in the vicinity of Mosul. The term *Yezidi* itself is of uncertain derivation. The Mohammedans associate it with the name of Yezid, the second Ommiad Caliph (A.D. 720-724), but the religion is undoubtedly older. Some have sought to connect it with the city of Yezd in Persia. Others again derive it from the Kurdish and Persian *Yazdân*, God, for the Yezidis unquestionably believe in a god, despite their veneration of the devil. The symbol of their faith is a peacock, which they call Malik Taus, the term by which they designate the devil. The devil is a creative agent of the supreme god and he is the author of evil. He was a fallen angel, but God reinstated him to heavenly rank and forbade the angels to scorn him. For this reason mankind should not venture to treat the power of evil with contempt. The Yezidis never use the name of Satan and they shrink from any mention of the devil. It is largely this that gives the idea that they are devil-worshipers, although it is possible, owing to their geographical position, that the Yezidis may actually show some surviving traces of the old devil-worship in Mazanderan anathematized by Zoroaster (q.v.). In numbers the Yezidis are not large, although there are said to be some 12,000 in the Caucasus region alone. Throughout history they have suffered much from persecution. The religion shows traces of old Iranian and Assyrian beliefs, such as dualistic traits and regard for the fire, the sun, and the elements, combined with some Mohammedan traits and influenced likewise by Manichæism and Nestorian Christianity. They recognize Mohammed as a prophet beside Abraham and the Patriarchs; and they consider that Christ was an angel in human form. The belief in a future life forms part of their faith. The rites of baptism and generally of circumcision are practiced among them, and there are special offices connected with marriage and death. Polygamy is not common among them. Their chief book of divine revelation is entitled *Al-Yalvah*, and its great interpreter was Shaikh Adi, who lived about A.D. 1200. For the main points of their religion, consult: Layard, *Nineveh and Its Remains* (London, 1850); Menant, *Les Yézidis* (Paris, 1892).

YEZO, yā′zō. The most northerly of the large islands of Japan, forming with its twelve adjacent islands and the Kurile Islands (q.v.) a division of the Japanese Empire known as the Hokkaido, or 'North Sea Circuit.' It is separated from the main island of Japan on the south by the deep strait of Tsugaru, 10 miles wide, and is included within the meridians of 139° 11′ and 146° 7′ E., and the parallels of 41° 21′ and 45° 30′ N.; area, 30,143 square miles; population, in 1900, 922,058, including 17,000 aborigines, known as Aino (q.v.).

The surface is much broken by two great intersecting mountain systems, one volcanic, from the Kurile Islands, and the other of granite and old schists from Saghalien, culminating in Tokachi-dake (8200 feet), latitude 43° 48′ N. and longitude 143° 10′ E. The volcanic peaks are numerous, the best known being Komaga-take (4000 feet), still active. The chief rivers are the Ishikari, 407 miles long, the seat of a great salmon-fishing and canning industry, and the Tokachi. There is comparatively little level land that is suitable for cultivation, and the principal industries, besides farming, are hunting, fishing, and mining—chiefly gold and coal. Mineral oil is found near Hakodate (the principal seaport) and elsewhere, and is being developed by foreign companies. Brewing is carried on at Sapporo, the capital of Ishikari Province (43° 4′ N., and 144° 43′ E.), and glass works for bottle-making and several paper mills are in operation. The chief exportable commodities are canned salmon, fish-manure, fish-oil, dried fish-roe, seaweed, salt, and sulphur. In 1900, 328 miles of railway were in operation. The forests are dense, and many wild animals, including deer and bear, abound. The climate is severe, and for nearly six months the country is covered with a deep mantle of snow and ice. (See the article JAPAN, section *Climate*.) Besides Sapporo and Hakodate, already mentioned, the chief towns are Okkashi, Nemuro, Mororan, a naval station on Volcano Bay, and Fukuyama or Matsumai (formerly the chief town of the island). From 1600 to 1868 the southwestern portion of the island was the possession of a Daimio named Matsumai, and Hakodate belonged to the Shogun. In 1871, fearing Russian aggression, active colonization was begun, a new department—the *Kaitakushi*, or Colonization Department—was established, and much development work was done under foreign superintendence. This was abolished in 1881, and the country was divided into prefectures as in Japan proper. It is still regarded as a colony, however, and electoral privileges have not as yet been extended to its inhabitants.

YGGDRASIL, ĭg′drȧ-sĭl (Icel. *yggdra syll*, sill of Yggr, a name of Odin). The name given in Scandinavian mythology to a tree which was conceived as binding together heaven, earth, and hell. It is an ash, whose branches spread over all the world, and reach above the heavens. It sends out three roots in three different directions: one to the Æsir in heaven, another to the frost-giants, the third to the under-world, or, according to other accounts, to the world of mankind. Under each root springs a wonderful fountain, endowed with marvelous virtues. From the tree itself drops honey. In it dwell an eagle, between whose eyes the hawk Vethrfolnir or Vethrlanfnir sits, and a squirrel, named Ratatoskr, while at its roots gnaws the serpent Nithhoggr. Between the eagle and the serpent the squirrel continually tries to breed dissension. The mythological basis of the tree Yggdrasil is uncertain, but from certain features it seems probable that Christian ideas have been blended with the original Scandinavian concepts.

YIDDISH (Judæo-Ger., Jewish, from Ger. *jüdisch*, Jewish). The language spoken by the Jews in Eastern Europe, the most widely spread dialect of the Jews. Although the Jews after the Dispersion spoke the language of the land in which they dwelt, it was inevitable that, in their Ghettos, they should intermingle with their colloquial speech a large number of Hebrew terms. Thus there developed at different times various Jewish dialects, Judæo-Persian, Ladino or Judæo-Spanish, and Yiddish or Judæo-German. Up to the fourteenth century the Jews of Germany spoke the High German of their neighbors, and wrote it with accuracy, although they employed the Hebrew script. After the Black Death, many Jews, whom persecution drove out of Germany, settled in the Slavic lands, bringing with them their High German. In Poland this dialect received a large infusion of Hebrew words. At the same time the High German underwent an evolution into the language of Luther, so that when the Jews returned to Germany in the seventeenth and eighteenth centuries, they brought with them a vernacular, based on the High German of the Middle Ages, yet differing radically from the language of the time, because of the admixture of Hebrew, Aramaic, and Slavic elements. This dialect, the Yiddish, has been carried all over the world, wherever the Jews of the Slavic lands have found refuge, and in its peregrinations the language has undergone many changes, admitting words and idioms of all the languages with which it has come in contact.

LITERATURE. Hebrew throughout the Middle Ages was the literary language of the Jews, and was employed not only in religious services, but also in business correspondence, in bookkeeping, and in the preparation of legal documents. As early as the sixteenth century translations of the Bible into Yiddish began to make their appearance to supply the wants of women, who did not receive a Hebrew education, and of the ignorant. The most popular Yiddish edition of the Pentateuch and of the Five Scrolls is the one known as *Zeenah Ureenah*. This is not a translation, but a paraphrase of the biblical text, embellished with the homiletic interpretations of the Talmud and Midrash. The compiler of the book was Jacob ben Isaac, of Janowo, Poland, who lived at the end of the sixteenth century. It has gone through many editions and to-day can be found in almost every Jewish household of Eastern Europe. Besides translations of the Bible there appeared books of a purely religious or moral character, the most popular of which were the *Sefer Hamareh*, "The Book of the Mirror" (Frankfort, 1706); *Simhat Hanefesh*, "The Joy of the Soul" (ib., 1706); and *Kab Hayashar*, "The Correct Measure" (Sulzbach, 1724). Of historical works the most famous were *Josippon*, after Josephus (Amsterdam, 1661), and *Sheerit Israel*, "The Remnant of Israel," by Menahem Man (ib., 1743).

It was not, however, until the beginning of the nineteenth century that Yiddish began to be used as a literary language. The movement for reform and for modern culture (*Haskalah*), aroused by the Mendelssohnian translation of the Bible, soon gained a firm foothold in Russia and in Galicia, and while the desires of the learned were satisfied by books written in Hebrew, the people at large had to be appealed to through the medium of the Yiddish. At first Yiddish was looked upon with scorn by those who had tasted of European civilization, and it was from them that the language received its unfortunate appellation of 'Jargon,' a name by which it has since been generally known among Jews. With the rise of able writers and poets who use Yiddish, the language is now receiving more considerate treatment at the hands of philologists and literary men. During the last fifty years an extensive Yiddish literature has developed, which includes science, belles-lettres, poetry, and history. Its home is almost exclusively in Russia and the United States.

Solomon Jacob Abramowitsch, better known by his pseudonym 'Mendele Mocher Sephorim,' easily ranks first among Yiddish authors of modern times. Best known of his works are: *Die Klatsche* (The Mare), a beautiful and touching allegory of the history of Jewish persecution and its effects on the national character (Vilna, 1873); *Das kleine Menschele* (The Mannikin), a cruel analysis of the soul of a 'self-made' man (ib., 1879); *Fischke der Krumer* (Fischke the Lame), a study of beggar life (Zhitomir, 1869); and *Die Takse* (The Tax), a criticism of the Jewish communal system. Abramowitsch's work is marked by a quaintness of humor and a depth of feeling which are enhanced by the practically amorphous medium in which he writes. His masterly arraignment of sham and wrong entitle him to a place with the great satirists of the recognized literatures. I. J. Linetzki's *Das polnische Jüngel* (The Polish Boy) is valuable for the picture it gives of the Chassidic life among the Jews. A. M. Dick was a prolific writer of the romantic school. Jacob Dienensohn produced a number of popular sentimental novels. M. R. Schaikewitsch, otherwise known as 'Schomer,' wrote more than a hundred lengthy books marked by a talent for narration and little else. Mordechai Spektor, Solomon Rabinowitsch, better known as 'Scholem Alechem,' and J. L. Perez are, after Abramowitsch, the most prominent of contemporary prose writers in Yiddish. They resemble Abramowitsch in the general undercurrent of sadness which runs through all their work, but like him, too, they display prominently a rich taste for humor, which in Rabinowitsch is often mingled with acute satire and in Perez with pathos and mysticism.

The influence most conducive to the rise of the Yiddish literature was the introduction of the Yiddish newspaper. The first successful newspaper in the language was established in 1863, when A. Zederbaum began to publish the *Kol Mewasser*, as a supplement to his Hebrew weekly *Hameliz*. Since then many Yiddish periodicals have appeared in various lands. The *Jüdisches Tageblatt*, the first Yiddish daily, appeared in New York in 1885, under the management of the editor of the weekly *Jüdische Gazetten*. Numerous newspapers advocating various ideals of religion and sociology have appeared from time to time in America, and now there are more than twenty Yiddish newspapers issued in this country. The first Yiddish daily in Russia, *Der Freind*, made its appearance in January, 1903, at Saint Petersburg. In January, 1904, another daily, *Der Tag*, began publication at the office of the Hebrew daily *Hameliz*, Saint Petersburg. It is almost exclusively in connection with the newspaper that Yiddish literature has developed in the United States. The Socialist press has counted among its contributors many men of high gifts and wide attainments who have done excellent work in popularizing the sciences and bringing some of the greatest works in foreign literatures within the reach of the Yiddish public. In belles-lettres they have shown but little originality, their work being plainly influenced by the popular French and Russian realists. Prominent in the ranks of Yiddish journalism is Abraham Cahan, who has also written successfully in English (*The Imported Bridegroom*, 1898; *Yekl*, 1899). J. Rombro, better known by his nom-de-plume of Philip Krantz, has gained reputation as an editor and writer on topics of general history. Z. Libin has shown in his sketches of Ghetto life a finished art approaching that of the French masters. Morris Winchevsky is in style probably the most original and effective of the group of Yiddish journalists. J. Goido, Leon Kobrin, and B. Feigenbaum may also be mentioned. Of writers not identified particularly with the liberal movement, the best known are Alexander Harkavy, Abraham Tannenbaum, Selikowitsch, Seiffert, and A. M. Sharkansky. The last has produced much acceptable verse, in imitation largely of foreign models, but revealing a good sense of form. Eliokim Zunser, originally one of the class of *badchens* who, in their capacity as rhapsodists, moralists, and clowns, constitute a picturesque feature of orthodox Jewish weddings, has gained wide note as the writer of songs whose fervent national spirit is made to atone for their utter lack of poetic art. Indisputably first, however, among writers of verse is Morris Rosenfeld, who has become known to the non-Yiddish public through translations of his poems into English (*Songs from the Ghetto*, Boston, 1898), and into German (*Lieder aus dem Ghetto*, Berlin, 1899). Rosenfeld was born in Russia in 1862, and came to the United States by way of England. Here he worked for a number of years as an operator in a clothing shop. From the sweatshop and the tenement he has drawn most of his themes, and the pervading tone in his verse is one of deep melancholy. His poems dealing with Jewish life specifically bear the same cast of despondency, often verging on despair. Yet at times he has shown himself capable of turning his fine lyric powers to the singing of the joys of life—nature, love, children. His language approaches closely to the German, and, transliterated, offers no very great difficulties to one familiar with that language. His complete works in Yiddish were published in 1903.

The Yiddish drama also received its fullest development in America. In the beginning of the eighteenth century two Yiddish plays, *The Sale of Joseph* and the *Ahasuerus Play*, appeared in print. These were performed in private Jewish homes, especially on the festival of Purim. In 1878 Goldfaden, the father of the Jewish theatre, who had first performed in Rumania with an itinerant company of actors, established the first Jewish theatre in Odessa. This met with great success and soon found imitators in other large towns of Russia. But the Government closed these theatres in 1883 and the actors had to seek their audiences across the Atlantic, where in the same year Tomaschewski and Golubok started a Jewish theatre in New York. Now there are four such theatres in New York, and the companies frequently make tours of the other large towns. The Yiddish drama, however, up to 1890 was of a very low order from the artistic point of view. Writers like Hurwitz, Lateiner, and others supplied the public with concoctions of melodrama, comic opera, and fabulous Jewish history, which were received with great favor. A great advance in artistic standards began with the work of Jacob Gordin (q.v.), who has dealt skillfully and in a thoroughly realistic manner with numerous phases of Jewish life in Russia and America. Creditable work has been done by younger writers, of whom Z. Libin has been mentioned above.

Bibliography. Grünbaum, "Die Jüdisch-deutsche Litteratur," in Winter and Wünsche, *Jüdische Litteratur*, vol. iii. (Trèves, 1896); id., *Jüdisch-deutsche Chrestomathie* (Leipzig, 1882); Karpeles, *Geschichte der jüdischen Litteratur*, vol. ii. (Berlin, 1886); Wiener, *The History of Yiddish Literature in the Nineteenth Century* (New York, 1899); Harkavy, *Dictionary of the Yiddish Language* (ib.. 1898); Gerzon, *Die jüdisch-deutsche Sprache* (Frankfort, 1902).

YING-TSE, yĭng'tsĕ'. A treaty port of Manchuria. See Niu-chwang.

YIN-YANG, yēn'yăng' (Chin. *yin*, shade, darkness + *yang*, light). The two primordial forces, essences, or principles developed from the self-existing *T'ai-yi* or 'Great Monad,' by the action and interaction of which, according to Chinese cosmogonic theories, the universe has been produced and cosmic harmony is maintained. The terms *yang* and *yin* primarily mean 'light and darkness,' but they are also taken to represent 'heaven and earth,' 'male and female,' 'positive and negative,' 'odd and even,' etc., and the whole conception—doubtfully associated with the name of Confucius, but elaborated by Chu-Hi (q.v.) and his school in the twelfth century—bears a striking resemblance to the Pythagorean theory of number as the principle of order, and of the ten 'fundamental opposites' of that system. (See Pythagoreanism.) In Japanese these two principles are known as *In-yō*.

YO-CHOW, yō'chou'. A walled city in the Province of Hu-nan, China, having the rank of *fu*, and capital of a department of the same name. It is situated near the point where the Tung-ting Lake connects with the river Yang-tse. Its inhabitants have long been noted for their turbulence, and their hostility to foreigners. It is now thrown open to foreign trade, the small foreign population making their settlements between the city and the river. The trade is principally transit.

YOGA, yō'gȧ (Skt., conjunction, concentration, religious or abstract contemplation). The name of one of the orthodox systems of philosophy of the Hindus. While the basis of this system, the Sankhya (q.v.), is chiefly concerned in teaching the *tattvas*, or principles of creation, and the successive development of the latter, the main object of the Yoga is to establish the doctrine of a Supreme Being, and to teach the means by which the human soul may become permanently united with it. This Lord, or Supreme Being, is defined by Patanjali (q.v.), the reputed founder of the system, as "a particular *Puruṣa*, or spirit, who is untouched by affections, works, the result of works, or deserts; in whom the germ of omniscience reaches its extreme limit; who is the preceptor of even the first, because he is not limited by time; and whose appellation is Om, the term of glory." See Om.

To attain the concentration which leads to union of the soul with the Supreme Lord, eight stages are necessary. These are self-control (*yama*), religious observance (*niyama*), postures (*āsana*), regulation of the breath (*prāṇāyāma*), restraint of the senses (*pratyāhāra*), steadying of the mind (*dhāraṇā*), meditation (*dhyāna*), and profound contemplation (*samādhi*). The first stage, self-control, consists in not doing injury to living beings, veracity, avoidance of theft, chastity, and non-acceptance of gifts. The second stage, religious observance, comprises external as well as internal purity, contentment, austerity, muttering of the Vedic hymns, and devoted reliance on the Lord. The third stage, of Yoga postures of various sorts, is regarded as essential to those following. The fourth stage, regulation of the breath, is threefold, according as it concerns exhalation or inhalation, or becomes tantamount to suspension of the breath. The fifth stage, the restraint of the senses, means the diversion or withdrawal of the senses from their respective objects, and their entire accommodation to the nature of the mind. This stage is preparatory to the sixth, or the steadying of the mind, which means the freeing of the mind from any sensual disturbance, by fixing the thoughts on some part of the body, on the navel or the tip of the nose, for instance. Meditation, the seventh stage, is the fixing of the mind on the one object of knowledge, the Supreme Spirit, so as to exclude all other thoughts. The eighth and last stage, profound contemplation, is the perfect absorption of thought into the one object of contemplation, the Supreme Spirit; it is devoid of all thought, even of meditation. In such a state a Yogin is insensible to heat and cold, to pleasure and pain; he is the same in prosperity and adversity; he enjoys an ecstatic condition. The last three stages are also comprised under the distinctive name *saṃyama*, or 'restraint,' because it is chiefly on the perfection attained in these three collectively that depend the wonderful results which are promised to a Yogin when he applies them to the contemplation of special objects. Such results are, for instance, a knowledge of the past and future, a knowledge of the sounds of all animals, of all that happened in one's former births, of the thoughts of others, of the time of one's own death, a knowledge of all that exists in the different worlds, of stars and planets, of the structure of one's own body, etc. There are especially, however, eight great powers which a Yogin will acquire when properly regulating and applying the *saṃyama*—the power of shrinking into the form of the minutest atom, of becoming extremely light, of becoming extremely heavy, of unlimited reach of the organs, of irresistible will, of obtaining perfect dominion over everything, of changing the course of nature, and, lastly, of going anywhere at will. If the Yogin applies *saṃyama* to the contemplation of the smallest divisions of time, and the successive order in which such divisions occur, he obtains a discrimination which enables him to understand the subtle elements, and to see all objects at once. When his intellect has become free from all considerations of self, and his spirit is no longer subject to the result of acts performed, and when both have thus obtained the same degree of purity, the Yogin obtains eternal liberation.

This is seldom obtained in one birth, for usually only a succession of births brings to maturity the result obtained in a prior birth. (See Karma; Metempsychosis.) When, however, final liberation is attained, first, all ideas of self cease. In consequence, thought is turned inward, and this is the commencement of liberation. But as recollections, derived from former existences, sometimes prevail in his mind, they must be abandoned. When the Yogin has succeeded in this, his knowledge will have become so infinite that but little will remain for him to be known. Then the cosmical *guṇas*, or qualities (see Sānkhya), having accomplished the main object of spirit, gradually arrive at the end of their functions, and, as a consequence, matter becomes separated from spirit. This is *kāivalya*, or true liberation. The practical part of the Yoga was admitted into the later Vedanta (q.v.).

The great power which this system of philosophy has at all periods exercised on the Hindu mind is less derived from its philosophical speculations or its moral injunctions, than from the wonderful effects which the Yoga practices are supposed to produce, and from the countenance they give to the favorite tendency of orthodox Hinduism, the performance of austerities. But to acquire such powers for show is expressly condemned by Pantanjali and he recommends them merely as a means of practicing the Yoga-dispositions, so as to fit one's self for the knowledge which can come only to those who have overcome all resistance. The perfect Yoga thus attained is called *Rāja-Yōga* or *Kāivalya*, in distinction from the practical Yoga called *Hātha-Yōga*, which latter is but a means to the supreme end of liberation. The text-book of this form of Yoga is Chintamani Svatmaram Jogindra's *Haṭhapradīpika* (edited and translated by Tatya and Iyangar, Bombay, 1893).

Originally, Yoga was not theistic; the Purusha was not God, but the perfected (liberated) spirit. But this individual spirit gradually, in the course of centuries, being influenced by the Vedanta, assumed the place of a personal supreme spirit or God, and *yōga* was interpreted as 'union with God,' whereas at first every spirit was individually eternal and *yōga* was the attempt to isolate spirit from matter. The system of Patanjali was taught by him in a work called *Yōgasūtra* (edited and translated by Mitra, Calcutta, 1883; translated by Dvivedi, Bombay, 1890), which consists of four padas, or chapters, each comprising a number of sutras (q.v.).

The oldest commentary on it is ascribed to one Vyasa (q.v.); and this was commented on by Vachaspati Miśra. Of other commentaries, those by Vijnanabhikshu (edited by Sastri, Benares, 1884) and Bhojadeva (edited by Mitra, Calcutta, 1883) are the best.

Consult: Hall, *Contribution Toward an Index to the Bibliography of the Indian Philosophical Systems* (Calcutta, 1859); Paul, *Yoga-Philosophy* (Benares, 1851); Markus, *Yoga-Philosophie* (Halle, 1886); Garbe, *Sankhya und Yoga* (Strassburg, 1896); Vivekananda, *Yoga Philosophy* (2d ed., New York, 1898); Müller, *Six Systems of Indian Philosophy* (ib., 1899).

YOKKAICHI, yôk'kī'chē. A town in the prefecture of Miye, Japan, situated on the Owari Bay, in the southern part of the island of Hondo, 23 miles southwest of Magoya (Map: Japan, E 6). It is an industrial town with many factories built in European style. The manufactures include silk, paper, and porcelain ware known as Banko faience. Population, in 1898, 25,220.

YOKOHAMA, yō-kô-hä'mȧ (Cross Strand). The principal treaty port of Japan, situated on the south coast of the main island, 18 miles south of Tokio, the capital; latitude 35° 26′ N., longitude 139° 39′ E. (Map: Japan, F 6). It stands on a little indentation on the west shore of the Gulf, or Bay, of Yedo, opposite the small prefectural city of Kanagawa, two miles north, originally designated in the treaty of 1858 as the port to be opened to foreign trade in the following year. Its position on the Tokaido, however, exposed the foreign residents to frequent attacks by the military retainers of the territorial barons as they journeyed to and from Yedo, and the native authorities favored the removal of the settlement to its present site on the 'opposite strand,' where stood at that time only a few fishermen's huts. The settlement then established, and the large native town which has grown up alongside of it on the north, occupy the original sea beach and a large stretch of filled-in swamp land at the back, bounded on the south and southwest by a tidal creek stretching west and southwest to Mississippi Bay. At a later date a well-wooded hill on the south of this creek, now known as 'The Bluff,' was thrown open to foreigners for residential purposes, and it is now thickly dotted with handsome villas and bungalows. In 1901 the villages of Honmoku, Negishi, and Nakamura, lying along the foot of the bluff as far as Mississippi Bay, were annexed to the municipality, which in 1903 contained 46,367 houses and a population of 267,550, including 2039 Europeans and Americans, and as many Chinese. The town is well laid out and contains many fine buildings of stone, including the prefectural buildings, the Saibansho or court-house, post office, custom house, railway station, a public hall, an Anglican, a French-Catholic, and a Protestant Union church in the settlement, and several native churches. There are also hospitals, a fine cricket and recreation ground, a race course, a public garden on the Bluff, hotels, club-houses, banks, and several weekly and daily newspapers, in English, French, and Japanese. A fine water supply was introduced in 1887; ships load and unload at a great pier 2000 feet long, and the anchorage is rendered safe by two great breakwaters 12,000 feet in length. Two large graving docks were completed in 1896-7. The total value of the trade of the port in 1902 was 228,308,180 *yen*, or about $114,155,000; of this the foreign imports amounted to 89,194,210 *yen* or about $114,156,000; of this the foreign imports amounted to 89,194,210 *yen*. Yokohama is the great silk emporium of the country, as Kobé is for tea.

YOKOSŬKA, yō-kōs'kȧ. A coast town of Japan, and the greatest of the six Imperial naval stations (Map: Japan, A 4). It is situated on a landlocked inlet of the Bay of Yedo, 12 miles south of Yokohama, with which it is in hourly communication by steamer. It is also connected by rail with Yokohama and Tokio, via Kamakura. Here are the Imperial dockyards and arsenals, with great graving docks and every appliance for turning out large armored vessels; begun during the Shogunate in 1866; opened under the Empire in 1871; initial cost $1,470,431. Population, in 1898, 24,750. At Hemi-mura, a mile distant, is the grave of Will Adams (q.v.), the English pilot who arrived in 1600, and after whom *Anjin-chō* or 'Pilot Street' in Tokio is named.

YOKUTS, yô-kōōts' (People). A numerous group of Californian Indian tribes constituting what is known as the Mariposan stock (q.v.). They range over the country about the upper San Joaquin River, with Tulare Lake and its tributary streams. Their villages consist each of a single row of conical or wedge-shaped lodges of tule rushes, set in perfect line, and with a continuous arbor of brushwood extending along the front. The first lodge is occupied by the village chief, whose office is hereditary, the next by the principal priest or master of ceremonies, after which come the common people. The ordinary weapon is the bow, with a peculiar jointed arrow, which can be lengthened or shortened according to the distance of the object aimed at. Shell beads are prized both as ornaments and currency and even now are rated as more valuable than coin. The rattlesnake and coyote are held sacred and never molested. The Yokuts make beautiful baskets, cradles, sifters, and the like, of grass and various woods, using a sharpened bone for an awl. They are great gamesters, especially at dice made from split walnuts inlaid with bright-colored abalone shell. The standard of morality is comparatively high. They are not warlike and do not practice scalping. The dead are usually buried, but sometimes cremated, the mourning period continuing until the next Dance of the Dead. Their two great annual ceremonies are the snake dance in the spring, in which the initiates dance and run about after the manner of the more celebrated Hopi society, and the Dance of the Dead, which, after several days and nights of lamentation and frenzied performance, concludes with a wholesale sacrifice of the most valuable property upon an immense funeral pyre erected to the memory of those who have died within the year. A few of the Yokuts are now gathered upon the Tule River reservation near Portersville, and some were also attached to the old missions, but the great majority are included among the 10,000 Indians of southern California reported as not under agency supervision. Consult Powers, "Tribes of California," in *Contributions to North American Ethnology* (1877).

YO'LOF, JOLOF, or **WOLOF** (Speakers). Negroes of the Western Sudan between the lower Senegal and the Gambia and stretching inland. They are said to be a handsome race, tall in stature (68-70 inches), dolichocephalic (index 75.2), and intensely black in color, but having regular features due without doubt to mixture with the Hamitic peoples north of them. The Yolof language is the medium of communication throughout Senegambia. In religion the Yolof are Mohammedans, but they still wear fetishes on their foreheads, breasts, and abdomens, mixed with bits of the Koran wrapped in parchment.

They pay great attention to dress and personal adornment. Consult De Roger, *Recherches philosophiques sur la langue oulofe* (Paris, 1829).

YONEZAWA, yō'nȧ-zä'vȧ. An important town in the Province of Uzen, Japan, 125 miles north of Tokio, on the island of Hondo (Map: Japan, G 5). It is in the southeast of a fertile plain which is surrounded by lofty mountains, 30 miles distant. It is connected with Fukushima by railway. Population, in 1898, 30,719.

YONGE, yŭng, CHARLOTTE MARY (1823-1901). An English novelist, born at Otterbourne, in Hampshire. She was educated at home, and resided in her native place throughout her life. She is said to have fitted out Bishop Selwyn's missionary steamer *Southern Cross* and to have built a missionary college at Auckland, New Zealand. In religion she was an adherent of the High Church, whose doctrines she quietly took for granted in her novels. For several years she edited the *Magazine for the Young,* and for more than thirty years the *Monthly Packet,* in which many of her novels made their first appearance. Miss Yonge published about 125 volumes, comprising historical and educational works and novels, most of them bearing a strong religious or moral stamp. Her first great success as novelist was with *The Heir of Redclyffe* (1853), which was very widely read. Its spiritual romanticism was not only popular with the lay public, but it was received with enthusiasm by Morris and Rossetti. Miss Yonge's books for girls are perhaps best represented by *The Daisy Chain* (1856), and her essays in the field of historical romance by *The Dove in the Eagle's Nest* (1866). Village life was admirably depicted in a series of tales closing with *Forget-Me-Not* (1900). Among miscellaneous publications may be cited *Catherine of Aragon and the Sources of the English Reformation* (1881); *Life of Hannah More* (1888); and *Life of the Prince Consort* (1889). Consult Coleridge, *Life of Charlotte M. Yonge* (New York, 1903).

YONGE, Sir WILLIAM (c.1695-1755). An English politician and wit, fourth baronet, son of Sir Walter Yonge. He was born at Colyton, Devonshire, and in 1722 entered Parliament. He became an office-hunting Whig, disliked and somewhat unaccountably distrusted, but so useful to Sir Robert Walpole and the King that he was appointed to a succession of important positions, such as one of the commissioners of the treasury, Secretary for War, and joint vice-treasurer of Ireland. Yonge's career was a remarkably successful one in spite of the universal contempt which he aroused. This was perhaps due to his skill as a parliamentary debater and the fact that he was an unswerving and useful supporter of the Whig Party. He had no qualities of statesmanship, however, and perhaps prided himself as much on his reputation as a wit as on his successes in politics. His satirical verses have nothing to commend them, though they led to the dislike of Pope, who mentions him in the *Essay on Man* as Sir Billy and refers to him elsewhere with great contempt. That his opinion carried some weight is nevertheless evidenced by the fact that Dr. Johnson once appealed to him in a question of pronunciation.

YON'KERS. A city in Westchester County, N. Y., adjoining New York City on the north; on the east bank of the Hudson River and on the New York Central and Hudson River Railroad, from whose terminal in New York it is 15 miles distant (Map: New York, C 5). It is situated on ground rising gradually from the river. The more elevated section affords a magnificent view of the Hudson and of the Palisades (q.v.) on the opposite bank, and has handsome residences. There are 107 miles of streets, more than half of which distance is paved, the greater part with macadam. The most interesting structure of the city is the Philipse Manor House, dating from 1682, which now serves as the city hall. Other noteworthy features include the Hebrew Home for the Aged and Infirm, the Leake and Watts Orphan House, Saint John's Riverside Hospital, Saint Joseph's Hospital, the Homœopathic Hospital, and 'Greystone,' formerly the residence of Samuel J. Tilden. A handsome building for the use of the Public Library (18,000 volumes) is in course of construction in Washington Park. The funds for the superstructure, which will cost $50,000, were donated by Andrew Carnegie. There are also Saint Joseph's Catholic Seminary, with a library of 22,000 volumes, the Hollywood Inn for Workingmen, with a library of 5300 volumes, and the free circulating library of the Woman's Institute. Not only is Yonkers an attractive residential city, but it has important industrial interests. In the census year 1900 the various manufacturing establishments had an invested capital of $13,097,205 and an output valued at $19,580,324. Hats, carpets, and rugs are among the principal products. There are large grain elevators, sugar refineries, foundries and machine shops, patent medicine and chemical factories, and the extensive works of the Otis Elevator Company. The government is vested in a mayor, chosen biennially, and a common council. Of the subordinate officials, the board of assessors, the health, park, fire, police, civil service, and water commissioners, and the board of education, are appointed by the mayor. The water-works, which represent a total expenditure of $1,676,984, are the property of the municipality. The city maintains three small public parks, a steel recreation pavilion on the water front, and two public bath-houses. For maintenance and operation it spends annually nearly $1,000,000, the chief items being: Schools, about $250,000; interest on debt, $145,000; public lighting, $100,000; police department, $90,000; water-works, $80,000; fire department, $75,000; and streets, $55,000. The assessed valuation of real and personal property within the city for the year 1902 was as follows: Real estate, $38,749,918; personal, $3,317,700. Population, in 1890, 32,033; in 1900, 47,931.

Yonkers was first settled about 1650, and derives its name from Adrian Van der Donck, called De Jontheer, or 'young nobleman,' by the Dutch, who owned the surrounding territory from 1645 to 1672. From 1672 to 1779 it was included in the Philipse Manor, the part now constituting the city being called Philipsburg. During the Revolution it was in the midst of the 'Neutral Ground.' In 1788 the township of Yonkers was organized, and in 1855 the village of Yonkers was incorporated. In 1872 the town was divided, the north portion being chartered as a city, and the south portion becoming Kingsbridge, which two years later was annexed to New York City. Consult: Allison, *The History of Yonkers* (New York, 1896); Scharf, *History of Westchester County* (New York, 1886).

YONNE, yôn. A tributary of the Seine, having its source in the mountains of Morvan, in the Department of Nièvre, France (Map: France, K 4). It empties into the Seine from the south, near Montereau. It becomes navigable at Auxerre. Length, about 150 miles.

YONNE. A north central department of France, formed of portions of Burgundy and Champagne. (Map: France, K 4). Area, 2892 square miles. The department is traversed by the Yonne, a tributary of the Seine, and its surface is undulating or hilly, with many beautiful valleys. A considerable portion is covered with forest, but more than half of the area is under cultivation, producing large crops of wheat, oats, beets, and potatoes. Vineyards cover about 84,000 acres. The chief mineral product is building stone, and the most important industries are sugar refining, lumbering, and glass manufacture. Population, in 1896, 332,656; in 1901, 321,062. Capital, Auxerre.

YOR′ICK. (1) The former jester of the King of Denmark in Shakespeare's *Hamlet*. The finding of his skull in the fifth act suggests to Hamlet the famous apostrophe beginning "Alas, poor Yorick!" (2) The pseudonym assumed by Laurence Sterne, in most of his works after the publication of *Tristram Shandy*. In the latter novel he drew a picture of himself which he labeled Parson Yorick, and thereafter even his "Eliza" correspondence was carried on under that *nom de plume*.

YORITOMO MINAMOTO, yō′rê-tō̆′mô mē̆′-nä-mō̆′tô (1146-99). A Japanese warrior and statesman, who played an important part in the struggles for power of the rival military families, the Taira and the Minamoto, to the latter of which he belonged. His father, Yoshitomo, having been treacherously murdered in 1159 at the instance of Kiyomori, chief of the Taira clan, and at that time the virtual ruler of the country, Yoritomo fled, but was captured and condemned by Kiyomori to be beheaded. Spared through the pity of the stepmother of Kiyomori, he was banished to Idzu. There he married the daughter of Hojo Tokimasa, one of his guardians in exile. In 1180, calling around him his father's scattered retainers, and securing the assistance of his father-in-law and the monks of Hiyeizan (see KIOTO), he got together an army which he placed under the command of his youngest brother, Yoshitsune, and proceeded against the Taira. Five years later his enemies were utterly annihilated in a great naval battle off Dan-no-ura, near Shimonoseki. He made Kamakura his capital, was created Sei-i-taĭ shogun in 1192, laid the foundations of the feudal system in Japan, and became the virtual ruler of the land—nominally under the Mikado—and the office of shogun became hereditary in the Minamoto family. He died in 1199 with his great reputation somewhat sullied by his cruel treatment of his brother Yoshitsune. See MINAMOTO YOSHITSUNE.

YORK. The capital of Yorkshire, England, situated at the junction of the Ouse and Foss, nearly equidistant from London and Edinburgh (Map: England, E 3). The city preserves its mediæval aspect with its narrow streets, quaint houses, ancient gateways, and double walls. The walls inclose a circuit of 2¾ miles, and along the tops have formed an interesting promenade from remote times. There are remains or memorials of Roman towers and temples, and of the earliest British churches. One of the most magnificent of the Anglo-Saxon churches was erected at York in the eighth century, and, destroyed by fire, rebuilt, enlarged, and changed from time to time, is now known as York Minster. A portion of the original church was disinterred during excavations in 1829. The present structure ranks with the finest specimens of Gothic architecture in the world. It was mainly built in the thirteenth and fourteenth centuries. Its length is 525 feet, and its extreme breadth 250 feet. The Roman Catholics have a fine pro-cathedral. The educational institutions include Saint Peter's School, founded in 1557, Archbishop Holgate's free school, dating from Henry VIII., and the Yorkshire School for the Blind, conducted in a palace originally built for the Lord President of the Council of the North.

The building erected for a fine art exhibition held in 1879 contains a concert-hall and picture galleries. The Yorkshire Philosophical Society possesses a handsome building and gardens on the site of Saint Mary's Abbey, with a museum, rich in antiquarian relics and specimens illustrative of natural history. There are also the county hospital, the first established in England north of the Trent, the lunatic asylum, and the Friends' retreat. The ancient castle, with the exception of its imposing Clifford's tower, is superseded by the modern and commodious assize courts. The Guildhall, a fine Gothic building, was erected in 1446. The government is vested in 12 aldermen and 36 councilors, of whom one is Lord Mayor. The annual rent from the municipal estates yields $18,645. The municipality owns the Foss Canal, provides tugs for towing vessels between Hull and York, and constitutes the Ouse navigation authority. It has built promenades and baths along the river. The city's industries include the making of leather gloves, combs, glass, etc., iron foundries, flax-spinning, the manufacture of linen, and the construction of railway carriages.

Before the Roman invasion York was one of the chief towns of the Brigantes, the most numerous and powerful of the British tribes. It was constituted a Roman station, under the name of *Eboracum*, by Agricola about A.D. 79, and became the principal seat of Roman power in the north, perhaps in all Britain. Here Hadrian lived and Severus died. Here, too, died Constantine Chlorus, the father of Constantine the Great, and here, as many believe, his greater son was born. When the emperors visited the province, York was their chosen residence. It suffered during the long conflict between the Britons and the Picts, against whose incursions York was a material defense. It afterwards became the capital of Northumbria. The first metropolitan church in England was built here by Edwin, the Northumbrian King, whom Paulinus baptized. William the Conqueror was long unable to overcome this stronghold of the north.

York has an interesting record, reaching from early Norman times down to the Civil War, of royal visits, conferences, and meetings of Parliament. In 1536, during the insurrections consequent upon the dissolution of the monasteries by Henry VIII., the city was seized by the insurgents of the 'pilgrimage of grace.' In its immediate neighborhood, Fairfax, in 1644, conquered Prince Rupert on Marston Moor. The city and castle, already besieged, surrendered to the Parliamentarians a few weeks after. Population, in 1891, 67,749; in 1901, 77,793. Consult Twyford, *York and York Castle* (1883).

YORK. A town in York County, Me., 40 miles southwest of Portland, on the York Harbor and Beach Railroad. It is situated on the coast, and, aside from its historic interest, has considerable reputation as a summer resort. Population, in 1890, 2444; in 1900, 2668. York was settled as Agamenticus in 1624, and was chartered by Sir Ferdinando Gorges as a borough in 1641, and in 1642 as the city of Georgeana—the first English municipal corporation in North America. It passed, along with the rest of Maine, under the jurisdiction of Massachusetts in 1652 and was incorporated as a town under its present name. In 1692 it was attacked by the Indians and one-half of its inhabitants were killed or captured. Consult Emery, *Ancient City of Georgeana and Modern Town of York* (Boston, 1874).

YORK. The county-seat of York County, Neb., 50 miles west of Lincoln, on the Chicago, Burlington and Quincy, the Kansas City and Omaha, and the Fremont, Elkhorn and Missouri Valley railroads (Map: Nebraska, G 3). It is the seat of York College (United Brethren), opened in 1890, and has the School of the Holy Family and a public library. There are also a fine county court house and a public park. York is the commercial centre for a farming and stock-raising section, and manufactures flour and foundry products. The government, under the revised charter of 1901, is vested in a mayor, chosen biennially, and a unicameral council. York was settled in 1871, and was incorporated in 1880. Population, in 1890, 3405; in 1900, 5132.

YORK. The county-seat of York County, Pa., 100 miles west of Philadelphia, on the Pennsylvania, the Northern Central, the Wabash System, and other railroads. It is regularly laid out. Among the prominent institutions are the York Collegiate Institute, the York County Academy, orphans' home, hospital, almshouse, and the public and York County Law libraries. There are two parks—Penn and Farquhar. Other features of interest include the post office, county court house, municipal building, high school building, opera house, and jail. York derives considerable commercial importance from its situation in a productive farming section, and is also a prominent industrial centre. In the census year 1900 the various manufacturing establishments had $9,640,784 invested capital and an output valued at $11,961,706. The city is especially interested in the manufacture of foundry and machine-shop products, tobacco, cigars, and cigarettes. There are also silk mills, farm-implement works, piano and organ factories, planing mills, breweries, brick yards, and manufactories of carriages and wagons, wall paper, nails and spikes, paper and wood pulp, furniture, shirts, bridge work, safes, flour, chains, wire cloth, cigar boxes, leather, artificial stone, etc. An extensive wholesale trade is carried on. Under the charter of 1887, the government is vested in a mayor, chosen every three years, and a bicameral council. The subordinate officials, with the exception of the school board, which is elected by popular vote, are appointed by the mayor, subject to the confirmation of the select council. For maintenance and operation, the city spends annually about $204,000, the chief items being: Schools, including libraries, museums, etc., $77,000; municipal lighting, $23,000; police department, $20,000; streets, $15,000; and fire department, $14,000. Population, in 1890, 20,793; in 1900, 33,708.

Several Germans settled here in 1734, but a town was not laid out until 1741. From September 30, 1777, until June 27, 1778, the Continental Congress, driven from Philadelphia by the approach of Howe's army, was in session here. In 1787 York was incorporated as a borough and in 1887 was chartered as a city. Consult Gibson, *History of York County* (Chicago, 1886).

YORK, House of. A royal house of England which contended with the House of Lancaster for the possession of the throne in the fifteenth century. The Lancastrian line had obtained the crown in 1399 in the person of Henry IV. (q.v.) and remained in possession until the incapacity of Henry VI. (q.v.) afforded an opportunity for the assertion of the Yorkist claims by Richard, Duke of York (1411-60), who united in his person the claims of Lionel, Duke of Clarence, third son of Edward III., and Edmund Langley, Duke of York, fifth son of that monarch. He thus could show a stronger title than Henry VI., who traced from John of Gaunt, fourth son of Edward III. Richard's aspirations for the crown and his rivalry with the ambitious Duke of Somerset led to the outbreak of the Wars of the Roses. (See ROSES, WARS OF THE.) Richard perished at Wakefield in 1460, but the struggle was continued by his son Edward, who ascended the throne in the following year as Edward IV. (q.v.). Edward died in 1483, and the throne was usurped by his brother, Richard, Duke of Gloucester, who made way for his accession by the murder of the sons of Edward. Richard fell at Bosworth in 1485. (See RICHARD III.) Henry, Earl of Richmond, the victor of Bosworth, by his marriage with Elizabeth, eldest child of Edward IV., united in himself the claims of the houses of Lancaster and York and reigned as Henry VII. (q.v.). George, Duke of Clarence, younger brother of Edward IV., who was executed in 1478, left a son, Edward, Earl of Warwick, and a daughter, Margaret. Edward was kept a prisoner in the Tower by Henry VII. until 1499. Margaret married Sir Richard Pole and her fourth son was the celebrated Cardinal Reginald Pole (q.v.). See PLANTAGENET.

YORK, Richard, Duke of (1411-60). An English statesman, only son of Richard, Earl of Cambridge (d.1415), by Anne Mortimer, sister of Edmund, Earl of March. Before his majority he was appointed constable of England, and in 1436, under Henry VI., Regent of France, with rank of lieutenant-general. He insisted on being recalled in the following year, but was reap-

YORK MINSTER

pointed in 1440, being recalled five years later. In 1447 he was made the King's lieutenant in Ireland; he returned to England in 1450, and, gaining in influence, in 1454 he was chosen protector of the kingdom during the imbecility of Henry VI. About the beginning of 1455 the King recovered, and various charges of treasonable intentions, arising from York's claim to the heirship to the throne, culminated in a short engagement in May (regarded as the first battle of the Wars of the Roses), but reconciliation between the King and the Duke followed. York was relieved of the protectorship in 1456. In 1460 his title to the heirship was admitted, but, as the Lords were unwilling to dethrone the King, a compromise was reached in October whereby it was agreed that York should succeed to the throne upon the death of Henry, and the Duke was proclaimed heir apparent and protector. Queen Margaret's objection to this arrangement led to hostilities, and York fell in the battle of Wakefield on the 30th of December.

YORK HOUSE. For a short time the London residence of the Archbishops of York, after their old residence, York Place, now Whitehall, had passed from the hands of the Church to those of the Crown, upon the downfall of Cardinal Wolsey. It stood on the Strand, west of Salisbury House. It was subsequently the official mansion of the Chancellors, and was the birthplace of Francis Bacon. York House came into the possession of the Duke of Buckingham, who began extensions, never completed, from designs by Inigo Jones.

YORK RIVER. The common estuary of the Pamunkey and Mattapony rivers in Virginia, which unite at West Point, 32 miles east of Richmond. It extends 40 miles southeastward, and opens into Chesapeake Bay north of the mouth of the James (Map: Virginia, H 4). It is about two miles wide, and navigable to its head.

YORKER BRETHREN, OLD ORDER OF. See RIVER BRETHREN.

YORK'SHIRE. A northeastern maritime county of England, bounded by Durham on the north, the North Sea on the east, Lincoln, Nottingham, and Derby on the south, and Lancashire and Westmoreland on the west (Map: England, E 2). It is the largest county in the kingdom, with an area of 6067 square miles, but is divided into three sections known as East, West, and North Riding, which for most administrative purposes form separate counties. The surface is very diversified, the Pennine Chain occupying the western part, with lower groups of hills in the east, while the central portion forms the valley of the Ouse, which enters the Humber estuary on the southern boundary. East Riding is chiefly an agricultural region, producing oats, barley, wheat, turnips, and potatoes. West Riding is one of the greatest manufacturing districts in the kingdom. The textile industry is the most largely represented, but smelting, founding, and other metal industries, such as the manufacture of machinery, are very important, their chief centres being Leeds and Sheffield. Mining is also extensively carried on, the chief products being coal in West Riding and iron in North Riding, the production of pig iron amounting to over 2,500,000 tons annually. Population, in 1891, 2,886,621; in 1901, 3,585,122. The county town is York, and the chief cities are Leeds, Sheffield, Bradford, Halifax, and Hull. Yorkshire formed part of the Anglo-Saxon kingdom of Northumbria. It was largely settled by Danish invaders, who from the eighth to the eleventh century were the ruling class. It is exceedingly rich in the remains of castles and monastic houses.

YORKSHIRE DON. A long, slim variety of canary-bird bred in Yorkshire, England. See CANARY, and the accompanying Plate.

YORKSHIRE TRAGEDY, A. A play by an unknown author, printed in 1608 under Shakespeare's name. It was founded on a story in Stow's *Chronicle.*

YORK'TOWN. A town and the county-seat of York County, Va., 70 miles southeast of Richmond; on the York River, and on the Baltimore, Chesapeake and Richmond and the Old Dominion Steamship lines. Population, in 1900, 151. It contains the oldest custom-house in the United States, a monument commemorating the surrender of Lord Cornwallis, and several public schools and churches. The town is chiefly noted for its two sieges (1781 and 1862). Cornwallis, having established himself here early in August, 1781, fortified the town with seven redoubts and six batteries on the land side, and a line of batteries along the river. Gloucester Point, on the opposite side of the river, was also strongly fortified. He had an army of about 8000 men supported by several vessels anchored in York River. Washington, with the combined American and French forces, left his headquarters near West Point, N. Y., on August 19th, proceeded by land, by way of Philadelphia, to Elkton, at the head of Chesapeake Bay, then down Chesapeake Bay, reached Williamsburg on September 14th, and on September 28th marched to the investment of Yorktown with a force of about 16,000, of whom 7000 were Frenchmen, under the command of Rochambeau. A French fleet under Count de Grasse had immediately before entered the Chesapeake, and, by blocking the James and York rivers, cut off communication between the British at Yorktown and New York. On October 6th the first parallel was opened and on the 9th the batteries opened, dismounting many of the guns and destroying several vessels. On the 11th the second parallel was opened only 300 yards from the fort. On the 14th the two advanced redoubts were carried by assault, one by American, the other by French troops. On the 16th the walls and fortifications of the British works were broken down and almost every gun dismounted. The British general attempted now to escape by night by way of Gloucester Point, but the attempt was frustrated by a furious storm, which scattered his boats. On the 19th he surrendered to the allies, the land army with its munitions being surrendered to the Americans, the marines to the French. The prisoners, exclusive of seamen, numbered more than 7000, of whom 2000 were sick or wounded. Among the spoils the Americans obtained 235 pieces of cannon, 8000 stand of small arms, 28 regimental colors; the French 2 frigates and 20 transports. The total loss of the British was about 550, and of the allies 300. This victory virtually ended the Revolutionary struggle.

The second siege was begun by McClellan with about 53,000 Union troops on April 5, 1862. The Confederate general, Magruder, with 15,000 men, had taken possession early in the spring and had erected formidable works around the town and on Gloucester Point. He was soon reënforced by General Johnston, who took command, the total Confederate force now numbering about 55,000, while the Federal army, also reënforced, now numbered about 95,000. During the night of May 3d-4th Johnston secretly evacuated Yorktown and retreated toward Richmond, but was pursued by a part of the Union army, and on the 5th was forced with a part of his troops under Longstreet to fight the battle of Williamsburg (q.v.).

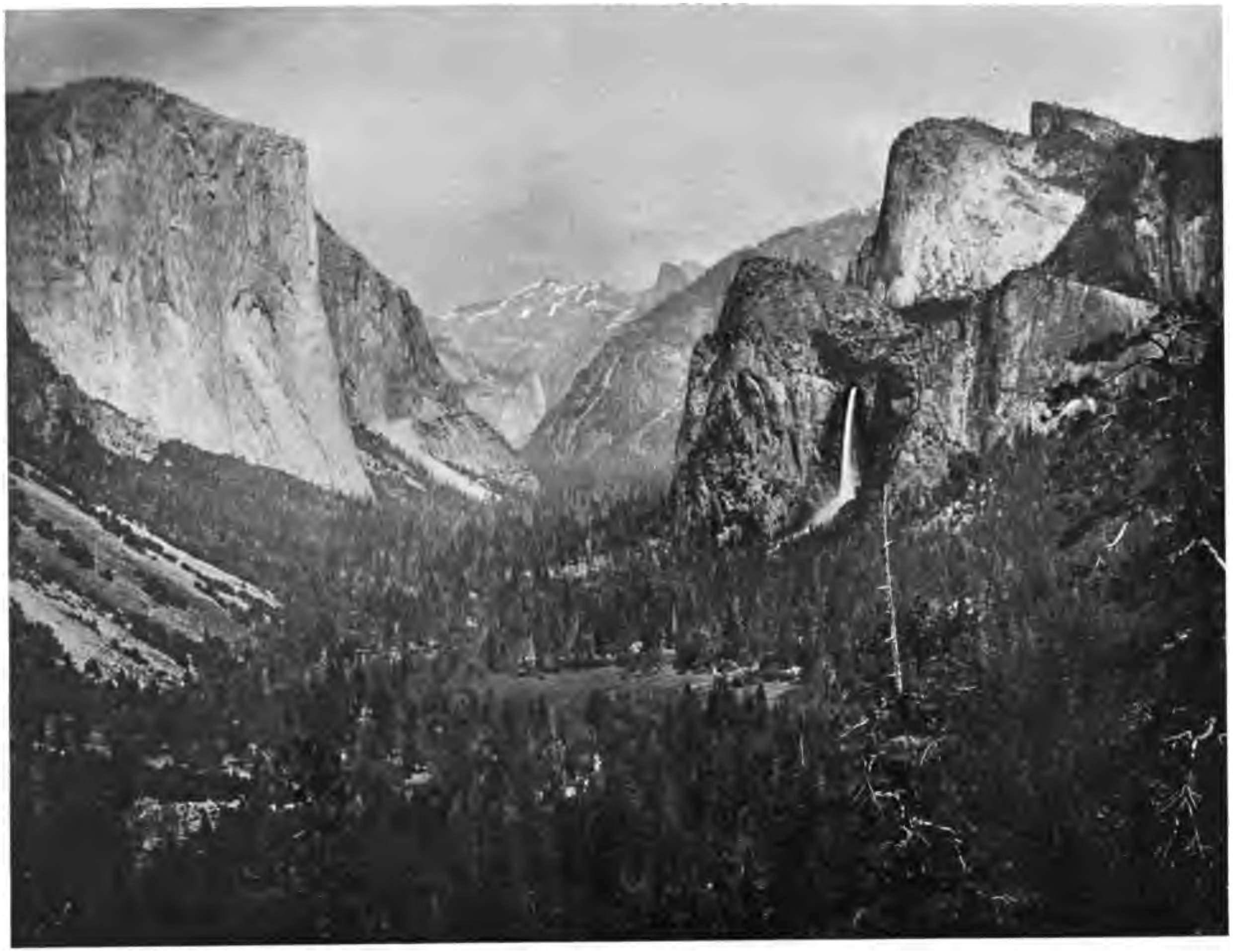
In 1881 the centennial of the surrender of Cornwallis was celebrated with elaborate ceremonies, and a monument commemorative of the event was dedicated in the presence of many distinguished Americans and foreigners. Consult: Johnston, *The Yorktown Campaign and the Surrender of Cornwallis* (New York, 1881); Balch, *The French in America During the War of Independence* (Philadelphia, 1891-95); Johnson and Buel (eds.), *Battles and Leaders of the Civil War* (New York, 1887); and *Report of the Commission Created in Accordance with a Joint Resolution of Congress Providing for the Erection of a Monument at Yorktown, Va.* (Washington, 1883).

YORK VON WARTENBURG, yôrk fôn vär'ten-bōōrk, Hans David Ludwig, Count (1759-1830). A Prussian field-marshal. He was born at Potsdam, entered the army in 1772, and was cashiered for insubordination and imprisoned (1779-81). He was in the Dutch East Indian service in 1783-84 and was reinstated in the Prussian army in 1787. He served in the Polish campaign of 1794 and distinguished himself in the struggle against France in 1806. In 1807 he attained the rank of major-general and in 1811 was made Governor-General of East and West Prussia. In the Russian campaign of 1812 he commanded the Prussian contingent in Napoleon's army, but he had no heart in this service, and during the retreat from Russia entered into a convention with the Russians, December 30, 1812, by which the Prussian troops were neutralized. This convention was necessarily disavowed by the King of Prussia, but the War of Liberation against Napoleon soon broke out and the General's conduct received grateful recognition. York distinguished himself in the campaign of 1813-14, defeated Eugène Beauharnais at Möckern, took part in the battle of Bautzen and that on the Katzbach, and fought at Leipzig. He shared also in the fighting which preceded the capture of Paris by the Allies. He was made a count in 1814 and a field-marshal in 1821. For his life, consult Droysen (Leipzig, 1890).

YORUBA, yō'rōō-bȧ, or **YARIBA**. Formerly a powerful State in Africa, comprising the territory lying southwest of the Nupe country and east of Dahomey and extending from Borgu south almost to the Bight of Benin. The invasion of the Fulbe in the first half of the nineteenth century led to the partition of the Yoruba empire into small States constantly warring with each other. Hence the existence of the large walled cities in that region such as Oyo, the Yoruba capital, Ibadan, the chief commercial city, Abeokuta, Ilorin, and a few others, some of which are supposed once to have had as many as 200,000 inhabitants. At present Yoruba is practically embraced in Lagos (q.v.). The population is estimated at from 1,000,000 to 2,000,000 and is of negro origin. They are chiefly agriculturists. Palm-oil is the main export article. The Yorubas are shorter than negroes in general (1.64 m. to 1.65 m.) and are often mesocephalic or brachycephalic. These characters, joined with their fair color, are regarded as evidence of dwarf elements. They are light brown in color, pleasing in features, brave, industrious, and great traders. They have large towns of rectangular houses with heavy, palm-thatched roofs, wide plazas, and merchants' booths. Professedly Mohammedan, they practice their ancient cult, which is chiefly conciliation of evil spirits and fetishism, but they punish sorcery with death. The Yoruba rulers maintain great state and an infraction of etiquette is a capital offense. Consult: Ellis, *The Yoruba-Speaking Peoples* (London, 1894); Crowther, *Grammar and Vocabulary of the Yoruba Language* (ib., 1852); Gouzien, *Manuel franco-yoruba de conversation* (Paris, 1899).

YOSEMITE (yô-sĕm'ĭ-tē) **VALLEY.** A celebrated valley in the Sierra Nevada Mountains, in the county of Mariposa, Cal. (Map: California, D 3). It is about 15 miles long and on an average less than a mile wide. The Merced River traverses the valley in a general direction from east to west. The scenery is famous for the numberless masses of picturesque rock formations and gigantic waterfalls, for striking heights and deep creek valleys. On both sides of the Merced rise perpendicular heights of granite, represented among others by El Capitan (3400 feet high), Cathedral Rock, Three Brothers (4000 feet), and Half Dome (4700 feet). The most celebrated of the waterfalls are the Bridal Veil Falls, formed by Bridal Veil Creek and descending over Cathedral Rock, a distance of over 600 feet. The total height of the falls represents nearly 900 feet. There are also Yosemite Falls, Nevada Falls, etc. In the eastern part of the valley is found Mirror Lake, a beautiful sheet of water. The valley was discovered in 1851. In 1864 it passed to California by act of Congress, under the condition that it be kept open as a public park. Since 1890 it has been known as Yosemite National Park. The celebrated big trees of California are in this immediate region. Consult the *Guide to the Yosemite*, by the California Geological Survey, and Bunnell, *Discovery of the Yosemite* (New York, 1893).

YOU'ATT, William (1776-1847). A noted British veterinarian and author, born at Exeter. Having been educated for the ministry, he officiated in London from 1810 to 1812 or 1813, when he established, with D. P. Blaine, a veterinary infirmary which came under his sole management about twelve years later. From 1828 to 1835 he delivered lectures and conducted practicums on veterinary practice. At the same time he established the *Veterinarian*, a monthly magazine, still published. Besides important work in conjunction with the Royal Veterinary College and the Royal Agricultural Society, to whose



YOSEMITE VALLEY

LOOKING EASTWARD, SHOWING EL CAPITAN, BRIDAL VEIL FALLS AND CATHEDRAL ROCKS

Journal he was a frequent contributor, he exercised a profound influence upon his profession. His voluminous writings, both in the *Veterinarian* and in his books upon the domestic animals are widely consulted and quoted. Among his books are: *The Horse* (1831; 2d ed. 1843); *Cattle, Their Breeds, Management, and Diseases* (1824); *Sheep, Their Breeds, Management, and Diseases, and the Mountain Shepherd's Manual* (1837); *The Dog* (1845); *The Pig: A Treatise on Breeds, Management, Feeding, and Medical Treatment of Swine; with Directions for Salting Pork and Curing Ham* (1847).

YOUMANS, yōō′manz, Edward Livingston (1821-87). An American scientist, born at Coeymans, N. Y. When only seventeen years old, he was afflicted with a malady of the eyes from which he suffered during the remainder of his life. Despite this handicap, however, he managed to acquire a good education. In 1845 his sister, Eliza Ann Youmans, became his reader and amanuensis, and with her aid he undertook the study of chemistry. In 1851 he prepared a *Chemical Chart* which won such favor that the next year he published a *Class-Book of Chemistry*. From that time on he devoted himself with remarkable success to popularizing science. He became a lecturer, founded (1872) and until his death edited the *Popular Science Monthly* magazine, planned the publication of the "International Scientific Series," by means of which works by the greatest scientists of all nations were published simultaneously in the principal modern languages, and introduced the works of Herbert Spencer and of other British scientists to American readers. Among his own publications are: *Handbook of Household Science;* (1857); *The Correlation and Conservation of Forces* (1864); and *Culture Demanded by Modern Life* (1867).

YOUMANS, William Jay (1838-1901). An American scientist, born at Milton, N. Y., brother of Edward Livingston Youmans (q.v.). He studied chemistry under his brother and at Columbia and Yale, then took a course in medicine at New York University, and, in 1865 studied natural history under Huxley in London. On his return to the United States he settled at Winona, Minn., and practiced medicine for about three years. In 1872 he assisted his brother in establishing and subsequently was associated in editing the *Popular Science Monthly*. After his brother's death in 1887 he became its editor-in-chief. He edited Huxley's *Lessons in Elementary Physiology*, and wrote *Pioneers of Science in America* (1895.

YOUNG, Arthur (1741-1820). A noted British agriculturist and author, born in London. Prior to 1759 he had written four novels and several political pamphlets which seem to have had no permanent value. In 1763 he took up farming, which, combined with rural investigations at home and abroad, became his life work. The permanent value and enormous amount of his agricultural writings, based largely upon personal experience and observation, place him well in advance of all British agricultural authors, and the sprightly style renders much of his product entertaining even to-day. His *Travels in France* pictures not only French agriculture, but the conditions prevalent in France prior to the French Revolution; hence it is a reliable source of information upon both these subjects. Young became one of the best known men of his time; secretary of the British Board of Agriculture (1793), and honorary member of the leading scientific societies of the world. Some of his best known works are: *A Six Weeks' Tour Through the Southern Counties of England and Wales* (1768); *Annals of Agriculture* (1784-1809, 1812-15); *Travels in France During the Years 1787, 1788, and 1789* (1794).

YOUNG, Brigham (1801-77). The successor of Joseph Smith, Jr., as president of the Church of Jesus Christ of Latter Day Saints. (See Mormons.) He was born in Whitingham, Windham County, Vt., June 1, 1801. He removed to Mendon, Monroe County, N. Y., and was baptized into the Mormon Church April 14, 1832. Appointed an elder, he first met the Prophet Joseph at Kirtland, Ohio. After a successful mission to Canada he went to Missouri in the 'Army of Zion.' Elected as one of the original Quorum of Twelve in 1835, he was called to preach to the Indians, and finally started on a mission to the Eastern States. In 1840 he was sent to Liverpool to assist Apostles John Taylor and Wilford Woodruff (qq.v.) in the English mission and became an editor of the *Millennial Star*. Upon the apostasy of T. B. Marsh, Young was left president of the Twelve, and held this position until his election as president of the Church, December 5, 1847. After the murder of Smith in 1844 Young remonstrated with the Mormons for their depredations in Missouri, and in turn demanded fair treatment from the Quincy Committee upon the expulsion of the Mormons from Illinois. The next year, having vainly sought Federal aid from President Polk, he urged the Saints to move somewhere west of the Rocky Mountains. In February, 1846, he was himself a member of the first party to leave Nauvoo, but stayed in winter quarters on the Missouri till the following January. Then he promulgated his first and only 'revelation,' to be found in the *Book of Doctrine and Covenants*. Reaching the Salt Lake Valley in 1848, he selected the site of the temple. Young's power over his followers was now shown by his prohibition of gold-mining, by his organization of the ill-fated hand-cart expedition, and by his election as Governor of the State of Deseret in 1849. The following year he was appointed by President Fillmore as Federal Governor of the Territory of Utah. Young's choice of his own ward bishops enabled him to control all local affairs and receive the bulk of the tithes. His suppression of the schismatic Gladdenites in 1853 led him to further steps against the exodus of the discontented, such as the murder of W. R. Parish, the organization of the 'Wolf Hunters,' and the instituting of 'blood atonement.' Defying the United States authorities sent out by President Buchanan in the so-called Mormon War of 1857, and indicted for treason after the Mountain Meadows massacre (q.v.), Young was nevertheless let alone by the Central Government. About this time he made his sole contribution to the body of Mormon divinity, the doctrine of the worship of Adam as God. In 1866 Young founded the Zion's Coöperative Mercantile Institution. In 1871 the case against him for unlawful cohabitation was dropped as unconstitutional, but the divorce suit brought by Ann Eliza Young, known as wife 'No. 19,' was sustained. Young died August 29, 1877, and was reputed to have left between $2,000,000 and $3,000,000, 24 widows, and 44 children.

YOUNG, CHARLES AUGUSTUS (1834—). An American astronomer, born at Hanover, N. H. He graduated at Dartmouth (1853), and till 1855 taught at Phillips Academy, Andover. From 1856 to 1866 he was professor of natural philosophy and mathematics in the Western Reserve College, Ohio. In 1866 he was made professor of astronomy and natural philosophy in Dartmouth. In 1877 he was appointed to fill a similar position at Princeton. In observing the total eclipse of August, 1869, he made the first observation of the spectrum of the solar corona. He was also the discoverer of the 'reversing layer' in the solar atmosphere. (See SUN.) He also studied the prominences and chromosphere, the spectroscopic measurement of the sun's rotation, solar cyclones and explosions. He was a member of Winlock's party of 1870, and observed the total eclipse at Jerez, Spain. Young published many scientific papers and text-books, among which are *The Sun* (1882) and *General Astronomy* (1898).

YOUNG, EDWARD (1683-1765). An English poet, born at Upham, in Hampshire, where his father was rector. He was educated at Winchester School and at Oxford. He first came before the world as a poet with an *Epistle* to George Granville on Granville's being created a peer (1713). The next year this piece of fulsome flattery was followed by *The Last Day*, dedicated to the Queen; *Force of Religion*, with a dedication to the Countess of Salisbury; and an epistle on *The Late Queen's Death*. In 1719 Young tried his hand at a tragedy entitled *Busiris*, which was succeeded by *Revenge* (1721), long popular on the stage, and *The Brothers* (first produced in 1753). For *The Instalment* (1726), on the occasion of Walpole's being invested with the order of the Garter, Young was granted a Government pension of £200 a year. Between 1725 and 1728 appeared in succession a series of satires entitled *The Love of Fame, the Universal Passion*. Taking orders, Young became chaplain to the King (1728), and rector of Welwyn, in Hertfordshire (1730). In 1731 he married Lady Elizabeth Lee, who was a daughter of the second Earl of Litchfield, and died in 1741. Then followed the famous *Night Thoughts on Life, Death, and Immortality* (1742-45). Young passed his last years mostly in retirement, and died at the rectory of Welwyn.

Young's reputation rests almost wholly upon *Night Thoughts*. This series of poems contains passages of fine imagination, and sayings, like "Procrastination is the thief of time," that have passed into popular speech. The *Night Thoughts*, read by everybody, gave rise to a school of graveyard poets. Translated into French and German, the series was received with equal enthusiasm abroad. Besides his verse, Young wrote a remarkable essay entitled *Conjectures on Original Composition* (1759). Like the *Night Thoughts*, its influence was great on the Continent, especially in Germany. Young collected his works (4 vols., 1757). The poems, with a memoir by Herbert Croft, were included in Johnson's *Lives of the Poets*. A folio edition of *Night Thoughts* (1797) was illustrated with designs by William Blake (q.v.). Consult Young's *Poetical Works*, edited with a *Life* by J. Mitford (London, 1854), and by G. Gilfillan (Edinburgh, 1853); and the exhaustive study of his life and works by Thomas, under the title, *Le poète Edward Young* (Paris, 1901). For his influence in France, consult *Texte, Cosmopolitisme littéraire* (Paris, 1895; Eng. trans. by J. W. Matthews, London, 1899). George Eliot wrote a famous essay on Young, entitled "Worldliness and Other Worldliness," in *Westminster Review* (1857).

YOUNG, EDWARD (1831-96). An English explorer, born at Hastings. In 1862 he commanded the ship *Pioneer* to the Zambezi and the Shire rivers under Livingstone. In 1867 he commanded the Livingstone search expedition. He was commissioned by the Free Church of Scotland to conduct a mission to Lake Nyassa in 1875, and at this time discovered the Livingstone Mountains and established the Livingstonia settlement. He wrote: *The Search After Livingstone*, a journal revised by Rev. Horace Waller (1868), and *Nyassa, a Journal of Adventures While Exploring Lake Nyassa, Central Africa, and Establishing the Settlement of Livingstonia* (1896).

YOUNG, Sir GEORGE (1837—). An English lawyer, born at Cookham and educated at Eton and Trinity College, Cambridge. He was called to the bar at Lincoln's Inn in 1864. He served on the royal commission on the coolie immigration in British Guiana in 1870 and was secretary of the Factory and Workshops Acts Commission in 1875, and of the Irish Land Acts Commission in 1881. His publications include: *Essay on Greek Literature in England*, for which he received the Le Bas prize (1862), and *Dramas of Sophocles Rendered in English Verse, Dramatic and Lyric* (1888).

YOUNG, GEORGE PAXTON (1818-89). A Canadian educator, born in Scotland. He became a minister of the Free Church of Scotland, and in 1848 took charge of Knox Church, Hamilton. In 1853 he was appointed professor of logic, mental and moral philosophy, and the evidences of natural and revealed religion, at Knox College. In 1864 he was appointed inspector of grammar schools for Ontario, and in 1868 was given charge of the Knox College preparatory department. He was made professor of metaphysics and ethics in University College, Toronto, in 1871. He was considered one of the ablest teachers and professors that Canada has ever had. His earlier works include: *Miscellaneous Discourses and Expositions of Scripture* (1854), and *The Philosophical Principles of Natural Religion* (1862).

YOUNG, JAMES (1811-83). A Scotch chemist, born at Glasgow. He was for several years assistant to Thomas Graham. About 1847 he began a series of analyses of petroleum, and succeeded in producing a lubricating oil for machinery and a lighter oil for lamps. He afterwards took out a patent for a process of slow destructive distillation of coal, paraffin being among the useful products obtained, and thus founded a new and important industry. (See PARAFFIN.) His discoveries showed the value of coal-oil and petroleum, and have contributed greatly to the development of the American petroleum industry. In 1872 he fitted out an expedition in search of Dr. Livingtsone.

YOUNG, Sir John (1807-76). A British administrator, born at Bombay, India. He was educated at Eton and at Corpus Christi College, Oxford, where he graduated in 1829. From 1831 to 1855 he was a Tory member of Parliament. He became Lord of the Treasury in 1841, was Chief Secretary for Ireland from 1852 to 1855, and was Lord High Commissioner of the Ionian Islands from 1855 to 1859, when he was recalled. From 1861 to 1867 he was Governor-General of New South Wales. In 1869 he was appointed Governor-General of Canada and Governor of Prince Edward's Island. During his administration he was called upon to suppress Louis Riel's rebellion, and as a reward for this service he was created Baron Lisgar on October 26, 1870. He returned to Europe in 1872 and spent the rest of his life in retirement.

YOUNG, John Russell (1841-99). An American journalist and diplomat, born in Downington, Pa. He was educated in the public schools of Philadelphia and New Orleans. He became news editor of the Philadelphia *Press* in 1861, when as private secretary he went to Washington with Forney, the owner of the paper, who had been elected secretary of the National Senate. Subsequently until after the battle of Williamsburg he was with the Army of the Potomac as a war correspondent. In 1864 he accompanied General Banks on his Red River expedition. After the war he was managing editor of the New York *Tribune* (1866-69); in 1870 founded the New York *Standard,* to which he contributed letters from Paris during the Franco-German War; and in 1872 became special foreign correspondent for the New York *Herald.* In 1877 he accompanied ex-President Grant on his trip around the world, an account of which he published under the title *Around the World with General Grant* (1879). He was then a member of the *Herald* editorial staff until 1882; and was United States Minister to China from 1882 to 1885. He continued in literary and journalistic work until 1897, when he was appointed by President McKinley librarian of the new Congressional Library at Washington. He edited a *Memorial History of Philadelphia* (1895), and was a frequent contributor to magazines and reviews.

YOUNG, Robert (1822-88). A Scotch biblical scholar and missionary, born in Edinburgh. He was superintendent of the mission press at Surat from 1856 to 1861, and in 1864-74 was in charge of the Missionary Institute at Edinburgh. His works include: *The Book of the Precepts by Rabbi Moses,* translated with a *Life* of the author (1852); *Bible Commentary* (1870); *Analytical Concordance to the Bible* (1879); *Two-Fold Concordance to the Greek New Testament* (1884); and *Grammatical Analysis of the Hebrew, Chaldaic, and Greek Scriptures* (1885).

YOUNG, Samuel Baldwin Marks (1840—). An eminent American soldier, first Chief of Staff of the Army of the United States, born in Pittsburg, Pa. In April, 1865, upon the outbreak of the Civil War, he entered the Federal Army as a private. He served with great efficiency throughout the war, attained the rank of colonel in December, 1864, and in April, 1865, was brevetted brigadier-general of volunteers for gallant services in the last campaign against General Lee. In March, 1867, he was also brevetted major, lieutenant-colonel, and colonel in the Regular Army for gallantry at Sulphur Springs, Va., Amelia Spring, Va., and Salior's Creek, Va., respectively. In May, 1866, he entered the Regular Army as a second lieutenant, Twelfth Infantry. He attained the rank of colonel of the Third Cavalry in June, 1897, and in May, 1898, was made a brigadier-general of volunteers for service in the Spanish-American War. He served with marked ability under General Shafter in the early part of the Santiago campaign, was promoted to the rank of major-general of volunteers in July, 1898, and for a time commanded the Second Army Corps. He was honorably discharged as major-general of volunteers and appointed brigadier-general of volunteers in April, 1899, and from July, 1899, to March, 1901, served with great ability in the Philippines, where for a short time he was military Governor of Northwestern Luzon and commander of the first district of the Department of Northern Luzon. During this period he was promoted to the rank of brigadier-general in the Regular Army, in January, 1900, and to that of major-general in the Regular Army, in February, 1901. After his return from the Philippines he commanded the Department of California and helped to organize the new War College, and in August, 1903, on the retirement of General Miles, he was promoted to the rank of lieutenant-general and for a week was the Commanding General of the United States Army. On August 15, 1903, when the new general staff system went into effect, he became Chief of Staff of the Army.

YOUNG, Thomas (1773-1829). A British scientist and archæologist. He was born at Milverton, in Somersetshire, of Quaker parents, and studied at a school at Compton, in Dorsetshire, and under a tutor. Toward the end of 1792 he began to study medicine in London, and afterwards at the University of Edinburgh. From Edinburgh he went to Göttingen, where he took the degree of doctor of medicine, returning to England in February, 1797. In order to qualify himself for membership in the College of Physicians, then restricted to graduates of Oxford and Cambridge, he entered at Emmanuel College, Cambridge, as a fellow-commoner, where he received his degree in 1799. In the year 1799 he took up his residence in London, and began to practice as a physician.

In 1801 he was appointed professor of natural philosophy in the Royal Institution, then newly established. Elected a fellow of the Royal Society in 1794, in 1802 he became its foreign secretary, a post which he retained till the end of his life. He resigned his professorship in 1803, fearing that his filling a chair of science might interfere with his success as a physician.

Young was elected one of the physicians of Saint George's Hospital in 1811. He afterwards published several medical works, which, though they were little more than compilations, and are now forgotten, show that he was thoroughly versed in the history of diseases and of medical opinion. Of these the most important were *Medical Literature* (1813) and *Practical and Historical Essay on Consumptive Diseases* (1815). He retired from practice in 1814 on his appointment as inspector of calculations in the Palladium Life Insurance Company. He served in 1814 also on a commission appointed to investigate the dangers involved in the introduction of illuminating gas in London, and in 1816 he was appointed a member of a commission to determine the length of the seconds pendulum, and which also determined the 'Imperial gallon' of ten pounds of water. In 1818 Young became secretary of the Board of Longitude and superintendent of the *Nautical Almanac*, in which capacity he served until the dissolution of the board in 1828, when he became the sole conductor of the *Nautical Almanac*. During the last years of his life he was a member of a council appointed to advise the Admiralty in scientific matters. Young was the first to describe and measure astigmatism, as well as to study the optical constants of the eye, and explained color sensation by the theory that the eye contained three sets of nerves or receptive systems located at the retina and corresponding to red, green, and violet, and that color-blindness was the result of a deficiency of one or the other of these systems. Young is often called the founder of physiological optics, and his theory was adopted and amplified by Helmholtz with the result that at present it is generally accepted. His most famous work in optics was his demonstration of the wave theory, which since the time of Huygens (1690) had made but slight progress. This was accomplished by his discovery of the 'interference of light,' which served to explain the color of thin and thick plates and various other phenomena. Young stated that "radiant light consists of undulations of the luminiferous ether," and maintained his position in spite of the numerous attacks to which his theories and papers were subjected. Many of the phenomena of polarized light were also discussed by Young, and to him are due many discoveries which were later developed by other physicists. To Young is due the use of the terms 'energy' and 'labor expended,' the former meaning the product of the mass of a body and the square of its velocity, whereas the latter, which is equivalent to the 'work done,' denotes the products of the force exerted and the distance through which the body is moved, both quantities being proportional to each other. The expression known as Young's modulus represents the use of absolute measurements in elasticity and denotes the weight which would stretch a rod or wire of unit cross-section to double its length. His explanation of capillary phenomena was the first correct one.

Young also conducted researches in Egyptology (q.v.), and published an *Account of Some Recent Discoveries in Hieroglyphical Literature and Egyptian Antiquities* (1823). He was at work on an Egyptian dictionary when he died. Young's work in physics was never adequately appreciated by his contemporaries and his countrymen. In fact, his great discovery of interference and its bearing on the undulatory theory of light was established largely through the activities of Fresnel and Arago, and to them he is indebted for the general recognition which his theory has since received. Young has been described by Helmholtz as "one of the most clear-sighted men who have ever lived, but he had the misfortune to be too greatly superior in sagacity to his contemporaries. They gazed at him with astonishment, but could not always follow the bold flights of his intellect, and thus a multitude of his most important ideas lay buried and forgotten in the great tomes of the Royal Society of London, till a later generation in tardy advance remade his discoveries and convinced itself of the accuracy and force of his interferences." Consult: Peacock, *A Life of Young;* also *Miscellaneous Works of Young*, edited by Peacock and Leitch (London, 1857). His lectures before the Royal Institution have been published in two volumes.

YOUNG CHEVALIER, The. A title given to Charles Edward Stuart, son of the Old Pretender.

YOUNG ENGLAND. A faction of the Conservative Party which had its rise about the year 1843 under the leadership of Disraeli and Lord John Manners. It sought to combat the rise of militant democracy by bringing about a closer connection between the upper classes and the people in the spirit largely of the mediæval feudalism, adapting itself to modern industrial conditions. The party disappeared in 1845. Disraeli has delineated the character of the movement in his novels *Sybil* and *Coningsby*.

YOUNG EUROPE. An international association formed in 1834 on the model of Mazzini's Young Italy (q.v.). It was composed of the national societies of Young Italy, Young Poland, and Young Germany, which, independent in their own sphere, acted in common, through a central committee, for the furthering of the principles of liberty, equality, and humanity in Europe. The headquarters of the society were in Switzerland, where, in 1835-36, was brought about the organization of a French society, Young France. The activity of the society speedily aroused the opposition of the Swiss authorities, who expelled many of its members from the country. Its influence quickly disappeared.

YOUNG GERMANY. The name given to a group of German writers, of whom Heine (q.v.) was the most famous, which in the third decade of the nineteenth century initiated a revolt against the prevailing spirit of romanticism in the national literature, which had resulted in a total separation of literature from the actualities of life. Against the dominant spirit of absolutism in politics and obscurantism in religion the writers of this school maintained the principles of democracy, socialism, and rationalism. Among many things they advocated the separation of Church and State, the emancipation of the Jews, and the raising of the political and social position of women. In 1835 the Federal Diet issued a decree forbidding the publication of the works of Heine, Gutzkow, Laube, Mundt, and Wienbarg (qq.v.).

YOUNG IRELAND. A party which had its rise during the agitation for the repeal of the Act of Union carried on by O'Connell (q.v.) after 1841, and differing from that great leader in their advocacy of forcible means for the attainment of their demands. The break between the Young Ireland Party and the conservative section became definite about the year 1844. Those who took a prominent part in the movement were Thomas Osborne Davis (q.v.), Gavan Duffy (q.v.), John Mitchell, Thomas Francis Meagher (q.v.), John Blake Dillon, and William Smith O'Brien (q.v.). In the *Nation*, the organ of the party, the people of Ireland were repeatedly called upon to revolt, and in the stormy year 1848 the British Government grew alarmed. Mitchell was arrested and deported to Tasmania, whereupon the other leaders of the Young Irelanders set to work with renewed activity to bring about an uprising. The attempted insurrection, however, failed miserably, and the leaders were all speedily arrested. Meagher and O'Brien were sentenced to death, but the sentence was commuted to transportation. The movement therewith quickly collapsed. See IRELAND.

YOUNG ITALY. A society organized by Mazzini (q.v.) in 1831 for the purpose of effecting the liberation of the Italian peninsula from Austrian domination and its union under a republican form of government. As distinguished from the Carbonari (q.v.), the new society sought to attain its aims by a campaign of agitation and open insurrection rather than by conspiracy. It first became openly active in the beginning of 1834, when occurred the abortive invasion of Savoy by Mazzini. Before this, however, the Sardinian Government had obtained full cognizance of the movement through its spies and had entered upon a course of severe repression, a number of the leaders being put to death and others being subjected to imprisonment and exile. The impracticable character of Mazzini made it evident that a successful revolution was impossible, and the society rapidly declined in influence, its place being taken by the more conservative national movement of which the Sardinian monarch was coming to assume the leadership. The society, nevertheless, did great good in quickening the spirit of Italian patriotism, and to a very large extent made the work of Victor Emmanuel and Cavour possible. It was the model for a number of revolutionary societies throughout Europe in the stormy period preceding the upheaval of 1848. See YOUNG EUROPE; ITALY.

YOUNG MEN'S CHRISTIAN ASSOCIATIONS. Societies of young men composed of an active controlling membership identified with evangelical churches and of a more numerous associate membership not yet connected with the churches. All their work seeks to promote the physical, social, mental, and spiritual welfare of their members.

NORTH AMERICA. The associations in the United States and Canada have been always affiliated, and in 1902 a promising organization was added in the City of Mexico.

The first associations on the continent were organized in December, 1851, at Montreal and Boston, both as a result of information received regarding the society organized seven years earlier in London, England. Forty more were formed within three years. Their first international convention was held at Buffalo, N. Y., June 7, 1854. A confederation was formed, with a Central Committee and an annual convention, which lasted until the Civil War. The war greatly diminished the membership, and the organizations that survived worked chiefly among soldiers in the field. At a special convention of the Northern associations, held in New York, November, 1861, the United States Christian Commission was formed. It received the practical sympathy of the Christian public, sent 5000 helpers to camps and hospitals, and distributed over $5,000,000 in money and stores. The associations in the South did similar army work, but not in a general organized capacity.

After the war the association entered upon a period of growth. Leading business men consented to serve in official positions. Employed officers increased in number and much more in experience and efficiency. Carefully planned buildings were erected, the indebtedness on earlier buildings was canceled, and great improvement in equipment was realized. But the chief gain came in the steady advance, through accumulated experience, of all standards of work.

A general outline of this growth is shown in the following table:

NORTH AMERICA	1866	1886	1902
Total number of associations	90	1,176	1,736
Total membership	15,548	154.921	350,455
Number of railroad associations	None	70	194
Membership	......	10,900	62,348
Number of student associations	1	258	642
Membership	117	12,760	38,096
Employed officers	12	664	1,934
Buildings	None	116	460
Value of buildings	......	$4,822,980	$25,417,605
Current expenses of associations	$50,000	$957,023	$3,583,496
Associations reporting gymnasia	None	168	545
Associations reporting educational classes	4	282	359
Number of students	60	6,000	30,143
Associations reporting Bible classes	18	430	920
Associations reporting boys' work	2	158	576
International secretaries employed	None	14	44
Current expenses, international work	$522	$37,848	$150,574
Members State and provincial committees	None	540	787
State and provincial secretaries employed	None	85	75
Current expenses, State and provincial work	......	$38,959	$179,159

THE WORK OF EACH ASSOCIATION. The local association has absolute autonomy, except that to affiliate with the international convention there must be constitutional provision restricting active (voting and office-bearing) membership to men in communion with some evangelical Church. A typical association may be thus described: (1) Membership—(a) *active,* who carry most of the responsibility; (b) *associate,* young men of good moral character. (2) An incorporated board of directors, the usual officers, and numerous committees. Real estate is generally held by a board of trustees. The members of these boards and committees number some 40,000. (3) As executive officer a salaried secretary, whose chief responsibility is to supervise, organize, and administer. (4) A specially constructed building, with reception room, offices, reading room, library, meeting and recreation rooms, educational classrooms, and quarters for boys' department. Modern buildings often contain dormitories for young men, which produce revenue and contribute toward the social life, especially when a restaurant is added. (5) Organized departments: (a) business—general supervision, membership; (b) religious—Bible and workers' training classes, evangelistic and devotional meetings, work in behalf of personal purity, and a specially emphasized personal work; (c) educational—evening classes, literary societies, and lectures; (d) physical—gymnasium and athletic field, with instructors qualified to make physical examinations and prescribe and direct safe and beneficial use of these facilities; (e) social—a pleasant resort with companionable supervision, music, recreative games, social gatherings, and entertainments; (f) information and relief—employment bureau, boarding-house register, savings fund, medical club, visitation of the sick; (g) a work along all these lines for boys.

The General Work. The North American conventions are biennial. Each convention elects one-third of the 45 members of its Executive or 'International Committee,' who reside in different parts of the continent. It is incorporated, and its headquarters and working quorum have been located in New York since 1866. Its permanent funds are held by a board of 15 trustees. Its employed force on the home field, which has grown steadily from one agent in 1868, at present consists of 44 secretaries. It has also 30 secretaries in foreign mission lands. State and provincial organizations exercise a closer and more immediate supervision, each over its own field. Twenty-six State and provincial conventions were held in 1902, attended by 3989 representatives from 935 associations. A well-developed State is divided into districts, and more recently some counties have been similarly organized and have employed county secretaries.

Physical Work. The first well-equipped gymnasium was opened in New York in 1869, and the first physical director was employed in it. There are now 353 physical directors and 130,000 men and boys using the various means of physical training. For the position of physical director men are sought having a good general education and thorough technical training, and actuated by high Christian purpose. Many of them conduct Bible classes of physical department men. Some associations have well-equipped athletic grounds and many more have summer camps for both boys and young men.

The Young Men's Christian Association Athletic League is the medium for coöperation between associations that desire it in the holding of games, the establishment of athletic records, and in lines of scientific work. One hundred associations, mainly in the larger cities, belong to it, and many others use its registration and sanction features.

Educational Work. The associations from the first had educational features. Systematic and unified development dates from the call of an international educational secretary in 1892. The department now includes the work of the reading room, library, educational lectures and practical talks, educational clubs, and classes in commercial, political, industrial, science, and language subjects. Courses in these subjects are suggested by the International Committee, on which annual examinations are held and certificates granted, which are recognized by over 100 colleges.

The Religious Work. Frequent references show the dominating religious purpose of all the work. The committee has promoted this through the influence and efforts of all its agents; through printed suggestions, especially of Bible study courses; and, since 1899, through the employment of several secretaries for special religious work. There is a world-wide observance of a week of prayer in November.

Securing and Training Employed Officers. Executive officers were employed by the Boston and New York associations as early as 1853. The demand for competent men began to be pressed upon the International Committee by the associations about 1870, and ever since it has given much attention to finding and training them and to supplying associations needing men with information about candidates. In 1871 was held the first of a series of annual secretarial conferences. This has been followed by the association training schools, which were organized as independent institutions at Springfield, Mass., in 1885, and at Chicago in 1890. Their courses of study include the history, organization, and methods of the entire work, Christian history, physiology, athletics, psychology, sociology, the study and teaching of the English Bible, and opportunity for participation in practical association work. The corporation controlling the Chicago school also conducts an extensive summer training conference on its grounds at Lake Geneva, Wis.

Boys' Work. The associations early made varied efforts, largely outside their own rooms, to benefit boys. The first separate boys' department was organized at Salem, Mass., in 1869. The New York State committee employed the first boys' work supervisory secretary in 1897, and the International Committee secured a similar officer in 1900. Commonly each class of boys—school boys, working boys, and street boys—can receive the most benefit by itself, and the largest possibilities are in the order just given. Accommodation is provided by some associations for a membership of a thousand boys, and ten buildings for boys only are in use.

Work Among Railroad Men. The first association organization for definite work of this kind originated at Cleveland, Ohio, in 1872, although the International Committee had made evangelistic efforts among the men engaged in building the Union Pacific Railroad, beginning in 1868. Delegations from Cleveland started eighteen other associations during the next five years. In 1877 the International Committee secured its first railroad secretary, and now has seven, stationed in different sections of the continent. In 1902 the 194 organizations expended $617,485. Of this amount the employees and others paid more than half, chiefly in membership fees. The remainder, together with large sums for buildings and equipment, was contributed voluntarily by the railroad corporations. Such contributions come from companies controlling over three-quarters of the railroad mileage of the United States and Canada. The early railroad branches opened reading rooms and held religious meetings. Now every form of work done by city associations is carried on, while dormitories and restaurants, first made prominent in the railroad work, have spread from it to the city work. Ample bathing facilities also characterize the railroad equipment. Emergency hospitals are sometimes maintained and many visits made to the sick and injured. Membership tickets are reciprocal. The International Railroad Conference at Topeka, May, 1903, was attended by 1476 delegates, together with representatives from three foreign nations. Several European governments have investigated this work, with relation to starting it in their own countries.

Work Among Industrial Men. The methods and spirit of the railroad associations are also being extended to other large bodies of employed men and their employers. Several manufacturing corporations have recently aided in establishing similar work among their men, sometimes in expensive buildings erected for the purpose. An international secretary has been designated for this field of effort.

Work Among Students. The first student associations were organized in the University of Michigan and the University of Virginia in 1858. In 1877 the thirty scattered societies became united in an Intercollegiate Movement, for which a secretary was secured by the International Committee. Nine men now prosecute this work. A body of literature has been created, and *The Intercollegian* is published monthly. In large cities the students of various institutions are affiliated through an intercollegiate organization, which is a department of the city association.

As a result of this work over 16,000 students are enlisted in private and voluntary Bible study, and a strong impetus has been given to the study of the Bible in the curriculum. With the aid of the Student Volunteer Movement for Foreign Missions, which is an outgrowth of the student associations, mission study classes have been formed with an annual enrollment of 5000, and over 2000 students, of whom about two-thirds are men, have already become missionaries.

Summer conferences for the study of the Bible and for the promotion of the religious life of students commencing in 1886, have spread from Northfield to all sections of the United States, and to so many other lands that in 1895 these societies were federated by the organization under American leadership into the World's Student Christian Federation, which is now made up of eleven national or international movements, with a total of 1600 societies and a membership of 82,000 students.

Work in the Army and Navy. About 1880 some State and provincial committees established association tents in summer militia encampments. This effort is still growing in extent and usefulness. Three days after the first call for volunteers for the Spanish-American War, the International Committee decided to undertake a similar work in the regular army and navy. Under Government authorization 133 tents, generally 40 by 60 feet in size, equipped with facilities for the comfort and welfare of the soldiers, were maintained by international, State, and local committees in the United States, Cuba, Porto Rico, and the Philippines. In charge of the work 223 trained secretaries were employed. At least fifty per cent. of the men who had access to the tents visited them daily. Similar work was carried on for sailors from Key West. The cost of this widespread work during 1898 was $135,225.

At the close of the war, the President, Government officials, army and navy officers, and soldiers and sailors requesting the continuance of this work, the International Committee began to form associations wherever the number of soldiers or sailors warranted. The first army association building, dedicated in 1900, was the gift of Mr. William E. Dodge to the New York City association for the work on Governor's Island. Two other buildings have since been erected. Army work is now carried on at thirty points in America, and at 200 elsewhere. At each centre the practicable features of association work are maintained, also extensive distribution of reading and writing materials, and a system of traveling libraries. The Soldiers' Bible and Prayer League is based upon a promise of daily prayer and Bible reading; the Army Temperance Union, upon a pledge of total abstinence. In 1901 the provincial committee of Ontario and Quebec, with some aid from the international committee, sent secretaries and equipment with the Canadian contingents to South Africa. The effort was highly successful.

In the navy (1) associations in coast cities have extended their privileges to sailors. (2) Branches of the naval associations have been formed on warships. A Naval Temperance League has been organized. (3) A house rented in 1899 near the New York Navy Yard and fitted up as a resort for enlisted men was superseded in 1902 by a seven-story building, 75 by 100 feet in size, and costing $415,000. It was the gift of Miss Helen Miller Gould through the Women's Auxiliary of the International Committee. Smaller buildings are in use near the Norfolk and Newport navy yards.

Work Among Negro and Indian Young Men. A few scattered associations of colored young men were formed prior to 1875, but systematic effort among them began at the international convention of that year, and a visiting secretary was put in this field soon after. Two competent colored men are now utterly unable to meet its calls. Unlike the other departments, it has had the great advantage of a beginning among the student class. Student associations are now organized in 69 educational institutions, including nearly every important school for colored young men in the South. The first fully organized city association, with a general secretary, was started in Norfolk, Va., in 1888. Since 1890 several valuable interstate conferences have been held each year, at the call of the International Committee.

Christian young men of the Sioux tribe spontaneously formed what were practically Young Men's Christian Associations as early as 1881. Since 1894 the International Committee has employed one of their own number, specially trained for the service, to develop this work. Under this guidance there are now 47 associations, with over 2000 members, and 14 small association buildings have been erected by the gratuitous labor of the men themselves.

The Field Work. This department seeks to start effective organizations in cities and villages wherever practicable, and to promote the symmetrical development of each association in all phases of its life; and then to group these associations by commonwealths and by counties for closer supervision, and to build up and supplement these State, provincial, and county organizations. The State and provincial organizations long ago undertook most of this closer supervisory effort and are doing it with steadily increasing efficiency. The five field secretaries of the International Committee live at points convenient for their work. A summer training conference and vacation resort, at Lake George, is attended by over 500 association men.

PUBLICATIONS. Reports of all international conventions and of most of the State conventions have been printed, and constitute the detailed history of the movement, in connection with the Year Books issued by the International Committee. A periodical has been maintained for many years. It is now published monthly in magazine form from the international office, under the name *Association Men*. Smaller periodicals give information and stimulus regarding single departments of the work. Three hundred books and pamphlets are on sale. The fifty or more courses of Bible study have been very widely used.

THE FOREIGN WORK. The International Committee sent its first foreign secretary to Japan in 1889. For several years previously urgent united appeals had come from many foreign missionaries for this aid, and in no case has a step been taken without such requests. The committee now has five men in Japan, seven in China, one in Korea, fourteen in India and Ceylon, and one each in Brazil, Argentina, and Mexico. England and Scotland have seven men in India. The errand of them all is to train and develop native workers as rapidly as possible. The salaries and personal expenses of the secretaries are provided by the organizations sending them. Otherwise the work in each locality is self-supporting, except that some of the buildings have been given from abroad.

EUROPE AND ELSEWHERE. The London association was formed June 6, 1844, as the result of religious effort among dry goods clerks by George Williams, then one of their number. From London as a centre associations were propagated throughout the United Kingdom and many other countries. Some organizations claiming an existence prior to, or independent of, the London movement became affiliated with it later. The first of a series of annual British conferences was held in 1858, and the first association building was erected in 1866. A National Union for England and Wales was formed in 1882, and for Ireland in 1884. The English National Council has recently been incorporated. The table shows the greater progress made since a general organization was effected:

ENGLAND, WALES, AND IRELAND	1883	1893	1902
Associations	188	405	395
Members and associates	29,214	59,433	78,742
Centres of work	188	....	1,259
General secretaries	45	65	73
Buildings	19	80	110
Value of buildings	£ 153,637	£ 397,695	£ 611,264
Current expenses of associations	£ 31,013	£ 72,565	£ 73,356
Associations reporting gymnasia	90	91	136
Associations reporting educational classes	57	137	93
Associations reporting reading rooms	95	103	304
Total weekly religious meetings	493	848	929

The Scottish general organization was formed in 1884. The leading facts regarding the associations of the world are given in the following table:

GEOGRAPHICAL DIVISIONS	Number of associations	Number of members	Employed secretaries	Buildings	Value of buildings
North America	1,736	350,455	850	460	$25,417,606
South America	14	988	3	1	50,000
Great Britain and Ireland	1,178	120,848	80	139	3,431,320
Scandinavia and Denmark	430	22,750	30	41	757,000
Germany	1,784	95,000	39	72	1,200,000
Belgium and Holland	348	9,086	3	32	......
France	103	5,987	6	10	295,000
Switzerland	470	8,477	6	15	200,000
Italy	58	1,700	1	1	20,000
Austria-Hungary	114	4,540	3	......	......
Russia and Finland	39	3,535	3	......	......
China	43	2,643	8	2	18,500
India and Ceylon	165	7,408	17	16	292,000
Japan	54	2,621	2	5	62,000
Africa	20	3,466	5	5	565,000
Australasia	18	3,292	9	7	308,000
Scattered	50	1,642	......	2	25,600
	6,624	644,438	1,065	808	$32,642,025

Between 1806 and 1841 a number of *Christliche Jünglingsvereine* came into existence in Germany. They were small bands of young men for mutual encouragement in the Christian life, and were usually connected with an individual church. Many others have since been formed, and all have come into affiliation with the more recently organized World's Committee. In 1883 a new and broader form of organization, *Christliche Vereine junger Männer*, resembling the American associations, was started in Berlin. This has since spread to other cities, and its methods have been adopted by many of the older societies. Associations were organized in France about 1850. The first world's conference, meeting in Paris in 1855, and notable for formulating a 'basis' since universally adopted, gave impetus to the French societies. The present national alliance was formed in 1867. In 1893 the Paris Association entered its new building, adapted to the advanced methods of work, and in 1902 held an enthusiastic celebration of the jubilee of its organization. The Swiss associations form two independent unions, the German and the French. The existing movement in Sweden began with the organization of the Stockholm Association in 1884, after the model of those at Paris and Berlin. Various European associations do special work for soldiers. There are many boys' branches.

A few associations were formed quite early in India, but vigorous growth began with the coming of American and British secretaries. Calcutta and Madras have excellent buildings. The Tokio building is an important centre for the national work. The general secretary and all the officers are Japanese laymen. Several useful associations have long existed in the South African and Australasian colonies.

THE WORLD'S CONFERENCE AND COMMITTEE. Fourteen world's conferences have met in leading European cities. At the eighth conference (Geneva, Switzerland, 1878), a "Central International Committee" was established, composed of representatives from the affiliating national organizations, and with a quorum resident in Geneva. This committee has greatly promoted the work, especially upon the Continent of Europe. The thirteenth conference was held in London in June, 1894, coincidently with the fiftieth anniversary of the London Association. Twenty-six nationalities were represented by 2000 delegates.

BIBLIOGRAPHY. Shipton, *The History of the London Young Men's Christian Association*, in *Exeter Hall Lectures* (vol. i., London, 1845-46); *Fifty Years' Work Amongst Young Men in All Lands* (ib., 1895); *Handbook of the History, Organization, and Methods of Work of the Young Men's Christian Associations* (New York, 1892); *Report of the 13th Triennial International Conference and Jubilee Celebration* (London, 1895); *Jubilee of Work for Young Men in North America* (New York, 1901); Doggett, *History of the Young Men's Christian Association*, vol. i. (ib., 1896); Doggett, *Life of R. R. McBurney* (Cleveland, Ohio, 1902); *Year Book of the Young Men's Christian Associations of North America* (New York, 1902-03); *British Young Men's Christian Association Year Book* (London, 1902-03).

YOUNG'S THEORY AND EXPERIMENTS. See LIGHT.

YOUNGSTOWN. The county-seat of Mahoning County, Ohio, 67 miles east by south of Cleveland, on the Mahoning River, and on the Pennsylvania, the Erie, the Lake Shore and Michigan Southern, the Baltimore and Ohio, and other railroads (Map: Ohio, J 3). It is attractively situated on both banks of the Mahoning River. Among the features of interest are the parks, including Mill Creek (400 acres), Idora, and Wick, and the Market Street steel viaduct. The Reuben McMillan Free Library contains about 20,000 volumes. Other prominent institutions are the Children's Home and the Mahoning Valley and City hospitals. The Federal building, county court-house, Young Men's Christian Association building, and the Park Theatre are the most noteworthy structures of the city. Youngstown is primarily an industrial centre, its various establishments, in the census year 1900, having an invested capital of $22,360,097, and an output valued at $34,801,101. A rolling mill was erected here in 1845, and a furnace in 1846, and the city is still noted for its extensive manufacture of iron and steel and foundry and machine products. There are also lumber and planing mills, carriage and wagon factories, and manufactories of roofing material, iron and steel pipe, oilcloth, bridge work, etc. The government is vested in a mayor, chosen biennially, and a council. The city solicitor, treasurer, auditor, and the board of public service are elected by popular vote. The board of public safety is appointed by the mayor subject to the confirmation of the council, or if the council fails to agree to the mayor's appointments, the board is appointed by the Governor of the State. The minor boards are appointed by the mayor. For maintenance and operation the city spends annually about $416,000, the principal items being: Schools, $145,000; police department, $44,000; fire department, $35,000; interest on debt, $33,000; streets, $29,000; water-works, $25,000; and municipal lighting, $24,000. The water-works, which represent an expenditure of $735,209, are owned by the municipality. In 1797 John Young made the first settlement here, and in the following year secured a title to the land from the Connecticut Land Company. Youngstown became the county-seat in 1876. Population, in 1890, 33,220; in 1900, 44,885.

YOUNG WOMEN'S CHRISTIAN ASSOCIATIONS. Organizations for the advancement of the physical, social, intellectual, and spiritual life of young women. The first Young Women's Christian Association was formed in London in 1855. There were a Prayer Union among and for young women, and a home in London for young women in independent pursuits, especially for returned Crimean War nurses.

The World's Young Women's Christian Association, organized in 1894, includes national associations, one from each country, and is on an interdenominational, evangelical basis. The headquarters are in London. The supervision of work is delegated to a committee of thirty-three active and eight corresponding members, resident in sixteen countries. They employ traveling and office secretaries; appoint secretaries for foreign fields; arrange quadrennial conventions (London, 1898; Geneva, Switzerland. 1902); call a week of prayer in November; and assist in establishing national organizations when the number of local associations warrants it. Their organ, *The World's Quarterly*, is published in three languages. The eleven organized countries are as follows: *Great Britain*, affiliated in 1894, embraces under the British National Council five divisions, London, North of England and North Wales, South of England and South Wales, Scotland, and Ireland, each with departmental committees and officers; total membership, 100,000, of whom 60,000 are Prayer Union members. Branches are either parochial or have headquarters in an institute or home. The Sunday Bible class is the chief feature of each British association. The Nurses' Union, Teachers' Department, Restaurant Department, Holiday Homes, Park Mission, and many other forms of work are included. A national traveling secretary is employed. Closely associated are the Factory Helpers' Union, the Traveler's Aid Society, and the Associated Guild of Registries. National organs. *Go Forward, Our Onward Way, Our Own Gazette, Workers.*—*Norway*, affiliated in 1894, has 8 branches.—*Sweden*, affiliated in 1894, has 51 branches: religious, educational, and foreign mission work is undertaken. Organ, *Forbundsblatet.*—*Denmark*, affiliated in 1902, has 7 branches and 938 members.—*France*, affiliated in 1900, has 246 associations, 7000 members, and 10 regional divisions; Bible classes, foyers or cheap lunch rooms, and temperance societies are included. Organ, *Journal de la jeune fille*.—*Germany*, affiliated in 1899, has 4000 branches, chiefly parochial, and 86,000 members. —*Hungary*, affiliated in 1903.—*Italy*, affiliated in 1897, has associations in all principal cities and many small towns; annual conferences are held.—*India*, organized in 1897, has 120 branches, one-half using English, one-half various local dialects; there are twenty-seven student branches. Bombay, Rangoon, and other cities own their own buildings. Camps and conferences for Bible study are held annually. Organ, *Young Women of India*.—*Canada*, affiliated in 1898, has 14 city and 23 student associations, with a traveling secretary for each department; biennial national conventions are held. Organ, *The Dominion Tie*. —*The United States of America*. The American Committee, affiliated in 1894, embraces 83 city associations, membership 41,836, and 450 student associations, membership 26,032. There are 23 State organizations which hold conventions, comprising associations in 40 States. The first association connected with this body was formed in the Illinois Normal University, 1872. Student associations especially in coeducational institutions of the Middle West, and town associations, were united in nine State associations, and in 1886 formed the National Young Women's Christian Association, with headquarters at Chicago. Among the fundamental principles adopted are: The definiteness of the work, being solely for young women along both religious and secular lines, the basis of membership, voting and office-holding members being communicants of Protestant evangelical churches; the preventive and educative character of the work, and its conduct by volunteer boards and committees and by paid professional workers known as secretaries. Of the 83 city associations, 4 are gospel settlements for women and girls. There are also 12 branch associations in 8 cities; 24 own buildings, 20 conduct boarding homes, 37 hold regular meetings in factories, 51 have noonday rests, 65 offer instruction in physical training to 7155 students. There are 8809 in educational classes, 4777 in Bible classes. There are also 12 association Bible circles in small towns. Of the 450 student associations, 14 employ general secretaries, advisory boards being formed from faculty members. All hold social and religious meetings. One hundred and sixteen colleges have missionary libraries; 10,412 students are in association Bible classes. The student department of the American Committee is one of the three constituents of the Student Volunteer Movement for Foreign Missions, and joined with the Intercollegiate Young Men's Christian Association, forms the American branch of the World's Student Christian Federation. The American Committee holds biennial conventions and four annual summer conferences: at Capitola, Cal.; Asheville, N. C.; Silver Bay, N. Y.; and Lake Geneva, Wis., with a total attendance, in 1902, of 2025. It supports four foreign secretaries in the India Young Women's Christian Association. The International Board of Women's and Young Women's Christian Associations of the United States and Canada was formed in 1891, conventions of the associations now included having been held biennially since 1871. The first association under this board was formed in Boston in 1865. In 1901, 53 associations were reported, 40 having boarding homes; 23 have restaurants; 28 have employment bureaus; 21 traveler's aid; 28 own buildings; 29,794 members are in educational, physical, and religious classes. The value of property owned is $4,206,980. The World's Committee also includes associations in Africa, Australia, South America, and the more remote European countries. In mission lands work is being undertaken at the solicitation of denominational missionaries, and secretaries are under appointment to work in the colleges and cities, as in America.

BIBLIOGRAPHY. *The World's Young Women's Christian Association Second Conference Report* (London, 1902); *Young Women* (Chicago, 1901); *The American Committee Year Book* (ib., 1903); *Journal of the Sixteenth Biennial Conference International Board Women's and Young Women's Christian Association* (Cleveland, 1901).

YPRES, ē′pr′, or **YPEREN**, ē′pe-rĕn. A town in the Province of West Flanders, Belgium, 35 miles south of Ostend, on the Yperlee River (Map: Belgium, A 4). The chief object of interest is the Cloth Hall, begun in 1201 and completed in 1342. Conspicuous also are the Gothic Cathedral of Saint Martin, dating from the thirteenth century, with rich carvings; the town hall, handsomely adorned with frescoes and paintings; and the eleventh-century Church of Saint Peter. Ypres was formerly a prominent industrial centre, especially known for its extensive production of woolen goods. Linen and lace are at present the most important manufactures. Population, in 1900, 17,371. Ypres was at the zenith of its prosperity in the thirteenth century.

YPSILANTI, ĭp′sē-lăn′tē, or **HYPSILANTIS.** The name of a Fanariot family (see FANARIOTS) claiming descent from a branch of the Imperial stock of the Comneni. The claim of its members to distinction is derived from their leadership of the Greeks in the struggle for independence of Turkish rule.—ALEXANDER YPSILANTI (c.1725-1807) was Hospodar of Wallachia (1774-77, 1796-98) and of Moldavia (1787), and was executed at Constantinople for alleged complicity in Greek conspiracies. His son, CONSTANTINE YPSILANTI (1760-1816), was appointed Hospodar of Moldavia in 1799 and of Wallachia in 1802. His sympathy with Russia led (1806) to his dismissal and flight to Transylvania. Reëstablished in the government of Wallachia by the Russians, he showed his hatred for the Porte by encouraging (1807) the Servians in their insurrection, but soon retired to Kiev, in Russia, where he died in 1816. Of his sons, the eldest, ALEXANDER (1792-1828), served for some time in the Russian army, fought with distinction against Napoleon in 1812-13, and by 1817 attained the rank of major-general. He was chosen by the Hetærists as their chief in 1820. (See HETÆRIA PHILIKE.) In promotion of the cause of Ruman independence, he collected large sums in Russia, and at Jassy in March, 1821, proclaimed the independence of Greece. Little suited by nature to guide the movement he had originated, he was defeated by the Turks near Dragasani (June 19th), and forced to take refuge in Austria. He was arrested and kept a prisoner for six years at Munkács and Theresienstadt. Released in 1827, broken in spirit and body by chagrin and privations, he retired to Vienna, where he died. His younger brother, Demetrius (1793-1832), also began his career in the Russian army. Sent to Greece by his brother to assume the leadership of the revolt there, he took part in the capture of Tripolitza (October, 1821), but was less successful in the following year in his attack on Eubœa. His gallant defense of Argos against the Turks stopped their victorious advance (1823). His stubborn resistance (1825) to the victorious Ibrahim Pasha at Napoli was another valuable service to Greece. In 1828 he was made commander-in-chief; but differences arising between him and the President, Capo d'Istrias, he resigned his post in January, 1830.

YPSILANTI. A city in Washtenaw County, Mich., 29 miles west by south of Detroit, on the Huron River, and on the Michigan Central and the Lake Shore and Michigan Southern railroads. It is also connected by electric lines with Ann Arbor and Detroit. Ypsilanti is the seat of the Michigan State Normal College. The industrial establishments include a foundry and machine shop, a creamery, flouring mills, a paper mill, agricultural implement works, planing mills, and manufactories of reed furniture and cement products. Under the revised charter of 1898 the government is vested in a mayor, chosen annually, and a common council. The waterworks and the electric light plant are owned and operated by the municipality. Ypsilanti was settled about 1825 and was incorporated in 1858. Population, in 1890, 6129; in 1900, 7378.

YRIARTE, ḗ'rē-är'tȧ, Charles Emile (1832-98). A French author, born in Paris and trained as an architect. In 1859 he followed the Spanish campaign in Morocco as correspondent and illustrator, and in 1860 that of Garibaldi in Sicily. In 1881 he became inspector of fine arts and continued to be in Government offices until his death in Paris. His publications include: *Portraits parisiens* (1865); *Goya, sa vie et son œuvre* (1867); *Lepuritain* (1875); *Florence* (1880); *Françoise de Rimini* (1882); *La vie d'un patricien de Venise* (1885); and *Autour des Borgia* (1890).

YSAYE, ē-sī'*ye*, Eugène (1858—). A Belgian violinist, born in Liège. His father, a successful conductor and violinist, who had acted as his teacher, sent him early to the Liège Conservatory. He next studied under Wieniawski and Vieuxtemps at Brussels, the latter of whom was so impressed with the boy's talent that he obtained for him State aid by which he was enabled to complete his studies in Paris. His first important engagement was as leader of Bilse's orchestra, Berlin, which appointment he held until 1881, after which he toured Europe and America. In 1886 he was appointed professor and director of the violin department at the Brussels Conservatory and soon afterwards organized the celebrated Ysaye quartet. His compositions include 6 violin concertos, variations on a theme by Paganini, 3 mazurkas for violin, and *Poème élégiaque* for violin with orchestra. He is considered one of the greatest of contemporary violinists.

YS'GAFELL. The pseudonym of the English writer Jane Williams (q.v.).

YSLETA, ē-slā'tȧ. An Indian pueblo. See Isleta.

YSOLDE, ē-sōld'. See Iseult.

YSOPET, ē'sṓ'pĕt'. A diminutive of Æsop; a general name in mediæval French literature applied to any collection of fables, more especially the title of a volume of this nature, written by Marie de France. This work consists of 103 pieces, written in octosyllabic couplets. It purports to be a translation "from an English version of a Latin translation of the Greek." The style is graceful and the 'morals' are brightly expressed. A modernized version is to be found in Roquefort's edition of the author's works (1820).

YSSEL, ī'sĕl, or **IJSSEL.** A river of the Netherlands, formed by the junction at Doesburg, in Gelderland, of the Oude (Old) Yssel from Westphalia and the Nieuwe (New) Yssel, an offset of the Rhine, perhaps representing the waterway cut by Drusus (Map: Belgium, E 2). Thence it flows north and northwest past Zutphen and Deventer, forming part of the boundary between Gelderland and Overyssel, and, passing Kampen, falls into the Zuyder Zee, forming at its mouth a delta of several arms. The Yssel is navigable for steamers throughout its length of 60 miles. There is another river of the same name, a branch of the Lek, in the Province of Utrecht.

YSTAD, ụ'städ. A town of the Province of Malmöhus, Sweden, on the Baltic, 40 miles east-southeast of Malmö (Map: Sweden, E 9). It is an ancient, irregularly built town. Sugar, tobacco, ironwork, and leather are manufactured. The new port is exceptionally free from ice. Population, in 1893, 8540.

YTTRIUM (Neo-Lat., from *Ytterby*, in Sweden). A metallic element contained in the mineral gadolinite and first pronounced to be a new earth by Gadolin in 1794. It is found with other cerium metals, as a silicate, in gadolinite and allanite, and as a fluoride in yttocerite. The metal was obtained by Berzelius as an impure powder by reducing the chloride with potassium.

Yttrium (symbol, Y; atomic weight, 89.02) is a dark gray powder that assumes the lustre and color of metallic iron when burnished. It combines with oxygen to form a sesquioxide, which is a yellowish-white powder.

YŬ, or **TA YŬ,** tä yōō (d. B.C. 2197). The third of the 'ancient kings' so much lauded by Confucius for their virtue and their benign rule—the others being Yao and Shun (qq.v.). He was a native of Sze-chuen, a reputed descendant of Hwang-ti, and son of that Kun, Minister of Public Works under Yao, who had struggled unsuccessfully for nine years with the great inundation which occurred in that reign. Commissioned by Shun, Yao's successor, to take up his father's unfinished work, Yŭ set out four days after his marriage, and for thirteen years never rested in his task, traversing the hills, surveying the nine provinces, opening up waterways for the imprisoned waters, noting the soil and productions, and fixing the form of the tax contribution of the different localities. Thrice he passed his own door without stopping, though he heard the wailing of his infant son within. In B.C. 2278 he announced the completion of his labors, and received the Principality of Hia (or Hsia) as his reward. In B.C. 2224 he became the colleague and successor of Shun, and in 2205, after three years' mourning for his colleague, he founded the *Hia* (or *Hsia*), the first of the twenty-five dynasties of China. The greatest of the engineering feats attributed to Yü is the opening of the great gorge or defile on the Yang-tse through the Wu Mountains above I-Chang (q.v.). See the *Tribute of Yü* in vol. iii. of Legge's *Chinese Classics* (London and Hong Kong, 1865).

YUAN SHIH-KAI, wän shē'kī'. A Chinese statesman, a native of Honan, who from 1884 to 1893 was Minister Resident at Seoul, the capital of Korea, where he gained much distinction during the disturbances there. (See Korea.) Returning to China, he was placed at the head of the foreign-drilled troops at Tientsin, and in 1894 became chief of the military secretariate in Manchuria. In 1895 he was again made commandant of the foreign-drilled troops. During the Boxer troubles he was Governor of the Province of Shantung, whence he was later promoted to be Governor-General of the metropolitan Province of Chi-li, holding also an important position in the general Government and being at the head of the army.

YUCATAN, yōō'kȧ-tän'. A large peninsula projecting northeastward from the southeastern extremity of Mexico, and separated from the western extremity of Cuba by the Yucatan Channel, 140 miles wide (Map: Central America, C 1). With the peninsula of Florida it incloses the Gulf of Mexico. The peninsula of Yucatan is about 400 miles long and 200 miles wide, with an area of about 80,000 square miles. It forms a portion of a great bank of coralline limestone which has been raised above sea-level in geologically recent times. The bank, covered with shallow water in which coral formation is still actively going on, extends 150 miles into the Gulf along the northern and western coasts of the peninsula, and along its margin the sea bottom falls suddenly from a depth of 600 to one of 6000 feet. The surface of the peninsula is accordingly very low and level, the undulations in the interior rising only a few hundred feet above the sea, except in the extreme southern part, where there are projecting spurs of the Central American Cordillera. Forests are confined mainly to these southern mountains, the rest of the peninsula being almost treeless, except in the marshy tracts along the coast, and of a monotonous and arid aspect. This is scarcely due to the climate, which is hot and humid, but rather to the peculiar Karst formation of the limestone composing the peninsula, which is perforated by numerous caverns and underground channels. These receive the rainwater, so that the peninsula is practically without rivers or running surface water, and the natives depend almost wholly upon the underground reservoirs for their water supply. Sisal hemp is the principal agricultural product. Politically the greater part of the peninsula belongs to Mexico, and consists of the States of Campeche and Yucatan (qq.v.). The southeastern part is divided between British Honduras and Guatemala. The total population is estimated at about 370,000, most of whom are aborigines. Yucatan was the principal seat of the Maya civilization, the highest form of native civilization existing in North America at the time of the discovery. See Yucatan, Antiquities of; Maya; Mayan Stock.

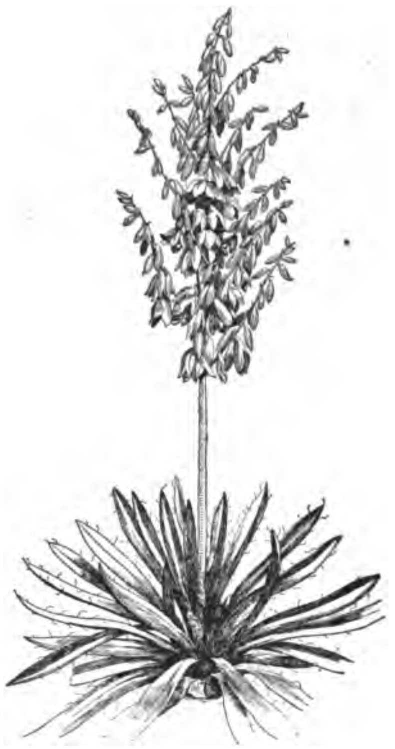
YUCATAN. A State of Mexico, occupying the northeastern part of the peninsula of Yucatan (q.v.), bounded on the north by the Gulf of Mexico, on the east by the Caribbean Sea, on the south by British Honduras and Guatemala, and on the west by the State and Gulf of Campeche (Map: Mexico, P. 8). Area, 35,203 square miles. Agriculture and stock-raising form the chief industries. The cultivation of hennequen is by far the most important feature of the agriculture, the crop for 1897 being estimated at a value of $6,932,327. Other important productions are sugar, tobacco, and vanilla, and in the northeastern section dye and cabinet woods. Population, in 1900, 312,264. A large portion of the State is still held by uncivilized Indians. Capital, Mérida.

YUCATAN, Antiquities of. The peninsula of Yucatan, which was divided into a number of independent States, was occupied by the Maya people at the time of the discovery of America. Their most trustworthy tradition states that they entered the country from the northwest, and this migration was in comparatively recent times. There is evidence to show that the ruined cities of the Maya race, in the State of Chiapas, the Republic of Guatemala, and in Northern Honduras, are more ancient than the cities of Yucatan. (See Maya; Mayan Stock.) Shortly before the Spanish conquest the country was partly overrun by Nahua hordes (see Nahuatlan Stock), and the population decimated by famine, pestilence, and intertribal warfare, so that the ancient civilization appears to have been on the wane at the beginning of the sixteenth century. In no other part of Mexico are there so many remains of ancient cities to be found, attesting a large population at the time of their building and occupancy. At the present time the greater part of the country is covered with a dense forest, completely concealing the ruins. Climatic conditions seem to have changed since the pre-Columbian period of occupancy, and many of the ancient cities could not support, at present, a large population. The peculiar conditions with regard to a supply of water evidently influenced the distribution of the larger centres of population. There are no surface rivers or lakes, with the exception of several in the southern part of the peninsula, but water is found in rivers flowing underground, which make their way to the surface in caves, called cenotes. Near these cenotes are found the greatest ruins, and the water supply was obtained in other portions of the country by the use of bottle-shaped cisterns called chultuns.

The Mayas of ancient times reached the highest level of civilization attained by any of the peoples of the New World. Their magnificent temples and palaces, their complicated system of hieroglyphic writing, and their surprising astronomical knowledge, attest their superiority over the other civilized tribes of ancient Mexico, although, owing to environment, their advancement along certain other lines was not so marked. Among the most important and best known ruins in Yucatan are Uxmal, Chichén-Itzá (q.v.), Labna, Kabah, Mayapan, and Ake. The ancient temples and palaces were massive structues, but this had no reference to defense; they were so built to insure strength and permanency. None of the buildings had windows; their interior construction was characterized by the triangular arch, which is known as the Maya arch, in which the inclined surfaces in each apartment or covered space slope inward from the sides, and sometimes also from the ends, at an angle of from fifteen to forty degrees from the vertical, either meeting at the top in a sharp angle as seen in a few cases at Chichén and elsewhere, or approaching to within a foot or two the narrow way, when they are connected by horizontal slabs and firmly held together by the superincumbent roof masonry. Flat ceilings, supported by modern beams, occur in a very few cases, as at El Meco and Tuloom on the east shore, but many of the buildings now roofless were probably originally constructed without roofs. Stone beams were used for short spans, as in miniature apartments, narrow openings, and passageways. The façades in many instances were composed of geometric designs and representations of huge grotesque masks. The material used in the edifices was the common limestone of the country, which was cut and carved with stone tools. Mortar, made of lime and sand, was extensively used; the floors and roofs were made of stucco, and all of the stonework in the edifices was covered with a thin coating of the same material, which in many instances was painted red. In many of the buildings the white surface was covered with mural paintings in various colors, the most famous being the frescoes in one of the temples of Chichén-Itzá. Many of the lintels of the doors were of wood, which were sometimes carved with symbolic hieroglyphic designs. These wooden lintels have been, in themselves, an element of weakness in the structures, for, had they not decayed, most of the great façades now in ruins would have been preserved. There is a certain lack of unity in the general assemblage of the structures; the common system is seen in the grouping of four edifices about a central court. Some of the ancient buildings were very extensive, notably the so-called palace of Labna, which shows four periods of construction. The total length of this building is 375 feet, and it formerly contained about fifty rooms. The tombs are usually found beneath the cement floors of the buildings and are so small that the body must have been doubled up in order to place it in the ossuary.

On the outskirts of the main group of buildings in these ancient cities were scattered the house sites of the common people who lived then, as the Mayas of the present day, in thatched-roofed huts of adobe. Excavations among the house sites reveal the presence of the three-stone fireplace or koben, which is still used by the Mayas. There are traces of ancient cement roadways, raised a few feet above the surface, leading from one town to another. The Mayas ranked among the first in ancient ceramic art; the most interesting specimens which have been exhumed bear incised hieroglyphic inscriptions. The calendar of the Mayas was similar to that of the Nahuas and Zapotecs (q.v.), but their system of hieroglyphic writing, approaching phoneticism, bears no resemblance to that of the other Mexican tribes. The nearest affinity is in the recently discovered hieroglyphic writing of the Zapotecs in the valley of Oaxaca. The modern Mayas of Yucatan retain no knowledge of the ancient lore of their ancestors, but among the Lacandones of the remote southern frontier of the peninsula it is probable that ceremonies to their ancient gods are still performed. Consult: Bandelier, *Notes on the Bibliography of Yucatan and Central America* (Worcester, 1880); Charnay, *Les anciennes villes du nouveau monde* (Paris, 1884); and the writings of Daniel G. Brinton (q.v.).

YUCCA (Sp., from the North American Indian name). A genus of plants of the natural order Liliaceæ, natives of the southern part of the United States and Mexico, but now widely distributed. *Yucca filamentosa* is often cultivated in gardens on account of the singularity and splendor of its apearance. *Yucca gloriosa* is a native of Virginia and of more southern parts of North America, but is hardy in the Northern States. Its stem, which is 2 or 3 feet high, bears on the upper part a great tuft or crown of large sword-shaped evergreen leaves, each terminating in a sharp black spine. From the centre of this crown of leaves arises the flower stalk, of 3 feet or upward in height, branching out on every side so as to form a



YUCCA FILAMENTOSA.

great panicle. The flowers are bell-shaped and drooping, white with a purple stripe on the outside of each segment of the perianth. The fibres of the leaves of *Yucca glauca* are used by the American Indians to make cloth cordage and baskets. The fibre of the yuccas is similar to that of the agaves and bromelias, and probably is often included under the name *pita flax* or *pita fibre*. *Yucca aloifolia* is common in the sand dunes of the South.

YUCCA MOTH. Any one of several species of the curious tineine genus Pronuba, of the family Prodoxidæ, all of the species of which are confined to yucca plants for food. The species of Pronuba are small white moths with narrow wings sometimes spotted with black. Their mouth-parts are perfectly adapted for the fertilization of the yucca flowers, which are not fitted for self-fertilization, or for fertilization by other insects. The moth, having collected a mass of pollen, lays an egg in the pistil, and pushes the pollen into the orifice, thus insuring fertilization and the development of the pod, in which the larva then develops. This instance of symbiosis (q.v.), which was worked out by the late C. V. Riley, is one of the most remarkable in biology. The yucca moths of the genus Prodoxus have no relation to the fertilization of the plant, but lay their eggs in the flower stem, in which their larvæ bore. Since some of the yuccas do not flower every year, these insects may pass more than a year in the pupal stage.

YUCHI, yōō'chē. A North American Indian tribe. See UCHEE.

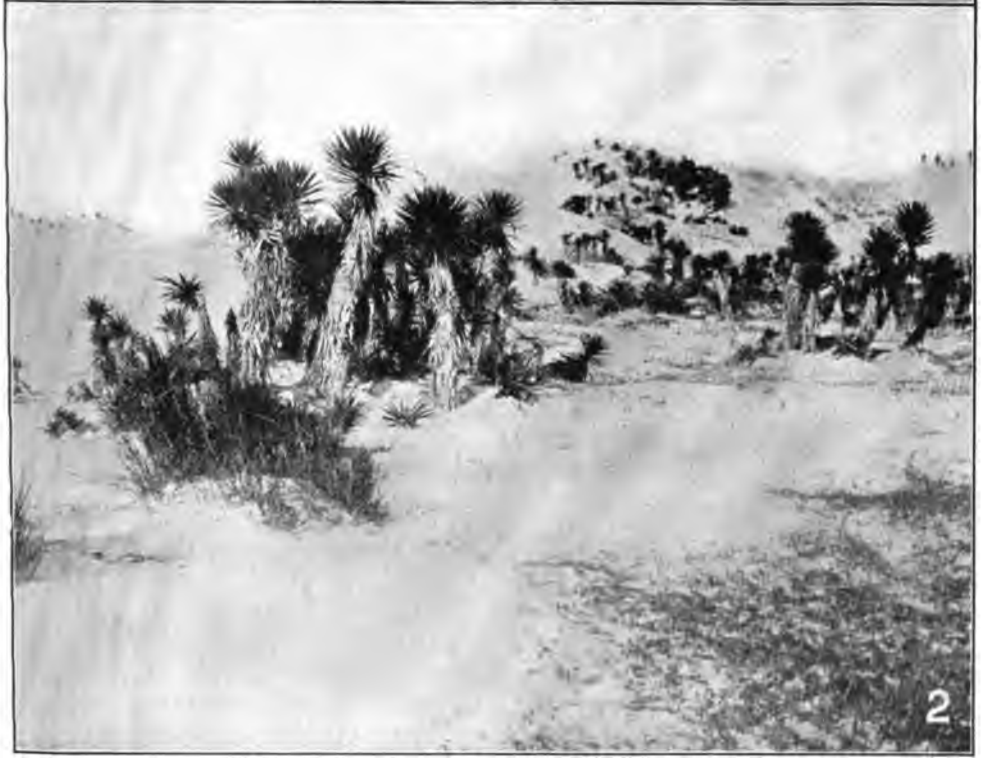
YUEN-SAN, wĕn'sän'. See WÖN-SAN.

YUEN or **YUAN** (1280-1367). A Mongol, and consequently an alien, dynasty that occupied the throne of China for eighty-eight years—the twenty-third of the twenty-five dynasties that have ruled in that country since B.C. 2205, when the first one was founded. The Yuen was founded by Kublai Khan, grandson of Genghis Khan, and successor of Mangu, who in 1260 found the northern provinces of China in the hands of the Kin Tatars, and a native dynasty, the Sung, (q.v.), in the south. Having successively vanquished these, he ascended the throne in 1280, chose the dynastic name of Yuen, and made Peking his capital. Though he displaced the Chinese high officials with uncivilized Mongols, in utter disregard of the Chinese practice of appointing only literati, he seems to have ruled wisely on the whole. He completed the grand canal between Hang-chow and Tien-tsin; inaugurated road-making and the planting of trees; introduced the use of paper money; and favored Buddhism, but proscribed Taoism, and ordered all Taoist books to be burned, except the *Tao-teh-King* of Lao-tse. He attempted the conquest of Japan, but the formidable armada and army he dispatched for that purpose were utterly annihilated by the Japanese and the terrific storms which they encountered. Of his eight successors only three are worthy of mention: Timur, his grandson (1294-1306), who proved himself honest and energetic and labored hard to correct abuses and improve the administration. Superfluous offices were abolished, the tax system was reformed and the lands of the powerful ecclesiastical establishments were taxed; but ill health proved a serious handicap, and he died at the age of forty-two. Kaisun, his successor (1307-10), was devoted to Buddhism, wine, and women, and accomplished little. His most important achievement was the redemption by the Government of the children who in times of famine had been sold. Ayuli Palpata, the fourth Emperor (1311-20), also professed to have the welfare of the people at heart, but his devotion to Buddhism led to the expenditure of vast sums on priests and ceremonies, and grinding taxation was the result. Disorders spread, risings occurred, the rulers spent their time in debauchery, and, in 1367, during the reign of the ninth Emperor, Chu Yuan-Chang, a temple servant at the head of a large army overthrew the corrupt Yuen, and in the following year ascended the throne as the first of the Ming or 'Illustrious' dynasty (1368-1643) and became known as Hung-Wu (q.v.), making his capital south of the Yang-tse, in the present Nanking.

YUGA, yụ'gȧ (Skt., yoke, period of time, generation). In Hindu mythology and astronomy, the name of a long period of years corresponding to an age of the world. Four such eras are mentioned: *Kṛta-yuga, Trētā-yuga, Dvāpara-yuga*, and *Kali-yuga*. The first was the golden age of the world, but each succeeding period became shorter and more evil, until the last, or Kali-yuga (q.v.). The Kali-yuga is said to have begun in the year B.C. 3101. A description of these immense world-periods, which comprise myriads of years, is found in *Manu* (q.v.), the *Mahābhārata* (q.v.), and the *Purāṇas* (q.v.). Conceived as a day of the gods, each of these long mundane eras is believed to be preceded by a period called *sandhyā*, or twilight, and followed by a similar period *sandhyāṁśa*, or portion of twilight. The precise length is given in divine years and reduced afterwards to terms of human years. The Krita-Yuga consists of 4000 divine years, its Sandhya of 400, and its Sandhyamśa likewise of 400 divine years. The Treta-Yuga consists of 3000, and its Sandhya and Sandhyamśa of 300 divine years each; the Dvapara-Yuga of 2000 divine years, with 200 such years as its Sandhya, and 200 as its Sandhyamśa; and the Kali-Yuga of 1000 divine years, with 100 such years as its Sandhya, and 100 as its Sandhyamśa. Since a divine year comprises 360 solar years of mortals, a year of men being a day of the gods, these Yugas, with their Sandhyas and Sandhyamśas, would severally represent 1,728,000, 1,296,000, 864,000, and 432,000, or in the aggregate 4,320,000 solar years of mortals. This cycle is called a *Mahā-yuga*, or 'great Yuga,' and a thousand such, comprising 4,320,000,000 years, make up a day and night of Brahma. As a designation of time Yuga is confined almost wholly to philosophical and descriptive works, for it plays no actual rôle in the strictly scientific works of Hindu astronomy. The term Yuga is sometimes, though exceptionally, applied also to other divisions of time. Consult Thibaut, *Astronomie, Astrologie und Mathematik* (Strassburg, 1899).

YUKAGIRS, yōō-kä'gērz. A stock once consisting of many tribes, as Omoks, Anauls, and Cheliags, occupying much of Siberia east of the River Lena. They call themselves Andondomni, or men. They num-

YUCCA



1. SAND DUNES WITH YUCCA, ETC., FLORIDA
2. THICKET OF YUCCA ALOIFOLIA SHOWING SHIFTING AND BUILDING UP OF DUNES, FLORIDA

bered in 1898 but 700 persons speaking their mother-tongue. Some of the Tungusic Lamuts, their neighbors, however, speak Yukagir, while the Yukagirs of Verkhoiansk have adopted the Lamut. The Chuvanzes of the Aniuy and the Upper Anadyr are classed with the Yukagirs. In physique the Yukagirs resemble the Tungus-Lamuts, but are more brachycephalic, and generally have lighter hair. The color of their skin is often quite light, especially among the women. Older accounts represent them as a warlike people having many contests with the Chukchi, Koriaks, and Russians. Consult: Kohn and Andree, *Sibirien und das Amurgebiet* (Leipzig, 1876); Müller, *Unter Tungusen und Jakuten* (ib., 1882).

YUKI, yo͞o'kê (Wintun Indian, aliens, enemy). A group of tribes constituting the nucleus of the Yukian stock, centring in Round Valley and on the headwaters of the Eel River, in the present Mendocino County, northwestern California. They were on friendly terms with their northern neighbors, the Wailaki, with whom they are much intermarried, but maintained constant aggressive warfare upon the more peaceful Pomo (q.v.) and Wintun (q.v.), and were bitterly hostile to the whites, seeking revenge with desperate persistence. Their houses were conical structures of poles and bark, sometimes thatched in winter, with large dome-shaped townhouses thatched and covered with earth. They wore little clothing beyond the G-string and both sexes tattooed the face. The dead were sometimes burned, but usually buried in a sitting posture. Their history from the irruption of the white miners in 1849 until the remnant was gathered upon a reservation twenty-five years later was one of unceasing raids and pitiless extermination. They were estimated on good authority at over 5000 about 1850. The confederated Yuki and Wailaki now on Round Valley Reservation number only 280, steadily decreasing.

YUKON, yo͞o'kŏn. A Territory of Canada occupying the northwestern portion of the Dominion. It is bounded on the north by the Arctic Ocean, on the east by the Territory of Mackenzie, on the south by British Columbia and southern Alaska, and on the west by the main portion of Alaska, the boundary toward which is the 141st meridian of west longitude (Map: Canada, D 4). Area, about 198,300 miles. The surface, whose features were little known until the last decade of the nineteenth century, is uneven in greater part, with the general elevation between 2000 and 3000 feet, and the whole country is filled with mountain ranges and rolling hills penetrated everywhere by large navigable rivers. There are a number of peaks rising considerably above the snow-line in the north and in the southwest, the loftiest being Mount Logan, close to the Alaskan boundary adjacent to Mount Saint Elias, with an elevation thought to exceed 19,000 feet. The main divide of the Rocky Mountains, separating the watershed of the Yukon from that of the Mackenzie, forms the eastern boundary, but it is in parts so low and depressed as to barely give the aspect even of a line of hills. The principal river is the Yukon, whose navigable headstreams and branches penetrate almost every part of the Territory. With respect to climate the Yukon is one of the coldest regions in the world. A maximum temperature of over 80° is frequently observed in summer, but the summers are very short, and frost occurs every month in the year. In winter a temperature of 50° below zero is common, and it has been recorded as low as 63° and 68°. The air is, however, dry, and the rainfall is not heavy, though it is sufficient to support large forests or woods of spruce and poplar, which cover the valleys and mountain slopes up to an altitude of about 2500 feet; the timber, however, is rarely of large dimensions. The agricultural possibilities of the Territory are probably not very great, but some of the hardier crops, such as rye and barley, easily produce, and some little truck farming of potatoes, turnips, lettuce, peas, and cabbage has been carried on in different localities. The geological structure is largely a continuation of that of British Columbia, consisting mainly of Archæan ridges flanked by extensive Paleozoic strata, which contains some of the richest gold fields in the world. (See YUKON GOLD FIELDS.) Beds of lignitic coal occur. Before the discovery of gold in 1896 the Yukon district was almost uninhabited; in 1901 the census population was 27,219. In 1898 the district was organized as a separate Territory, and Dawson (q.v.) is now the capital. Means of communication are amply afforded by the navigable rivers within the Territory, but access across the mountainous borders was at first very difficult. A railroad traversing the White Pass is now in operation between Skagway and the upper waters of the Yukon.

YUKON GOLD FIELDS. It is intended to describe under this title not only the gold-mining districts situated along the tributaries of the Yukon River, but also the Nome district of Seward Peninsula, which was discovered and developed largely as a result of the operations in the Yukon region. The occurrence of gold in the interior of Alaska was known in the early part of the last century, but it was not until 1886, when the auriferous gravels of Forty-Mile Creek, a tributary of the Yukon, were found, that mining operations assumed a permanent character. Soon after this date the settlements of Forty-Mile and Circle City became the centres of a small mining industry, and further explorations made known the gold districts of Birch Creek, Mission Creek, Koyukuk River, and other streams in the Yukon basin. In August, 1896, a rich placer claim was located by a California prospector on Bonanza Creek, a tributary of the Klondike River, which joins the Yukon a short distance above the American boundary. This discovery may be said to mark the beginning of the present important industry. It was followed by an invasion of miners from the other fields of Alaska, and during the ensuing winter began the remarkable 'rush' from Canada and the United States, which was attended with terrible hardships and great loss of life. By the summer of 1898 there were over 40,000 people in the Klondike region, and Dawson had become a thriving camp with several thousand inhabitants.

The Klondike region includes approximately the area lying on the east side of the Yukon River between the Klondike River on the north and the Indian River on the south. The gold is found in gravel deposits along the courses of the small streams. Its source has been presumed to be the quartz veins which occur in the schists of the neighboring hills, but no gold-bearing quartz, in quantity at least, has yet been found *in situ* in the region. Most of the gold has been mined from the river-bed deposits. But in many places the terraces which lie 50 feet or more above the streams have been found sufficiently rich to repay working. The values are usually concentrated along bed-rock, sometimes impregnating the latter to the depth of a foot. Except for a few feet near the surface the ground is frozen throughout the year, and the work of thawing and excavation is extremely difficult and tedious. The gravels are washed during the summer months, usually in short sluices. The total production of the Klondike district from 1896 to 1902 inclusive is approximately $80,000,000.

The Nome district, which is next in importance to the Klondike, is situated on the southern side of Seward Peninsula, at the entrance to Norton Sound. The first discoveries were made in the summer of 1898, and the next year witnessed the establishment of Nome City, and the development of mining into an important industry. A peculiar feature of the district is that the gold occurs not only in the creek and bench deposits of the small valleys, but it is also found in the gravels of the coastal plain, which is a tundra, and even more extensively in the beach sands. The creek deposits are similar in character to those occurring in the Klondike. A large number of the small streams that drain the southern side of the peninsula have been worked, including Anvil, Cripple, Eldorado, Ophir, Solomon, and Kugruk creeks, each of which gives its name to a local district. The coastal plain in the vicinity of Nome is covered with a heavy growth of moss, and beneath this there are layers of gravel from 40 to 80 feet thick which carry gold. The methods employed in mining these deposits are similar to those used in working the creek gravels. Most of the excavation is done with the aid of steam for thawing the frozen gravels. The production of the Nome district from its discovery to the close of 1902 is about $20,000,000.

YUKON RIVER. One of the largest rivers of North America. It is formed at Fort Selkirk, Yukon Territory, Canada, by the junction of the Lewes and Pelly rivers, and flows northwestward into Alaska, which it traverses in a southwest direction, finally turning west and emptying into the Bering Sea through a large delta on the south shore of Norton Sound (Map: Alaska, D 3). Its total length, including the Lewes, is, according to a recent report of the United States Geological Survey, 1865 miles. The Lewes, which is generally considered the upper course of the main stream, rises in a cluster of lakes (Lindeman, Bennett) in the extreme northwestern corner of British Columbia and on the northern foot of the Chilkoot Pass and flows northward to the Pelly confluence at Fort Selkirk. The upper courses of the river and its tributaries generally flow through narrow valleys inclosed between mountains of modern elevation, and in some places taking the form of cañons. In Alaska the river flows for hundreds of miles through level, moss-covered tundras, where the width, between its low, marshy banks, is from one to two miles, though its depth is not great. The delta is of vast extent, having an area, including the portion inclosed by the Kashunuk arm, of 9000 square miles. The volume of discharge of the Yukon has been thought to be fully two-thirds that of the Mississippi, and great quantities of sediment are brought down. There are 26 outlets over 200 yards wide and numerous smaller channels. All of them, however, are silted up, with a depth of only two to nine feet on the bars, while the sea for many miles from shore is only a few feet deep. Sea-going steamers cannot, therefore, enter the river, but proceed to the harbor of Saint Michael, about 70 miles to the north, where they unload into stern-wheel steamers, many of them of majestic size, which ply regularly in summer to Dawson. A fleet of "upper river" steamboats runs between Dawson and the White Horse Rapids, where a portage effects a union with the third section of river navigation—from Miles Cañon to Bennett. Navigation is continuous (although hampered by rapids) between the White Horse and the mouth of the river. The current is over most parts very swift, and the descent very rapid. From Dawson to the sea, about 1400 miles, the fall is on the average nearly a foot per mile. The navigation of the whole river is free to Canadian vessels; the navigable season is comprised between the months of June and September or October. The chief settlement on the Yukon is Dawson, at the confluence of Klondike Creek, the centre of the gold-mining region. The largest tributaries join the main stream in Alaska. They are the Porcupine, the Koyukuk, and the Tanana. See YUKON GOLD FIELDS. For bibliography see ALASKA.

YULAN. See MAGNOLIA.

YULE, Sir HENRY (1820-89). An English engineer and Orientalist, born at Inveresk, Scotland. In 1840 he entered the Bengal engineers; he served in India on various public works, and from 1858 to 1862 was secretary to the Government in the Public Works Department. In 1862 he was retired with rank of colonel, and from 1875 to 1889 sat in the Indian Council. Besides numerous articles in the *Journals* of the Royal Asiatic and Geographical societies he published: *Cathay and the Way Thither* (1866); *The Book of Ser Marco Polo the Venetian* (1871); and with Dr. Burnell, *Hobson-Jobson, an Anglo-Indian Glossary* (1886; 2d ed. 1903). He wrote the notes for the Hakluyt Society's reprint of the manuscript (1681) diary of William Hedges (1888-89).

YUMA, yōō′mȧ (probably, sons of the river). The most important tribe of Yuman stock (q.v.), originally occupying a territory on both sides of the Colorado River, above and below the entrance of the Gila, in Arizona and California, and now gathered upon a reservation in the extreme southeastern corner of California to the number of about 650, being only about one-half their population of fifty years ago and one-sixth of that in 1800. Like all of this stock, they are agricultural and are of fine physique, and although generally peaceful in disposition, have shown themselves brave in their early conflicts with the Americans, Mexicans, and surrounding tribes. Their ordinary shelter was the brushwood wikiup. They wore very little clothing, but painted and tattooed their bodies in elaborate designs, and were fond of shell and turquoise ornaments and feather headdresses. They burned their dead. Two missions were established among them by Spanish Franciscans in 1780, but in the next year the Yuma massacred the missionaries and their companions, and the effort was abandoned.

YUMAN STOCK. An important linguistic stock of the lower Colorado River region of California and Arizona, with portions of the adjoining Mexican States of Sonora and Lower California. Among the most important tribes are the Yuma, Mohave, Walapi, Maricopa, Yavapai, Havasupi, Cocopa, and Cochimi (qq.v.). All the Yuman tribes, excepting those of the Lower California peninsula, were primarily agricultural and vegetarian, rather than hunters, and all had the arts of pottery and basket-making. They were brave and warlike in self-defense, but not predatory like the Apache or the Plains tribes. Their ordinary dwellings were brush wikiups, and as a rule they practiced cremation, but sometimes deposited their dead in caves in the rocks. The Yuman tribes of the Lower California peninsula seem to have been among the lowest in the scale of all American aborigines, but the Yuma (q.v.) and others of the Colorado were among the highest types, physically and intellectually. The Jesuit and Franciscan missions established among them between 1760 and 1780 made but little impression, and the majority of those who have survived the contact with civilization remain in nearly their original condition. From a probable total of perhaps 20,000 about 1760 they have dwindled to barely 5000, nearly all of of whom excepting the Cocopá are within the United States. The tribes of Lower California, estimated during the mission period at 12,000, have almost entirely disappeared.

YUNCA, yōōn'kȧ (from Quichua *Yuncacuna*, dwellers in the hot country). A group of ancient cultured tribes, constituting a distinct linguistic stock, formerly occupying that portion of the coast of Peru extending from about latitude 4° S. to latitude 10° S., their capital being near the present Trujillo. According to their own traditions they had coasted down from the north in canoes. They were agricultural and built reservoirs and irrigating canals, some of them so solidly constructed that they are still in use to-day. The ruins of the great palace at Gran Chimu, with its massive walls, spacious terraces, and elaborate bas-reliefs and frescoes, are one of the wonders of ancient America. They were also famed for their skill in the fashioning of jewels, vases, and other work in gold and silver. They were brought under subjection to the Inca empire of Peru some time before the arrival of the Spaniards, but their language, which is still spoken in some secluded valleys, bears no trace of Quichua influence, although surrounded on all sides but the ocean by tribes of that stock. Consult Carrera, *Arte de la lengua yunga de los valles del obispado de Trujillo* (Lima, 1644; new ed., ib., 1880). See PERUVIAN ARCHÆOLOGY.

YUNG-CHING, yōōng'chĭng', or **YUNG-CHENG,** chŭng (1677-1735). The reign-title of the third Emperor of the Ta Tsing, the present dynasty of China. He was the fourth son of K'ang-hi and succeeded him in 1723 at the age of forty-five. He banished or imprisoned all his brothers except the thirteenth, who, until his death in 1730, was his chief adviser. The Roman Catholic missionaries fell into disfavor in this reign chiefly because "in troublous times the converts followed none but their directions." An edict of expulsion from the country was changed at the last moment to one of banishment, first to Canton, and later to Macao, only those being retained at Peking who were needed in the Government service; 300 churches were demolished or put to profane uses, and a persecution of the native Christians was begun. Yung-Ching was a man of peace, devoted to letters and art and to the promotion of agriculture, and made no effort to extend his dominions by military expeditions as his father had done. His reign, which was short, was filled with famines, destructive floods, and earthquakes, which gave him opportunities for the display of his paternal care of his people. He died in 1735 and was succeeded by K'ien-lung.

YUNG-LO (1360-1424). The reign-title of Chu-ti, the third Emperor of the Ming dynasty. He was the fourth son of Hung-wu (q.v.), the founder of the dynasty, and in 1403 superseded his nephew Hwei-ti, who had ascended the throne while Chu-ti was absent in the north on a great military expedition. Throwing off his allegiance to the son of his eldest brother, he marched south, overcame all opposition, entered Nanking, the capital, and assumed the Imperial dignity, his nephew disappearing forever from view in the disturbances which followed. Yung-lo proved himself a man of great energy and enterprise, but was bigotedly devoted to Buddhism and bestowed the best offices on priests. He patronized literature, however, and his name is inseparably connected with the *Yung-lo Ta Tien*—the "Great Canon of Yung-lo"—an encyclopædia in 22,877 books, besides a table of contents in 60 books, which was prepared by a commission of three eminent scholars, with the assistance of five chief directors, 20 subdirectors, and 2169 literary workers. It was begun in 1405 and completed near the close of 1407. It contained the substance of all the classical, historical, philosophical, and literary works published down to that time, and embraced astronomy, geography, the occult sciences, medicine, Buddhism, Taoism, and the arts. Many rare works have been preserved in it which would otherwise have been irrecoverably lost.

YUNG WING (1828—). A Chinese scholar and educator. He was born near Maçao, of humble parentage, entered a mission at eight years of age, and later the Morrison School, under the Rev. S. R. Brown, and was by him brought to America in 1847. He became a Christian, and devoted his life to the welfare of China. He graduated at Yale College (1854), the first of his race to take a degree from an American college. He conceived a plan for having Chinese youth of promise brought to America for education. He returned to China in 1855. In 1871 his plan was adopted by the Government, and the sum of $1,500,000 granted. He was made chief commissioner of the Chinese educational mission, and then placed 112 Chinese young men under a fifteen years' course of instruction in the United States. He was made a mandarin of the second grade, intendant of the Province of Kiangsu, and was for a while Associate Minister to the United States. He returned to the United

States in June, 1902, and has resided in Hartford, Conn.

YUN-NAN, yo͞on′nän′ (Chin., 'south of the clouds,' from *yün*, clouds + *nan*, south, in allusion to the great banks of fog which overhang the Province of Sze-Chuen on the north). One of the eighteen provinces of China proper, bounded on the north by Sze-Chuen, on the west by Kwei-Chow and Kwang-si, on the south by Tongking and the Shan States, and on the west by Upper Burma and the Shans. Estimated area, 146,680 square miles; estimated population, in 1903, 12,324,574, composed of Chinese (many of them Mohammedans), Shans, and Lolos. Yunnan may be described as consisting of a great central plateau 5000 to 7000 feet above the level of the sea, diversified by ranges of hills and mountains, which in some places rise to heights of 7000 feet above the plateau, with lofty, massy ranges in the northwest whose serrated summits are covered with snow. The drainage is partly to the Yang-tse in the north, partly southeast through the Si-kiang, but mostly southward through the Song-koi, the Mekong, and the Salween, which traverse its western parts from north to south. Its rivers have furrowed for themselves deep channels—several hundred feet in some places—through the prevailing red sandstones and shales. Lakes are numerous and some of them large. The province is known to be rich in minerals; 'smokeless' coal (that is, anthracite) is widely distributed; copper is extensively mined; silver, lead, tin, zinc, and iron are found and worked; gold is found in the river sands, and salt pits are numerous and much salt is produced. The chief industries are agriculture, mining, metal-working, and lapidary work—jade-cutting being one of the most active branches. The jade, however, comes from Tammaw, in Upper Burma, and the precious stones are also brought in from the west. The chief copper supply of the Empire comes from Yun-nan, as well as the Chinese 'German silver,' commercially known as *pack-tong* ('white copper'). The chief agricultural products are rice, wheat, maize, a poor quality of opium, tobacco, a little cotton and silk, tea, and anise seed. The tea grown in the Department of P'u-erh is noted throughout the Empire as more refreshing than any other, and brings a high price. It is steamed and then made into cakes for transportation. Two towns, Mong-tse and Sze-mao (qq.v.), are open to foreign trade, and there is a British consul at Têng-yueh-chow, on the western frontier. The province shares with Kwei-chow the supervision of a Tsung-tuh or Governor-General. The Governor resides at Yun-nan-fu (q.v.). A rebellion, begun in 1855 by the killing of 14,000 Mohammedans, lasted until 1873, when it was suppressed with much slaughter. It did much to desolate the country and impoverish the people.

YUN-NAN-FU. A city of China, capital of the Province of Yun-nan. It stands in a great plain 6420 feet above the level of the sea, near the northeast shore of Lake Tien-ch'ih (area, 1400 square miles), in latitude 25° 3′ N., longitude 102° 42′ E. (Map: China, B 6). Its walls, which have a circuit of three miles and are pierced with six gates, inclose in the northern section many swamps and vegetable gardens. The population and the business are in the southern half; the streets are wide and clean, all garbage being collected daily by bullock carts, a most unusual thing in China. As the extensive suburbs were destroyed during the so-called Mohammedan rebellion (1855-1873), most of the business is done within the city, and the streets are thronged with apparently well-to-do people. The great salt emporium still exists outside the south gate. The drainage of the lake is to the Yang-tse. The climate is healthful. There are heavy snows in winter.

YURIEV, yo͞or′yĕf, UNIVERSITY OF. The official name for the University of Dorpat, in Livonia, Russia. It had its inception in the gymnasium founded by the Swedish Government when it gained possession of Livonia. This institution was changed in 1632 into a university. There were then instituted four faculties conducted by 19 professors who came from Germany. During its existence under the Swedish régime it was known as the 'Academia Gustaviana.' When in 1656 the city was taken by the Russian forces a few of the teachers and students attempted to perpetuate the university at Reval. There were about 60 students attached to the institution as late as 1665, when it ceased to exist. In 1690 it was reopened as the 'Academia Gustaviana Carolina' at Dorpat, with but ten professors, mostly Swedes. When war broke out in the north it was transferred in 1699 to Pernau, where it declined rapidly and became extinct in 1710. In 1802 Paul I. was led to establish a German university at Dorpat, to induce the students of the Baltic Provinces to remain in Russia. During the period of 1828-38 there existed at the university a special institute for the education of professors for the rest of the Russian universities. During the reign of Nicholas I. the university, in common with the rest of the Russian universities, suffered from Government oppression. In 1850 the traditional philosophical faculty was divided into the faculties of history-philosophy and physics-mathematics. In 1865 more favorable statutes were granted the university and a freer academic life came into existence. Its autonomy was, however, taken away in 1889. Up to 1891 the university was a purely German institution, but since then the Government has taken strenuous measures to Russify it. Since 1895 all instruction except in the theological and part of the medical faculties is carried on in Russian. Professors were given two years within which to acquire the Russian language. The attendance in 1901 was 1790. The university library, established in 1802, contains over 200,000 volumes.

YU′ROK, yo͞o′rŏk (down stream, so called by the upper tribes). A group of tribes, including the Weitspek, Rikwa, and others, and constituting what is known as the Weitspekan linguistic stock, occupying the territory of the lower Klamath River from about the junction of the Trinity to the sea, in northwestern California. They are distinguished for their lively, inquiring and enterprising disposition, being now industrious laborers among the whites, caring for their money and accumulating household property. In former times they held the monopoly of the canoe-making for the other tribes of the vicinity, constructing large and seaworthy canoes by burning and scraping out great logs of redwood. Their houses are peculiar circular cellars, over which are built square cabins of split logs set upright in the ground, with a very small doorway. The women are skillful basket-makers, weaving water-tight baskets, as well as mats, cups, and cradles, from willow twigs and pine roots, and ornamenting them in patterns of various color designs. Their ordinary weapons in former times were the bow, lance, and knife. Chiefs have but little authority and the men marry but one wife. They bury their dead with the usual funeral rites and keep up a fire near the grave for several nights. They have a number of dances, including one to celebrate the birth of a child. A careful estimate in 1870 made their number about 3000, although undoubtedly greatly diminished since the coming of the whites. Their present number is unknown, as they have never been gathered upon a reservation.

YURUCARE, yōō'rōō-kä'râ (Quichua, white men), or **YURACARE**. A group of tribes constituting a distinct linguistic stock, living in the forests on the eastern slope of the Andes, about the headwaters of the Beni River, Central Bolivia. The Yurucare are noted for their light complexion and tall stature, averaging nearly six feet, and for their handsome features, particularly among the women. They are hunters and warriors, wild and given to a roving life, although some of them were collected into the Chiquito missions during the mission period ending with the expulsion of the Jesuits in 1767.

YUSCARAN, yụs'kȧ-rän'. The capital town of the Department of El Paraiso, Honduras, 33 miles south-southeast of Tegucigalpa. In the vicinity are silver mines. Population, 5000.

YUSUF-IBN-TASHFIN, yōō'sụf-ĭb'n-täsh-fēn' (BEN-TASHUFIN or -TAXFYN) (c.1006?-1106). A Moorish conqueror, second of the Almoravide (q.v.) dynasty in Morocco and founder of the Almoravide dominion in Spain. He was a cousin of Abu-Bekr, the founder of the dynasty, and succeeded him on the throne, his capital being at Morocco (c.1070). In 1086 he was called into Spain by Al-Mo'tamid, Emir of Seville, to assist in checking the advance of the Castilians under Alfonso VI., and routed the Spaniards at Zalaca (Sacralias), near Badajoz. Recalled to Ceuta by the death of his eldest son, he was unable to follow up his victory, and the Castilians again threatened the hold of the Moors in Spain. At the renewed solicitation of the Emir, Yusuf crossed again into the peninsula (1090). He beat back the Spaniards, made war upon the Moorish princes, and united the whole of the Mohammedan dominions in Spain to the Kingdom of Morocco. In 1103, at the age of 97, as it is said, he abdicated in favor of his son Ali, and returned to Africa, where he died. Consult: Freeman, *History and Conquests of the Saracens* (Oxford, 1856); Coppée, *History of the Conquest of Spain by the Arab-Moors* (Boston, 1881).

YUTHIA, yōō'thē-ȧ. A city of Siam. See AYUTHIA.

YUZGAT, yụz-gät', or **YOZGAD**. A town in the Vilayet of Angora, Turkey in Asia, capital of a sanjak, situated at an altitude of over 4000 feet, more than 100 miles east of Angora (Map: Turkey in Asia, F 3). Population, 15,000.

YVERDON, ē'vâr'dôɴ'. A town of the Canton of Neuchâtel, in Switzerland, at the southwest end of the Lake of Neuchâtel, 23 miles southwest of the city of Neuchâtel (Map: Switzerland, A 2). Its ducal castle (1135) was occupied from 1805 to 1825 by the celebrated school of Pestalozzi. The castle now contains the municipal school, a museum of Roman and Celtic antiquities, and a library. Yverdon has a handsome town hall and an extensive system of docks. There are railroad shops and foundries. Population, in 1900, 7985, nearly all French Protestants.

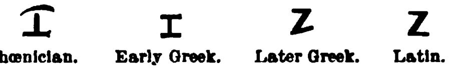
YVES D'ÉVREUX, ēv dā'vrẽ', PIERRE (c.1570-c.1630). A missionary and author, born at Evreux, in Normandy. In 1595 he became a Capuchin and was sent as superior of four missionaries with a French colony in 1612 to Maranhão, Brazil. Two years afterwards he returned to France and wrote an account of his life in Brazil, part of the manuscript of which was destroyed by his printer. A modern annotated edition was published in 1864 by Ferdinand Denis from the only known copy, which was in the Bibliothèque Nationale in Paris. The copy had the title *Suite de l'histoire des choses plus mémorables advenues en Maragnan ès annés 1613 et 1614.*

YVETOT, ēv'tō'. The capital of an arrondissement in the Department of Seine-Inférieure, France, on the plateau of Caux, 31 miles by rail northeast of Havre (Map: France, C 2). The ruins of the Bernardine monastery are occupied by the court and jail. Cloth fabrics are extensively manufactured. Yvetot was long an independent principality, locally called a kingdom. Its sovereignty came to an end in 1681. It has been immortalized by Béranger in his burlesque song, "Le roi d'Yvetot." Population, in 1901, 7352.

YVON, ē'vôɴ', ADOLPHE (1817-93). A French battle painter, born at Eschwiller (Moselle). He studied with Delaroche in Paris, and first exhibited portraits. After a journey to Russia in 1843, which resulted in many valuable drawings and pictures of Russian subjects executed later, he devoted himself to biblical and historical subjects, among them a "Repentance of Judas" (1846) and several after Dante, but the success of his "Battle of Kulikovo" (1850) determined him to become a battle painter. The exhibition of "Napoleon Crossing the Alps" and "Marshal Ney at the Retreat from Russia" in 1855 brought him a commission to accompany the French army to the Crimea. His three colossal pictures of the "Storming of the Malakoff" (1857-59, Versailles), which received the grand medal of honor at the Salon, are characteristic of his art. They show good draughtmanship, composition, and dramatic action, but are hard and dry in color, and theatrical in the extreme. His later works include, besides a number of portraits, the "Battle of Solferino" (1861), "Battle of Magenta" (1863), and the "United States of America" (1870), an allegorical representation of thirty-four states grouped around the central figure of the Republic, executed for A. T. Stewart.

Z

Z The twenty-sixth and last letter in the English alphabet. Z is the Greek *zēta* (ζ), and, like *y* (q.v.), was introduced into the Roman alphabet in the reign of Augustus to transliterate Greek words. In the Phœnician alphabet it was the seventh letter. Its development was as follows:



Phonetic Character and Philological Value. As a phonetic character Z is the voiced alveolar spirant. In its formation the blade of the tongue approximates the sockets of the upper front teeth and the air rushes over the flattened edge of the tongue with a sibilant sound, *zebra, zinc, squeeze, gaze*. In English and other modern languages this sound is frequently represented by *s*, as *noses, propose, cheese;* French *plaisir*, German *gesungen*. The letter *z* has also the sound of *zh* in *azure, seizure;* this latter sound is more frequently represented by *s*, as in *measure, treasure*. In derivation English *z* represents Anglo-Saxon *s*, which became voiced when unaccented, as *freeze*, Anglo-Saxon *freosan; sneeze*, Anglo-Saxon *sneosan*. Initially, however, *z* generally indicates a word of foreign origin, as in *zeal, zodiac, zenith*, from the Greek, Arabic, etc., but in the old exclamation *zounds* the *z* stands for *s* ('God's wounds').

ZAANDAM, zän'däm', or **SAARDAM**. A town in the Province of North Holland, Netherlands, at the meeting of the canalized Zaan and the Y, six miles north-northwest of Amsterdam (Map: Netherlands, C 2). It is a typical Dutch town, famous for its cleanliness. The small brick or wooden houses are surrounded by stiffly arranged gardens in which the favorite tulip predominates. Along the banks of the Zaan—in the 'Zaanstreek'—there were formerly more than 400 windmills, but the machinery is now mostly run by steam. These mills are employed in sawing wood, grinding corn, and manufacturing oil, cement, and paint. The cabin occupied for a week in 1697 by Peter the Great, while he worked as a ship carpenter, is an object of great local pride. During the seventeenth century the town had large interests in the whale fishery, and shipbuilding flourished. Population, in 1901, 22,022.

ZABEL, tsä'bel, Eugen (1851—). A German author, born at Königsberg, where he studied philosophy and philology. In 1876 he went to Berlin and became associate editor of the *National Zeitung*. Besides the monographs *Berthold Auerbach* (1882), *Ivan Turgenieff* (1884), *Graf Schack* (1885), *Anton Rubinstein* (1892), *Hans von Bülow* (1894), *Verestchagin* (1900), and *Tolstoi* (1901), he published *Litterarische Streifzüge durch Russland* (1887), *Im Reiche des Zaren* (1898), *Russische Litteraturbilder* (1899), *Europäische Fahrten* (1901), *Zur modernen Dramaturgie* (1902), *Moskau* (1902), and others. He is also the author of several short stories and comedies, and translated from Sophocles, besides dramatic works from the Russian, French, Spanish, and English.

ZABERN, tsä'bĕrn (Fr. *Saverne*). A town in Alsace, 20 miles northwest of Strassburg, on the Zorn and on the Rhine-Marne Canal (Map: Germany, B 4). The manufactures include agricultural implements, grindstones, leather, and spectacle glasses. Population, in 1900, 8498. Conspicuous are the castle of the bishops of Strassburg, erected in its present form in 1779 and now used as a barrack, and the Hauptkirche, built in the late Gothic style and dating from the second half of the fifteenth century. Zabern, which was the Tres Tabirnæ of the Romans, was destroyed by the Alemanni in 357, but in the same year was rebuilt and fortified by Julian. In the tenth century it belonged to the bishops of Metz and then to the bishops of Strassburg. At Zabern in 1525, 18,000 insurgent peasants were massacred. In 1622 it withstood the Count von Mansfeld; and subsequently was taken by the French, who in 1696 destroyed the fortifications.

ZABRZE, zäbr'zhe. A village of Silesia, 95 miles southeast of Breslau (Map: Germany, H 3). It lies in the coal-mining district and near one of the richest mines of Silesia, operated by the State. The place contains a number of machine shops, wire mills, and coke ovens. Population, in 1900, 19,562.

ZACATECAS, tsä'kȧ-tä'kȧs. An interior State of Mexico, bounded by the States of Coahuila on the north, San Luis Potosí on the east, Jalisco and Aguascalientes on the south, and Jalisco and Durango on the west (Map: Mexico, G 6). Area, 29,757 square miles. The State belongs to the central plateau of Mexico and has a mean altitude of over 7000 feet. The western part belongs to the region of the Sierra Madre and rises to about 10,000 feet. The climate is temperate, but dry. Owing to its mountainous surface, Zacatecas has only a limited area of cultivable land and is more favorable for grazing than for agriculture. In the southern part, however, there are tracts of land well adapted for the raising of cereals and cotton. The chief importance of the State lies in its extensive silver deposits, which have been worked since the middle of the sixteenth century. The first silver mine was opened in 1548; from 1610 to 1810 at least 670,000,000 pesos were taken from the three famous mining centres of Zacatecas, Fresnillo, and Sombrerete. There are also deposits of copper, lead, and quicksilver, which are worked to some extent. The chief products of the State are cotton and woolen goods, sugar, rum, and wine. The principal railroads are the Mexican Central, with its Tampico branch; the Coahuila and Pacific; and that of the Mexican National Construction Company. Population, in 1895, 447,265. Capital, Zacatecas.

ZACATECAS. A city of the State of Zacatecas, Mexico, 439 miles by rail northwest of the City of Mexico, in a lofty valley some 8000 feet above the sea (Map: Mexico, G 6). Owing to the narrowness of the valley in which it is situated, the city spreads in irregular blocks, with winding streets, up the sides of the encircling hills. The cathedral, in the heart of the city, with elaborately sculptured façade, unfinished towers, and costly interior, dates from the seventeenth century. The plazas of Juarez and of Villareal, and the paseos of the Alameda and of Cañada de San Francisco, add much to the charm of the city. There is a municipal palace, containing an attractive courtyard, the mint, and the Calderon Theatre. Zacatecas owes its settlement and subsequent prosperity to its silver deposits. During recent years richer veins have been discovered in other portions of the State, and the importance of those of Zacatecas have been somewhat eclipsed. Recent discoveries point, however, to an extensive future output of gold. In the reduction of the silver ore the ancient and wasteful *patio* process is still employed, though a few foreign firms have introduced modern methods. There are manufactures of pottery, some simple household weaving, and an extensive transit trade. Population, in 1900, 39,912. Zacatecas was founded in 1546 and became a city in 1585. The Franciscan friars from this city played an important part in the early history of Texas. The State and city opposed the centralizing policy of Santa Anna, but were overthrown by him, in 1835, before he departed on his memorable Texas campaign. In 1871 a battle between Juarez and a revolutionary force took place on the Hill of the Bufa.

ZACH, tsäG, FRANZ XAVER, Baron (1754-1832). A German astronomer, born in Pressburg, Hungary. He served for a short time as an officer in the Austrian army, then became private tutor in London, and in 1786 entered the service of Duke Ernst of Saxe-Gotha. The Duke built an observatory for him on the Seeberg, near Gotha, of which Zach was director (1787-1806). Afterwards he assisted in the establishment of observatories at Naples and Lucca, and edited the *Monatliche Korrespondenz zur Beförderung der Erd- und Himmelskunde* (28 vols., Gotha, 1806-13). He also published *Tabulæ Motuum Solis Novæ et Correctæ* (1792, supplemented 1804); *Tabulæ Speciales Aberrationis et Nutationis* (1806). He also edited *Allgemeine geographische Ephemeriden* (1796), and *Correspondance astronomique* (13 vols., Geneva, 1818-25).

ZACHARIÄ, tsäG'ȧ-rē'ȧ, JUST FRIEDRICH WILHELM (1726-77). A German poet, born at Frankenhausen. He studied jurisprudence at Leipzig and Göttingen, taught from 1748 at Brunswick, and in 1761 became professor of literature in the University of Halle. His earliest and best work was a comic heroic poem, modeled on Pope, *Der Renommist* (1744), and the most noteworthy of some descriptive poems were the *Tageszeiten* (1755) and *Die vier Stufen des weiblichen Alters* (1757). Considerable merit attaches to his *Fabeln und Erzählungen* (1771). Consult: Zimmer, *Zachariä und sein Renommist* (Leipzig, 1892), and Zimmermann, *Friedrich Wilhelm Zachariä in Braunschweig* (Wolfenbüttel, 1896).

ZACHARIAS, zăk'ȧ-rī'as. Pope 741-752. He is noticeable as one of the Greek prelates by whom the destinies of Rome and Italy were much influenced in the seventh and eighth centuries, and was instrumental in the redemption of captives from the pagan masters by whom they had been held in slavery. Zacharias, by his interposition in more than one instance in favor of the city of Rome with the Lombard kings, contributed to that prestige of the Roman See which eventually led to its obtaining the leadership of Italy, and in the end the temporal sovereignty of Rome and the adjoining territory. He died at Rome on March 14, 752. His letters are in Migne, *Patrologia Latina*, vol. lxxxix., and his Greek translation of the *Dialogues of Pope Gregory the Great* is in the same work, vol. lxxvii.

ZACHARIÄ VON LINGENTHAL, tsäG'ȧ-rē'ȧ fōn lĭng'en-täl, KARL SALOMO (1769-1843). A German jurist, born at Meissen. He studied at first philology and philosophy, then jurisprudence, at Leipzig, and in 1792-94 at Wittenberg, where he qualified as privat-docent and in 1797 became professor of law. In 1807 he was called in the same capacity to Heidelberg. The reputation which he earned with his *Handbuch des kursächsischen Lehnrechts* (1796), and with *Die Einheit des Staates und der Kirche* (1797), was greatly increased through the publication of the *Handbuch des französischen Civilrechts* (1808; 8th ed. 1894-95) and of *Vierzig Bücher vom Staate* (1820-32; revised ed. 1839-43). Consult the biography by Brocher (Paris, 1870). His son, KARL EDUARD (1812-94), born at Heidelberg, was distinguished as an adapter of Byzantine law, and through his writings really established the science of Greco-Roman jurisprudence. Prominent among them are: *Delineatio Historiae Juris Graeco-Romani* (1839); *Geschichte des griechisch-römischen Privatrechts* (1864; 3d ed. 1892); *Jus Graeco-Romanum* (1856-84), the best collection of Byzantine law books; *Paralipomena ad Basilica* (1893); and an edition of *Justiniani Novellæ* (1881-84-91).

ZACHER, tsäG'ēr, JULIUS (1816-87). A German philologist, born at Obernigk, in Silesia. He studied at Breslau and Berlin and in 1856 became professor extraordinary at Halle. The years 1859-63 he passed at Königsberg as professor and university librarian, and in 1863 returned to Halle as full professor. His works, though few, were of great value to the study of Germanic languages, and include: *Die deutschen Sprichwörtersammlungen* (1852); *Alexandri Magni Iter ad Paradisum* (1859); *Die Historie von der Pfalzgräfin Genovefa* (1860); and *Pseudocallisthenes* (1867).

ZACK. Pen-name of the English writer Gwendoline Keats (q.v.).

ZACYN'THUS. See ZANTE.

ZADKIEL, zăd'kĭ-ĕl. The name under which R. J. Morrison published (1835) a new edition of the seventeenth-century *Christian Astrology* of William Lilly, and most of his own works.

ZAD'OCK, or **ZADOK**. The name by which Dryden designates Archbishop Sancroft in *Absalom and Achitophel.*

ZAF'FARINES. A group of islands off the coast of Morocco. See CHAFARINAS.

ZAFFRE (Fr. *zaffre, saffre, safre,* Sp. *zafre,* probably from Ar. *ṣafrā,* yellow). An impure cobalt oxide prepared by roasting cobalt ore, reducing it to powder, and then mixing with two or three parts of fine sand or ground quartz. It is used as a blue color by enamelers and painters on porcelain and glass.

ZAGAZIG, zä'gȧ-zēg', or ZAKAZIK. A town of Lower Egypt, situated on the Muizz Canal, about 20 miles north of Cairo (Map: Egypt, E 2). It lies in a fertile region and carries on a considerable trade in cotton and grain. It has also a number of cotton-spinning establishments. Population, in 1897, 35,500. In the vicinity is the site of the ancient Bubastis (q.v.).

ZAGOS'KIN, MIKHAIL NIKOLAIEVITCH (1789-1852). A Russian novelist and dramatist, born in the Government of Pensa. He served as an adjutant in the campaign of 1812, taking part in the siege of Dantziz. Later he devoted himself to literature and in 1817 received a position in the directorship of the imperial theatre. In 1820, having become favorably known through several comedies, he was made director of the theatre at Moscow. In 1831 he became director of the Court theatre at Moscow, with the rank of actual privy councillor, and in the following year was made keeper of the armory in the Kremlin. He died at Moscow. Zagoskin wrote seventeen comedies, of which the most important are: *Mr. Boganotoff, or the Country Gentleman in the Metropolis; Boganotoff the Second, or the Metropolitan in the Country; The Journey Abroad;* and *A Romance on the High Road.* His reputation was advanced by his novels, of which *Yuri Miloslavski* (1829) was the most popular. In 1834 this was translated into English as *The Young Muskovite, or the Poles in Russia.* His books are gracefully written and constitute a good portrayal of Russian manners at various periods. He also wrote several volumes of essays entitled *Moskva i Moskvitchi.*

ZAGREB. See AGRAM.

ZAHN, tsän, THEODOR (1838—). A German theologian. He was born at Mörs, studied at Basel, Erlangen, and Berlin, and became professor at Göttingen (1871), at Kiel (1877), at Erlangen (1878), at Leipzig (1888), and again at Erlangen (1892). Some of his more important writings are: *Der Hirt des Hermas untersucht* (1868); *Forshungen zur Geschichte des neutestamentlichen Kanons und der altkirchlichen Litteratur* (1881-1902); *Geschichte des neutestamentlichen Kanons* (1889-92); *Das apostolische Symbolum* (1892); *Einleitung in das neue Testament* (1900).

ZÄHRINGEN, tsâ'rĭng-en. The reigning family of Baden. It traces its descent from Gebhard, eldest son of Guntram the Rich, Count of Breisgau, who lived in the early part of the tenth century. His younger brother Lanzelin is said to have been the founder of the Hapsburg line. In 1077 the line of Zähringen divided into the ducal or Zähringen branch, which became extinct in 1218, and the present branch of Baden. The dukes of Zähringen ruled over extensive possessions in what is now Southern Baden and Northern Switzerland. They had their seat in the Castle of Zähringen, which now lies in ruins, some two miles north of Freiburg.

ZAÏRE, zȧ'ĕr'. (1) The best of Voltaire's tragedies and one of the best dramas of the French classic school. It was produced in Paris, August 13, 1732, and owes much to Shakespeare's *Othello.* (2) An opera by Bellini, produced in 1829.

ZAKAZIK, zä'kȧ-zēk'. A town of Egypt. See ZAGAZIG.

ZALDÍVAR, sȧl-dē'vär, RAFAEL (1834-1903). A Salvador statesman, born at San Alejo. Educated in medicine and surgery, he so distinguished himself in epidemics of cholera (1857) and yellow fever that he was called in 1860 to the University of Guatemala as professor of physiology and hygiene. In the same year he was elected to the Chamber, and thereafter was a member of the Senate, Minister to Germany, and Minister of War. He was elected President in 1876, in 1880, and in 1884, and greatly improved the finances and industries of the country. He was Minister to the United States until shortly before his death, and withdrew because of an arbitration decision adverse to Salvador, growing out of a United States claim in behalf of the Salvador Commercial Company. He was transferred to Paris, where he died.

ZALEU'CUS (Lat., from Gk. Ζάλευκος, *Zaleukos*) (seventh century B.C.). A celebrated lawgiver of Epizephyrian Locri, in Southern Italy. Of his life nothing is known, and most of the traditions in regard to him are untrustworthy. He flourished in the middle of the seventh century B.C., and his code is reputed to have been the first written code which any Greek State ever possessed. It is said that the occasion for his legislation was given by an appeal which the people made to the Oracle of Delphi to remedy their troubles, whereon they were told to make laws for themselves. These laws, though most severe, were for a long time greatly celebrated. So averse were the people to a change that if any one proposed a new law, he was obliged to appear in public with a noose around his neck; and if his proposal was rejected the noose was tightened and the proposer strangled on the spot. It is said that adultery was punished with the loss of both eyes, and the people were forbidden to use napkins when eating, to travel abroad, etc.

ZALIN'SKI, EDMUND LOUIS GRAY (1849—). An American artillerist and inventor, born at Kurnik, Prussian Poland. When four years old he was brought to America by his parents, who settled in Seneca Falls, N. Y. In 1864 he served as a volunteer aide on the staff of Gen. Nelson A. Miles. For gallantry in the action at Hatcher's Run, Va., he received in February, 1865, a commission as second lieutenant in the Second New York Artillery. In 1866 he was appointed second lieutenant in the Fifth United States Artillery, attaining the rank of captain in 1887, and was retired in 1894. From 1872 to 1876 he was professor of military science in the Massachusetts Institute of Technology. He then spent several years in study and investigation at the Artillery School at Fortress Monroe, Va., where he graduated in 1880, and at the School of Submarine Mining at Willetts Point, N. Y. Most noteworthy is his invention and development of the pneumatic dynamite torpedo gun. He also invented the electrical fuze, telescope sights for artillery, a ramrod bayonet, and an intrenching tool, and originated the method of finding the exact sight allowance for wind in small arms and rifled artillery, and a system of range and position finding for seacoast and artillery firing. From 1888 to 1890 he was in Europe investigating British and Continental ordnance methods and equipment for the United States Army. See AIR GUN; ORDNANCE.

ZALUSKI, zȧ-lōōs'kē, JÓZEF ANDRZEJ (1702-74). A Polish bishop and scholar. He was born of an influential family, and at an early age took orders, becoming canon of Plock and a dignitary of the ecclesiastical courts. After the death of Augustus III. he espoused the cause of Stanislas Leszczynski, and with him fled to Lorraine, where he held several benefices. He soon returned to Warsaw, however, where he was made Bishop of Kiev. He collected a library of 230,000 volumes and 15,000 manuscripts, to which after 1748 he gave the public free access. This library he bequeathed to the Polish nation, but in 1795 it was removed to Saint Petersburg, and became the nucleus of the Imperial Library. Zaluski did much toward the awakening of Polish literature. His writings included a *Specimen Historiæ Poloniæ Criticæ* (1733), and a bibliographical chronicle, *Biblioteka historyków*, edited by Muczkowski (1832).

ZA'MA (Lat., from Gk. Ζάμα). In ancient geography, the name of two places about five days' journey southwest of Carthage and somewhat less than 30 miles apart. Inscriptions show that the eastern Zama was near the modern Sidi-Amor-Djedidi, and the western at Djiama. At one of these places the final battle of the Second Punic War was fought in B.C. 202. The Romans, under the command of the youthful P. Cornelius Scipio Africanus, defeated completely the Carthaginian forces under Hannibal. Mommsen holds that the western town, Zama Regia, gave its name to the battle, but this view is not universally accepted.

ZAMACOIS, thä'mȧ-kō'ĭs, EDUARDO (1842-71). A Spanish genre painter, born at Bilbao. He studied chiefly under Madrazo in Madrid, and under Meissonier in Paris. His art somewhat resembles Meissonier's, but is lighter in touch and more brilliant in color, and he ranks with Fortuny as the greatest Spanish genre painter of the nineteenth century. He succeeded especially well in seventeenth-century subjects, often satirical in character. Many of his paintings are in private possession in the United States, where he is a great favorite. Among the best known are "Cervantes as a Recruit" (1863); "The King's Favorite" (1868); "Entrance to a Convent" (1869); "The End of the Masqued Ball" and "The Education of a Prince" (1870).

ZAMAHSHARI, zä'mȧ-shä'rē (Ar. *Abū 'l-Kāsim Mahmūd ibn 'Umar al-Zamakhsharī*) (1074-1143). A noted Arabic philologist and exegete. He was born at Zamahshar, in Persia. According to the usual custom, he traveled extensively for study and spent considerable time in Mecca. He belonged to the sect of the Mutazilites. (See MOHAMMEDAN SECTS.) His principal works, so far as they have been edited by Europeans, are: a commentary on the Koran, edited by Lees (Calcutta, 1856); an Arabic grammar of classic character, edited by Von Broch (Christiania, 1879); an Arabic-Persian Lexicon, edited by Wetzstein (Leipzig, 1844); the *Golden Necklaces*, a collection of moral sayings which has been frequently translated, e.g. by Fleischer (Leipzig, 1835) and by De Meynard (Paris, 1876). Consult Brockelmann, *Geschichte der arabischen Litteratur*, vol. i. (Weimar, 1898).

ZAMBALE, thäm-bä'lȧ. A peaceable Malay people in middle western Luzon; their speech is called Tino. Their ancestors are said to have been among the earliest immigrants into Luzon. See PHILIPPINE ISLANDS.

ZAMBALES, thäm-bä'lȧs. A province of Luzon, Philippine Islands, situated on the western coast of the island, and bounded on the north by the China Sea, on the east by the Gulf of Lingayen, Pangasinán, Tárlac, and Pampanga; on the south by Bataán and the China Sea; and on the west by the China Sea (Map: Philippine Islands, E 4). Area, including dependent islands, 2210 square miles. Parallel with the shore rise the Zambales Mountains, whose highest peak reaches an altitude of 5453 feet. The rivers are short and unimportant, the roads few and almost impassable during the rainy season. Rice is the most important crop, with small quantities of corn and sugar cane. The live-stock industries are important. There are some mines of copper and coal and numerous mineral springs. The timber resources are extensive and varied. Population, in 1900, 87,295. The Augustinians began work there in 1584, while the Recollets made a formal entry in 1712.

ZAMBEZI, zăm-bē'zĭ *or* zȧm-bā'zē, or ZAMBESI. A large river of Africa, the fourth in size on the continent. It rises on the boundary between Portuguese West Africa and the Congo Free State in latitude 11° S., longitude 24° E., and flows with a general southeastward direction in a great double curve forming the letter S (Map: Africa, G 6). First its course lies within Portuguese West Africa, then on the boundary between that colony and the British colony of Rhodesia, and for a short distance between the latter and German Southwest Africa, after which it traverses Rhodesia, and finally flows through Portuguese East Africa until it empties into the Mozambique Channel in latitude 19° S. Its total length is about 1650 miles. The sources of the river are in a marshy depression of the great plateau, 5000 feet above the sea, and close to the sources of the Kassai, the great tributary of the Congo. The upper course is through a grassy plain which is annually inundated, but after the river has reached the British boundary its valley becomes narrow, and its course broken by falls and rapids. Shortly after turning eastward into Rhodesia it plunges in the great cataract known as the Victoria Falls (q.v.) into a deep transverse rift in the basalt floor, and for the next 30 or 40 miles it rushes through a deep and narrow gorge bounded by forest-covered ridges. For the next 800 miles it is in general a navigable stream, though broken in several places by rapids as it passes through rocky gorges, and obstructed by sandbanks at low water. The last great interruption is the Kebrabasa Rapids in the Portuguese territory, 400 miles from the sea, and from that point to the delta the river is permanently navigable. The delta has an area of several thousand square miles and a coast extension of 100 miles, but the channels are shifting and obstructed by sandbanks. The northernmost arm, Kwa Kwa, passes the port of Quilimane, but the central or Chinde passage is the most accessible. Among the chief tributaries of the Zambezi are the Shire, which drains Lake Nyassa, and the Kuando, which joins the main stream on the boundary of German Southwest Africa. The latter river is also believed to receive water from the Kubango (q.v.) during the wet season, in which case the Kubango becomes the longest tributary of the Zambezi system. Although the total navigable length of the river and its tributaries exceeds 4000 miles, the Zambezi is of little importance as a commercial route, since the navigable portions are broken up into a large number of short stretches separated by rapids, and the river is in general so shallow and obstructed by sandbanks that at low water only small boats can pass. The upper course of the river. was first explored by Livingstone in 1854-55. Consult: *Proceedings of Royal Geographical Society* (London, 1890) ; Coillard, *On the Threshold of Central Africa* (London, 1897).

ZAMBOANGA, thäm'bō-än'gä. A province in the island of Mindanao, Philippine Islands, bounded on the north by Misamis, on the east by Cotabato and Celebes Sea, on the South by Celebes Sea and the Strait of Basilán, and on the west by the Sea of Joló (Map: Philippine Islands, G 13). Its area, including dependent islands, is 3486 square miles. Three peninsulas, inclosing the Dumanquilas and Sibuguey bays, jut into the Celebes Sea. The westernmost of these is traversed by a low range of mountains, whose highest peak is 1752 feet. The climate is the most healthful of the Philippines, with but little variation in temperature and with a pleasant sea breeze. There are few inconveniences during the rainy season. The plain of Zamboanga is the only cultivated portion, where by means of irrigation a little hemp and rice are produced. Gutta-percha is also a product of the province. The southern portion contains the only settlements of note, of which Zamboanga (q.v.) is the capital. The native population is Moro, with a few of the Tagálog and Visayan races. Population, in 1900, 117,503.

ZAMBOANGA. The largest town of the island of Mindanao, Philippine Islands, and the capital of the Province of Zamboanga (Map: Philippine Islands, G 13). The present town, recently built since the American occupation, with a church, fort, and hospital, is surrounded by a plain covered with cocoanut groves and rice fields. It is an important market for hemp, copra, and gutta-percha, and is a general commercial point between the waters of the Celebes and Sulu groups and has regular steamer connection with Manila. Its climate is healthful. The town was settled in 1635 as a military basis against the pirates and Moros. Population, in 1900, 7634.

ZAMIA (Lat., fir-cone left to decay on the tree, from Gk. *ζαμία*, *zamia*, *ζημία*, *zemia*, harm, damage). A comprehensive name for plants of the natural order Cycadaceæ, the species of which are found throughout the tropics. They have a tree-like stem, with a single terminal bud and pinnate leaves. The wood consists of concentric circles, with very loose cellular zones between them. The male and female flowers are on separate plants, in tessellated catkins, the scales of which differ in form in the male and female plants. The central part of the stem contains much starch, especially in old plants, and a kind of sago or arrowroot is made from some of them. The genus Zamia has been divided, the Old World species being mostly embraced in the genera Macrozamia (q.v.) and Encephalartos, the American species still retaining the name Zamia and comprising about thirty species. They are found mainly in Central America, Mexico, West Indies, and Northern South America. The central part of the stem of the kaffir bread tree (*Encephalartos caffer*), of South Africa, which is about 6 to 7 feet high, with a scaly stem, is much used as an article of food by the Kaffirs and Hottentots, who prepare it by wrapping it in a skin well rubbed with grease, burying it until it undergoes putrefaction, bruising it with stones, making it into cakes, and baking it in wood-ashes. There are numerous fossil species

ZAMIA (*Zamia integrifolia*).

of Zamia. Closely allied to it is the fossil genus Zamites. The only common species in the United States is *Zamia integrifolia*, the coontie, which abounds in low grounds in southern Florida. It has short, globular or oblong stems with numerous leaves spreading from their summits. The stems contain much starch, from which the Florida arrowroot is made.

ZAMOJSKI, zȧ-moi′skē̇. One of the most distinguished families of the Polish nobility.—JAN ZAMOJSKI (1541-1605) was born at Skokow, was educated at Strassburg and Padua, and became a leader in Polish affairs. He assisted in the election of Henry of Anjou to the Polish throne (1573) and became grand chamberlain of the King. When Henry returned to France, Zamojski joined the party of Stephen Bâthory, and on the latter's election (1575) became Grand Chancellor. He was commander-in-chief during the war with Russia, 1580-82, and secured favorable terms of peace. On the death of Bâthory, in 1586, he threw his influence in favor of the election of Sigismund III., though he himself might have secured the crown. He rendered his country great services by his defense of the borders against the Turks, the Cossacks, and the Swedes. He died at Zamosc in 1605. He was a munificent patron of literature, and himself wrote *De Senatu Romano* (Venice, 1563) and *Testamentum Joannis Zamori* (Mainz, 1606).—ANDRZEJ ZAMOJSKI, Count (1716-92), was born at Zdiezun, served for a time in the Saxon army, and reached the rank of major-general. On his return to Poland in 1754 he was raised to high offices, becoming Chancellor in 1764. He laid down this post in 1767. He was one of the first nobles to emancipate his serfs. He drew up a code of laws in 1776, the principles of which were incorporated in the Constitution of 1791. He died at Zamosc, February 10, 1792. Consult Mazade, *Le comte André Zamoyski et le marquis Wielopolski, deux portraits* (Paris, 1863).—ANDRZEJ ZAMOJSKI (1800-74) was the grandson of the preceding, and studied at Geneva and Edinburgh. In 1823 he entered the Polish civil service, and in 1831 was Minister of the Interior in the revolutionary Government. After the failure of the patriotic movement Zamojski returned to his estates, carried on an agricultural paper, started a private bank, introduced steam-navigation on the Vistula, and was at the head of a great agricultural association which was regarded with disfavor by the Russian Government, and was suppressed in 1862. Zamojski was banished and went to Paris. He died at Cracow, October 29, 1874.

ZAMORA, thȧ-mō′rȧ. A town in the Province of Zamora, Spain, 130 miles northwest of Madrid, on the right bank of the Duero, which is here spanned by a magnificent fourteenth-century bridge of sixteen pointed arches (Map: Spain, C 2). The interesting old town, situated on the slope of a hill, is picturesquely marked by its church towers. The cathedral is a twelfth-century structure in Romanesque style. La Magdalena, dating from the twelfth century and the golden age of the Templars, and the parish Church of San Pedro and San Ildefonso are worthy of note. The municipal building dates from 1622. The palace of the provincial deputation has an elegant stairway and session chamber with many paintings illustrative of the early history of Zamora. The public hospital is an important structure with interesting Gothic windows. Among the leading manufactures of the city are serges, linens, leather, hats, brandies, and pottery. Its population in 1900 was 16,417. Zamora is of ancient but uncertain origin. It figured in the wars between the Christians and the Mohammedans. It was at times the residence of the kings of Leon and Castile and the meeting place of the Cortes. It was prominent during the War of the Communes.

ZAMOSC, zä′môsch (Russ. *Zamostye*). A district town in the Government of Lublin, Russian Poland, 55 miles southeast of Lublin (Map: Russia, B 4). It manufactures bent furniture. Population, in 1897, 12,400, chiefly Poles.

ZAMOUSE. The West African buffalo (q.v.).

ZAMPIERI, tsäm′pē̇-ā′rē̇, DOMENICO. An Italian painter. See DOMENICHINO.

ZANARDELLI, zä′när-dĕl′lē̇. GIUSEPPE (1826-1903). An Italian statesman, born in Brescia, and educated in law at the University of Padua. He took part in the rising against Austria in 1848-49, and from 1851 to 1858 was a private tutor at Brescia. In 1860 he was elected to the new Italian Parliament at Turin, and from that time he was a prominent liberal member of the Chamber. When the Left first came into power with Depretis (q.v.) in 1876, Zanardelli accepted the portfolio of Public Works, but resigned in November, 1877. He was Minister of the Interior in the Cairola Cabinet from March to December, 1878, and from 1881 to 1883 was Minister of Justice, a post he again filled from 1887 to 1891, and from 1897 to 1898. He became Premier at the fall of Saracco in 1901. He was three times president of the Italian Chamber.

ZAN′CLE. See MESSINA.

ZANDER. See MOVEMENT CURE.

ZANE, EBENEZER (1747-1811). An American pioneer, born in Berkeley County, Va. In 1770 he made the first permanent settlement on the Ohio River (on the site of the present Wheeling), building there a blockhouse called Fort Henry, which was several times attacked by Indians during the Revolution. He owned the land on which the present Zanesville stands, and assisted in laying out the original settlement there.

ZANELLA, zȧ-nĕl′lȧ, GIACOMO (1820-88). An Italian poet and historian of literature, born at Chiámpo. He was educated for the priesthood at the Seminary of Vicenza, and was ordained in 1843. He taught for a time at the Seminary of Vicenza, and then in a lyceum at Venice in 1857. Afterwards he held a similar position at Padua, and from 1866 to 1876 was professor of Italian literature in the university of that city. From that time he devoted himself to literature exclusively. Although not a great poet, he expressed the ideals of national unity and faithfulness to the Church with considerable grace and facility. His literary studies are treatises marked by a pleasing style. His volumes of verse were: *Versi* (1868); *Il piccolo Calabrese* (1870); *Edvige* (1881), collected by Lampertico (1894). His prose works include: *Storia della litteratura italiana* (1880); *Vita di Andrea Palladio* (1880); and *Paralleli letterari* (1885). Consult Biadego, *Saggio bibliografico degli scritti a stampa di Giacomo Zanella* (Lucca, 1888).

ZANESVILLE, zānz'vĭl. The county-seat of Muskingum County, Ohio, 59 miles east of Columbus, at the confluence of the Muskingum and Licking rivers, and on the Baltimore and Ohio, the Zanesville and Ohio River, the Bellaire, Zanesville and Cincinnati, the Cincinnati and Muskingum Valley, and other railroads (Map: Ohio, C 6). It has an attractive situation, flanked by lofty hills, and is well laid out. Among the noteworthy features are the bridges spanning the Muskingum and Licking rivers, the county court-house, city jail, Soldiers' and Sailors' Memorial Hall, and the buildings of the various fraternal organizations. There are six parks. Of the institutions of the city, the most prominent is the Zanesville Athenæum with 12,000 volumes. Zanesville is situated in a section engaged in farming, and having extensive deposits of limestone, clay, and coal. Good water power for manufacturing is derived from both rivers. In the census year 1900 the various establishments had $5,162,067 invested capital and an output valued at $7,468,839. The manufacture of pottery, terra-cotta, and fire-clay products is the leading industry. The Baltimore and Ohio Railroad maintains shops here, and there are also foundries and machine shops, farm implement works, flouring mills, lumber and planing mills, and manufactories of soap and candles, iron and steel, paving material, malt liquors, etc. The government is vested in a mayor, chosen biennially, and a unicameral council. The city solicitor, treasurer, auditor, and the board of public service are elected by popular vote. The board of public safety is appointed by the mayor, subject to the confirmation of the council, or if the council fails to agree to the mayor's appointments, the board is appointed by the Governor of the State. All minor boards are appointed by the mayor. The water-works are the property of the municipality. Population, in 1890, 21,009; in 1900, 23,538.

ZAN'GA. A revengeful Moor in Edward Young's tragedy *The Revenge,* who ruins Don Alonzo by arousing his jealousy. The part was made famous by Macready and John Kemble.

ZANG'WILL, Israel (1864—). A British novelist and man of letters, born of Hebrew parents in London. He was educated at the Jews' Free School, Spitalfields, in the East End of London. He traveled on lecturing tours in Ireland, Holland, Palestine, and the United States. In literature he met with success in the essay, the humorous sketch, the drama, and the novel, especially the novel depicting Jewish scenes and characters. His Jewish studies comprise mainly: *Children of the Ghetto* (1892); *Ghetto Tragedies* (1893); *The King of Schnorrers,* grotesques and fantasies, including "A Rose of the Ghetto" (1894); *Dreamers of the Ghetto,* containing admirable sketches of great Jewish thinkers, as Spinoza and Lassalle (1898); *They that Walk in Darkness* (1899); and *The Mantle of Elijah* (1900). Dramatized by the author in 1899, *The Children of the Ghetto* had a popular reception in New York and London. *The Mantle of Elijah* was also turned into a drama. Some of his essays contributed to the *Pall Mall Gazette* Zangwill collected under the title *Without Prejudice* (1896). Among his other work in fiction and the fantastic sketch are: *The Premier and the Painter* (1888); *The Bachelor's Club* (1891); *The Big Bow Mystery* (1892); *The Old Maids' Club* (1892); *Merely Mary Ann* (1893); *The Grey Wig* (1902). He also wrote a considerable amount of verse. He was a prominent advocate of Zionism (q.v.).

ZANO'NI. A mystical historical novel by Bulwer Lytton (1842). A first sketch, entitled "Zicca," appeared in *The Monthly Chronicle* during the preceding year.

ZANTE, zän'tā *or* zän'te. One of the principal Ionian islands, forming a nomarchy of Greece, situated eight miles south of Cephalonia and nine miles west of the Peloponnesus (Map: Greece, B 4). Area, 277 square miles. The western part of this beautiful island is characterized by chalk mountains reaching a height of about 2700 feet. The eastern part is a rich plain flanked by the peak of Skopos. The island is subject to earthquakes. Its springs of mineral pitch have been known since the time of the ancient Greeks. The soil is fertile. Two-thirds of the area is in vine. Wine, olives, and fruits are exported. Zante is noted for currants, the shipments of which are, however, not so valuable as formerly. The principal import is Russian wheat. The capital is Zante. Since the earthquake of 1893 the island has not regained its former prosperous condition. Population, in 1896, 45,032. In ancient times Bacynthus, as the island was called, was an independent State; became a member of the Confederacy of Delos; passed under the rule of Macedon, and then of Rome; and became identified with the destinies of the Ionian Isles, with which it was annexed to Greece in 1864.

ZANTE. The capital and chief port of the Greek island and nomarchy of Zante (Map: Greece, B 4). It is situated on the eastern shore of the island at the foot of a mountain crowned by a citadel built by the Venetians. It has a good harbor, a custom-house, and an arsenal, and manufactures carpets and gold and silver articles. It shares, however, in the general backward condition of the island. Population, in 1896, 14,650.

ZANTHOX'YLUM (Neo-Lat., from Gk. ξάνθος, *xanthos,* yellow + ξύλον, *xylon,* wood), often spelled *Xanthoxylum.* A genus of trees and shrubs, the type of the natural order Rutaceæ. *Zanthoxylum Americanum,* a North American deciduous shrub or very small tree with ash-like leaves, is common from Canada to Virginia, and is called prickly ash or toothache tree, from the use made of the hot acrid bark and capsules for the relief of toothache. It has also been used in the United States as a remedy for chronic rheumatism. Some of the species are popularly called peppers in their native countries, as in India and Japan, where they are used as a substitute for that condiment. This species is sometimes called Northern prickly ash, to distinguish it from *Zanthoxylum clava-herculis,* Hercules's club, a low-growing tree the bark of which is studded with stout warty prickles, and which is found from Virginia southward. *Zanthoxylum cribrosum,* or *Zanthoxylum floridanum,* as it is better known, occurs in south Florida, the Bahamas, etc., where it is called satinwood. *Zanthoxylum pterota,* another small tree, is found on the Gulf coast in Florida, Texas, Mexico, and in South America.

ZANZIBAR, zăn'zĭ-bär′ *or* zăn'zĭ-bär. A sultanate and British protectorate of East Africa. It consists of the two islands of Zanzibar and Pemba (the latter 30 miles northeast of the former). The island of Zanzibar is traversed by the parallel of 6° S. (Map: Africa, G 4), Their combined area is 1020 square miles; their population in 1902 was estimated at 200,000. (See PEMBA.) The island of Zanzibar, situated about 25 miles east of the coast, is of oblong form and 52 miles long, with an area of 613 square miles and an estimated population of 150,000. The east coast is steep, forbidding, and difficult of access. The region to the west is generally flat and arid, poorly covered with trees, presenting a Karst formation, and characterized by coral stone. West of this portion is the rich, cultivated part of the island, with rows of hills diversified in sections by swamps. It is well watered with flowing streams. The fertile and alluvial soil is composed of coral lime. The west coast is easy of approach. It is supplied with bays with deep water near the shores, which are fringed by islands. The climate is generally favorable, fevers threatening only in the interior. The mean annual temperature is 79.7° F. The flora is equatorial, but not well known. Among the fauna are the civet cat, python, chameleon, and iguana. The fisheries are productive. Agriculture and trade are the leading pursuits. Sugar cane and manioc are raised. Sorghum and red pepper figure prominently. In the clove industry the protectorate leads the world. The cocoa palm flourishes and contributes largely to the exports. Donkeys are raised. Good roads have been constructed. The town of Zanzibar was declared a free port in 1892, and its commerce has steadily risen. It is mostly with Great Britain. In 1902 the port was visited by vessels with a tonnage of nearly 350,000. The exports are largely cloves, rubber, ivory, and copra; the imports, rice, piece goods, and coal. The British administer justice and all other branches of authority, only a shadow of power being left to the Sultan. The army numbers about 1000 men, under British leadership. Zanzibar is the capital. Mohammedanism is the leading religious faith. Christian missionary work is actively progressing. There are only about 200 Europeans on the island of Zanzibar. There is a small and active population from India. Over half of the inhabitants are former slaves from the adjacent coast, who till the fields and do the domestic service. The ancient race is the Mohammedan Wahadimu, who have been forced back into the forbidding coral districts. The sultanate was formerly extensive, comprising other islands and portions of the adjacent mainland. The area was gradually reduced until in 1890 the present limits were settled upon. In that year the British protectorate was declared under treaties between Great Britain, France, and Germany. There is a British Prime Minister, under whom the Sultan stands practically as a Crown pensioner. Slavery was done away with by compensation in 1897. Consult: Newman, *The Transition from Slavery to Freedom in Zanzibar and Pemba* (London, 1898); Fitzgerald, *Travels on the Coastlands of British East Africa* (ib., 1898).

ZAPARO, sȧ-pä'rō. An important group of tribes in Ecuador, constituting a distinct linguistic stock, and occupying the country between the Upper Napo and Pastasa, frequently coming down to the Marañon (Amazon). Their various tribes are continually at war with one another, but unite against a common enemy. They are described as indolent, good-tempered, and hospitable, very hardy, dexterous in throwing the lance, and daring boatmen. The women are pleasing in features and gentle in disposition. They live under roofs raised upon posts and without any other furniture than the hammocks in which they sleep. A few tribes occupy permanent villages and cultivate the ground. Their weapons are the club, lance, and blowpipe with poisoned arrows. Their priests get their inspiration in delirious trances brought on by drinking a sacred liquor. Their language, of which considerable material has been collected, is agreeable in sound and simple in construction. They are variously estimated to number from 10,000 to 20,000.

ZÁPOLYA, zä'pôl-yŏ. An Hungarian royal family of Slavic descent.—STEPHEN ZÁPOLYA, Voviode of Transylvania, was one of the generals of Matthias Corvinus. He took part in the conquest of the Archduchy of Austria, and was made its Governor. He died in 1499.—His son, JOHN ZÁPOLYA (c.1487-1540), Voivode of Transylvania, was elected King of Hungary by the National Party after the death of Louis II. at Mohács in 1526. His rival was Ferdinand of Austria. The claimants to the throne waged war against each other at intervals for several years, John Zápolya being supported by the Sultan Solyman the Magnificent. In 1538 the Treaty of Grosswardein was made, by which the kingdom was divided between them. JOHN SIGISMUND ZÁPOLYA, son of John Zápolya (1540-71), was recognized by Sultan Solyman as King of Hungary, but had to be satisfied with Transylvania and Eastern Hungary. His subjects joined the reformed religion. He was succeeded by Stephen Báthory.

ZAPOTEC, sä'pô-tĕk′. An important ancient cultured nation of Southern Mexico, occupying the greater portion of the present State of Oaxaca, where their descendants still number more than a quarter of a million. With the Mixtec (q.v.), Mazatec (q.v.), and several other tribes they constitute the Zapotecan linguistic stock. They formed an independent State, as highly advanced in civilization as the Aztec, and were sedentary and agricultural, living in villages and cities with houses built of stone and mortar. The great ruins of Mitla (q.v.), among the most remarkable on the American continent, are ascribed to the Zapotec, and according to their own tradition were originally sepulchral in purpose. Their records were kept by means of a hieroglyphic calendar, upon the general plan of that in use among the neighboring nations. The modern Zapotec are intelligent, industrious, and progressive, and have furnished Mexico some of her best leaders, soldiers, and artisans. They still hold to many of their ancient beliefs and rites, among which are the building of memorial cairns and the burial of money with the dead.

ZAPOTLANEJO, sȧ-pōt'lȧ-nä'hō. A town in the State of Jalisco, Mexico, 22 miles east of Guadalajara. Near the town occurred the battle on the bridge of Calderon, January 17, 1811, in which the Royalist Calleja inflicted a crushing defeat upon the revolutionary forces under Hidalgo (q.v.). Municipal population, in 1895, 20,270.

ZARA, zä'rȧ (Slav. *Zadar*). The capital of the Austrian Crownland of Dalmatia, on the coast of the Adriatic, 130 miles southeast of Triest (Map: Austria, D 4). It is built in the form of an oval, on a narrow promontory, separated from the mainland by a moat, across which is a drawbridge. The ramparts afford a fine promenade to the inhabitants. There is a spacious and well-protected though somewhat shallow harbor. The streets generally are narrow and ill paved, and the drainage defective; the town is not well supplied with water. Of its churches, the most noteworthy are its cathedral, founded by Enrico Dandolo, Doge of Venice, and the church of the patron saint, Simeon. There is a lofty marble column, which is all that is left standing of the ancient Roman temple. The commerce of late has shown considerable increase. Many of the inhabitants are engaged in fishing and in the coasting trade. The chief manufactures are rosoglio, maraschino, leather, silk, and linen fabrics. Population, in 1900, 32,506, nearly all Italians. Zara is the Iadera of the ancients. In the Middle Ages Venice and Hungary long contended for the possession of the town, which was a place of commercial importance. In 1202 the Venetians, with the aid of the Crusaders, reduced it, but they subsequently lost it. In 1409 they purchased it from Ladislas, King of Naples, claimant of the crown of Hungary. It subsequently shared the fortunes of Dalmatia (q.v.).

ZARA. The heroine of Congreve's tragedy *The Mourning Bride*, from whose lines in the third act has been derived the proverbial warning, "Hell hath no fury like a woman scorned."

ZARAFSHAN, zä'rȧf-shän'. A river of Russian Turkestan. See Zerafshan.

ZARAGOZA, thä'rȧ-gō'thȧ. A town of Spain. See Saragossa.

ZARATHUSTRA. See Zoroaster.

ZARLINO, zär-lē'nō, Gioseffo (1517-90). An Italian composer and musical theorist, born at Chioggia. In 1537 he became a member of the Franciscan Order, and in 1541 went to Venice in order to complete his studies with Willaert. He became maestro di cappella at Saint Mark's in 1565, and held the position until his death. His extant compositions number only 21. Among these are: *Modulationes* (1566); three *Lectiones pro Mortuis* (1563); and a mass. His theoretical works are: *Istituzioni harmoniche* (1558), in which Zarlino recognizes the natural opposition of the major and minor triads, taken up later by Tartini, and more successfully by Hauptmann, and also gives clear and practical demonstrations of double counterpoint and canon, illustrated by a number of examples in notes; *Dimostrazioni harmoniche* (1571); and *Sopplimenti musicali* (1588).

ZARNCKE, tsärn'ke, Friedrich (1825-91). A German philologist and historian of literature. He was born at Zahrenstorf, in Mecklenburg-Schwerin, and was educated at the universities of Leipzig, Berlin, and Rostock. In 1850 he founded at Leipzig the *Litterarisches Centralblatt für Deutschland*, in 1852 became privatdocent at the university, and in 1858 was made full professor. His contributions to the study of comparative literature were of especial value, notably in the fields of saga and romance. Among the more important of his numerous publications are: *Der deutsche Cato* (1852); *Sebastian Brants Narrenschiff* (ed., 1854); *Das Nibelungenlied* (ed., 1856); *Mittelhochdeutsches Wörterbuch*, with W. Müller (1863); *Ueber den althochdeutschen Gesang vom heiligen Georg* (1874); *Der Graltempel* (1876); *Der Priester Johannes* (1876-79); and *Christian Reuter* (1884).

ZARZUELA, thär'thōō-ā'lȧ. In Spain, a short two-act musical drama of a light order resembling our comic opera or operetta. It is interspersed with a great deal of spoken dialogue. The name is derived from the Spanish town of Zarzuela, where during the seventeenth century the first works of this kind were produced at the royal castle.

ZASLAVL, zȧs-lȧv'ly'. An ancient town of Volhynia, Southwestern Russia, about 80 miles west of Zhitomir. It has extensive sugar mills and paper mills. Population, in 1897, 12,688.

ZASULICH, zȧ-sōō'lēch, Vyera Ivanovna. A Russian revolutionist. Though only an acquaintance of one who was indirectly connected with the revolutionary plot of Nechayeff, she was placed under police surveillance and for several years was sent about from place to place in Eastern Russia. In 1876 she was freed from prison, but the flogging of the student Bogolyuboff by order of General Trepoff, head of the secret police, whom the student refused to salute, aroused her. On February 5, 1878, she called at Trepoff's office and shot him, but not fatally. At her trial on April 12th she claimed that her object was to call the Government's attention to the outrage. The jury, of which eight were governmental officials, two merchants, one a wealthy nobleman, and one a student, unanimously acquitted her. The spectators, mostly of high social standing, met the verdict with loud demonstrations of approval, and the press unhesitatingly commended it. Yielding to public opinion, the Government removed Trepoff, promoting him to the post of general of cavalry. Four newspapers received warning, political offenses were almost entirely exempted from trial by jury, and on June 11th the Supreme Court of Revision canceled the acquittal on the ground of some informality. Zasulich escaped abroad, and has since lived chiefly in Switzerland, taking an active part in the Russian revolutionary propaganda by many articles contributed to the Russian free press as well as to periodicals in Western Europe.

ZDONSKAWOLA, zdōōn'y'-skȧ-vōl'yȧ. A town in the Government of Kalish, Russian Poland, about 40 miles west of Lodz. It has manufactures of cotton and woolen goods. Population, in 1897, 15,934.

ZE'A, or **KE'A** (Lat. *Cea*, from Gk. Κία, *Kia*, Κέως, *Keōs*). The northwesternmost island of the Cyclades, 13 miles east of Cape Colonna. 14 miles in length, and 8 in greatest breadth. Its surface rises from the coast in terraces, culminating in the centre in Mount Saint Elias, about 1700 feet in height. The climate is healthy, and the soil fertile. The products are wine, fruit, barley, cotton, and silk. Attention is paid to the rearing of cattle and silkworms. Population, in 1889, 3863. The island anciently possessed four towns, Iulis, Coressia, Carthæa, and Pœeessa, but there is now only one, *Zea*, situated on the northwest slope of the mountain, about three miles from the coast, on the site of the ancient Iulis. Near it is a colossal lion, and there are other less important remains of the ancient city. A few remains are also still to be found on the sites of the other three ancient towns. Iulis was the native town of the lyric poets Simonides, 'the Cean,' and Bacchylides, and of Prodicus, the famous sophist. The harbor of Zea, Port Saint Nicholas, about three miles from the town, admits the largest vessels, and is well frequented.

ZEA. See MAIZE.

ZEA, sā'ā, FRANCISCO ANTONIO (1770-1822). A Colombian naturalist, author, and statesman, born in Medellin and educated at Popayán and Bogotá. In the latter city he became associated with the Spanish botanist Mutis. While a tutor of natural history in the College of San Bartolomé at Bogotá he was sent to Spain and imprisoned for two years at Cadiz for his political pamphlet *Los derechos del nombre* (1795). He was released on condition that he should not return to his country. Upon the recommendation of Mutis he was well received in scientific circles at Madrid, and was granted a pension to continue his studies in Paris. After his return to Madrid in 1801 he was appointed director of the botanical garden, and assumed the editorship of the *Semanario de Agricultura* (1805) and of *El Mercurio de España*. He was repeatedly refused permission to return to his native country, but finally managed to do so in 1815 as a result of his association with the French. With Bolivar (q.v.) he took an active part in the war of independence, founded the *Correo del Orinoco* (1818), became a member and the president of the first Constituent Assembly at Angostura (1819), and was elected Vice-President of Venezuela and later of the new Colombian republic (1819). In 1820 he was sent to Europe as Minister to England and France, with instructions to negotiate loans in behalf of the new Government. But his unfamiliarity with financial matters made him an easy prey of designing capitalists, and his extravagance was far beyond the means of the infant republic. So ruinous were the terms he made that his credentials were canceled, and he retired to England in disgrace. There he died, at Bath, in 1822. His publications include: *Memoria sobre la quina según los principios de Mutis* (1800); *Las kuinas de la Nueva Granada* (1805); *Descripción del Salto de Tequendama* (1805); and *Colombia Siendo* (1822).

ZEALAND, zē'land, **ZEELAND,** or **SEELAND** (Dan. *Sjælland*). The largest and most important island of Denmark. It lies between the Cattegat and the Baltic, and is separated by the Sound from Sweden, and by the Great Belt from Fünen (Map: Denmark, E 3). Length, 81 miles; extreme breadth, 67 miles; area, 2682 square miles. The surface is low and gently undulating; the coasts, which are rock-bound on the southeast, are indented by bays and fiords, the chief of which is the Roskilde-Isefiord in the north. The rivers are small, the largest being only 50 miles long, but there are several lakes. The island is exceedingly fertile. Agriculture and cattle-breeding are the principal employments. The chief city is Copenhagen (q.v.). Population, in 1901 (including the islands of Möen, Amager, and other neighboring islets), 960,053.

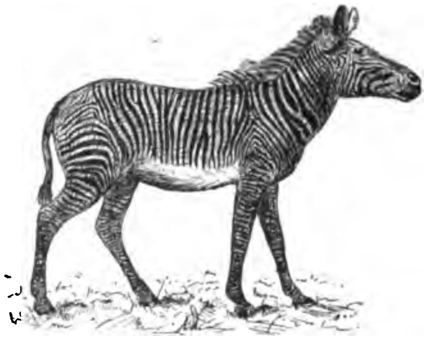
ZEALAND, Dutch **ZEELAND,** zā'länt. A province of the Netherlands, occupying the southwestern region of the country, and bounded by the North Sea on the west and northwest, the provinces of South Holland and North Brabant on the northeast and east, and Belgium on the south (Map: Netherlands, B 3). The Krammer arm of the Meuse River is on the northern border. Zealand consists mostly of islands, embracing Schouwen, Walcheren, Tholen, and North and South Beveland. They are formed by the estuary of the Scheldt, whose wide arms—the Hond or West Scheldt, and the Ooster Scheldt—traverse the province. Area, 690 square miles. Dikes and dunes line the borders of the province. The islands are extremely low, and for the most part farmed. Grain and vegetables are raised. There are oyster fisheries, some manufactures, and a commerce in grain. Population, in 1899, 216,295. Capital, Middelburg. Flushing is in this province.

ZEALOT (Gk. ζηλωτής, *zēlōtēs*, enthusiastic follower, from ζῆλος, *zēlos*, zeal, from ζέειν, *zeein*, to boil, foam). A term applied by Luke (Luke vi. 15; Acts i. 13) to Simon, one of the twelve Apostles, probably to distinguish him from the better known Simon Peter. In the list in Matthew (x. 4) this Simon is called the Canaanæan (Καναναῖος). The two words zealot and Canaanæan are equivalents, the former being simply the Greek translation of the Hebrew term meaning zealous. The Zealots were a more or less closely organized party among the Jews, embracing the more fanatical elements of the population, whose watchword was complete political independence of Roman control. Simon, previous to his discipleship, probably had some connection with this party. The details of their early history are unknown. It was their lawless violence that precipitated the great war with Rome (A.D. 66-70) which resulted in the destruction of the Jewish nation.

ZEBRA (African name). The name in general of all the African striped species of the horse family (Equidæ), of which four species are usually recognized, namely the true or mountain zebra (*Equus zebra*), Burchell's zebra (*Equus Burchelli*), Grevy's zebra (*Equus Grevyi*), and the quagga (*Equus quagga*). The last-named was only partly striped and is extinct. (See QUAGGA.) The 'true' zebra is now nearly extinct. (See EXTINCT ANIMALS.) It was an inhabitant of South Africa, and especially of mountainous districts, where it roved in small bands. It was the smallest of the group, standing a trifle over four feet high at the withers, and had relatively long ears, a comparatively short mane, and a scantily haired tail. Its ground-color was white (brownish on the face), and the stripes were black, and arranged as shown on the Plate accompanying the article Equidæ. Originally abundant in Cape Colony, all that remain of this species are a few carefully protected bands on certain mountains.

The zebra now most often seen in South Africa, and common in menageries, is Burchell's, which the Boers call 'quagga.' It is from two to four inches taller than the true zebra, has shorter ears, a longer mane, and a more hairy tail. Its ground-color is yellowish, its black stripes are differently arranged (see Colored Plate accompanying article Horse) and are absent from the lower legs, and there is no stripe along the spine. It is an inhabitant of the plains, where it gathers in small herds. Never known south of the Orange River, it has now become extinct in the Transvaal, but throughout all the plains-country north and west of that colony is still to be found in large numbers. It has often been semi-domesticated, but never has been made generally useful; and a domestic race of zebras seems impracticable. Many hybrids have been produced between this zebra and both the horse and the ass; but the results are not encouraging. For the interesting phenomena of Ewart's experiments with these hybrids see Hybridity; Telegony.

The third species, Grevy's zebra, inhabits the hilly regions from the Victoria Nyanza north and east to Central Somaliland. It is taller and slimmer than the true zebra, and like it is striped down to the hoofs; but in other respects it more resembles Burchell's. It is distinguished from both, however, by the much greater number of stripes, which are very narrow, deep black, and separated by narrow white streaks; the pattern of striping is its own, also, the transverse black lines reaching much farther across the sides, and the oblique stripes on the haunches being short. These zebras prefer hill-forests and are known in their region as 'mountain' zebras in distinction from the plains-roving Burchell's. Several varieties have been described and named, as Chapman's, Grant's, Selous's, etc., but all seem referable to this single species, which was probably the one called by the ancients *hippotigris*. The habits of all zebras are much the same as those of wild asses or of wild horses; and it is believed that Grevy's zebra comes nearest of all existing Equidæ to some of the more recent extinct horses, as Hipparion. It is, indeed, very difficult to distinguish one of these so-called 'species' from another, or from the 'horses,' except by the variable and transitory external characters. Their flesh is most excellent food, and their hides have value for leather, as well as for making rugs and ornamental articles, and zebra-hunting is an attractive sport. Consequently the race is rapidly decreasing.


GREVY'S ZEBRA.

ZEBRA CATERPILLAR. The larva of a noctuid moth (*Mamestra picta*), named in reference to the colors of the black and yellow striped larva which feeds upon the leaves of many garden fruit-bushes, vegetables, and flowers. The moths issue in May and deposit the eggs for the summer generation. The caterpillars from these eggs mature early in June, and a second generation of moths appears in August, the offspring of which are frequently so numerous as to cause considerable damage to autumnal crops. They hibernate as pupæ. When young the caterpillars feed in companies, but when older separate. They are readily destroyed when young by pyrethrum powder, and later by an arsenical spray.

ZEBRA PARRAKEET. See Parrakeet.

ZEBRA SWALLOWTAIL. A common North American papilionid butterfly, *Iphiclides ajax*. See Swallowtail.

ZEBRA-WOLF. The thylacine. See Dasyure.

ZEBU´, zā-bōō´. One of the Philippine Islands. See Cebú.

ZEBU. See Humped Cattle.

ZEB´ULUN, or **ZEBULON** (Heb. *Zebūlūn*). The tenth son of Jacob and the sixth of Leah (Gen. xxx. 19-20; xxxv. 23). The allotment of the tribe of Zebulun was in the northern part of Palestine (Jos. xix. 10-16), and appears to have reached to the seacoast (Gen. xlix. 13). The tribe, owing to its remote situation, played a minor part in history; its most notable recorded achievement was the support which it furnished to Deborah (q.v.) in the rising against Sisera (Judges iv. 6; v. 14-18). When Tiglath-pileser carried off the northern tribes (II. Kings xv. 29), Zebulun was probably included (cf. Is. ix. 1). The territory of Zebulun was the scene of a part of the early ministry of Jesus (Matt. iv. 13).

ZECHARIAH, zĕk´ȧ-rī´ȧ (Heb. *Zĕkaryāh*, or *Zĕkaryāhū*, Yahweh remembers). A frequent Old Testament name. The most notable of those bearing it are: (1) Zechariah, the son of Jehoiada. He was high priest in the first part of the reign of Joash (q.v.), King of Israel. The Chronicler represents Joash as straying from the true religion upon the death of his mentor Jehoiada; Zechariah rebukes the apostasy, whereupon he is stoned to death in the temple. The Talmud has traditions upon the subject. It has been supposed that Jesus referred to this martyr in Matt. xxii. 35, Luke xi. 51, but these passages clearly refer to another Zechariah, son of Berechiah, who was put to death in the manner indicated immediately before the siege of Jerusalem by the Romans. (2) Zechariah, King of Israel. He was the son of Jeroboam II. (q.v.) and last of Jehu's dynasty. After six months' reign he was assassinated by Shallum, who usurped the kingdom (II. Kings xv. 8-12). (3) Zechariah the Prophet. He was the son of Berechiah, son of Iddo, and one of the prophets who stimulated the rebuilding of the Temple after the return of the Jews from the Exile. He is mentioned along with Haggai in Ezra v. 1, vi. 14, as inciting to the work upon the Temple. The books of Haggai and Zechariah place this prophetic activity in the second year of Darius, B.C. 520 (Hag. i. 1; Zech. i. 1), while Zech. vii. 1 indicates a further activity of the prophet in the fourth year of Darius (B.C. 518). The message of these prophets was effective, but we know nothing further concerning their careers.

As for the book ascribed to Zechariah, there is no doubt concerning the authenticity of the first eight chapters. These well illustrate the condition of the returned exiles. The prophecies of the second year (chap. i.-vi.) begin with a call to repentance (i. 1-6). There follows a series of eight visions (i. 7-vi. 8), fraught with messages of promise and consolation. The first (i. 7-17) represents God's arousing for the building of the Temple and the wall of Jerusalem. The second (i. 18-21) foretells the destruction of Israel's enemies. The third (chap. ii.) reveals the future wonderful growth of the city. The fourth (chap. iii.) presents dramatically the legal rehabilitation of Israel in God's favor in the person of Joshua the high priest, accompanied with a promise of a king. The fifth (chap. iv.) mystically figures the divine grace that is to come through the two anointed men, Joshua and Jerubbabel, the respective priestly and royal leaders of the people. The sixth (v. 1-4) pictures the curse which will miraculously purge the restored community of its sinners. The seventh (v. 5-11) exhibits the removal of the wickedness of the land to Babylonia. The eighth (vi. 1-8) shows the divine accomplishment of judgment upon Babylonia. In the prophecies of the fourth year (chap. vii.-viii.) we have some utterances concerning the observance of fasts. In the ancient prophetic spirit, in reply to an inquiry from certain people concerning the necessity of the fasts connected with the anniversaries of Jerusalem's destruction, Zechariah condemns the godless kind of fasting, and requires instead justice and mercy between man and man (chap. vii.). The prophet took a notable place in the revival of the hopes and work of the Jewish community. His thought was Messianic, over-hopeful indeed in its anticipation of the nearness of the new order of things. But it was the sanguine temperament of these prophets (vii. 3) which reëstablished the new state. Over against a certain crabbedness of imagery in the visions, we find some of the noblest notes of evangelical prophecy in the call to repentance and the discussion of the fasts. The prophet stood under the influence of Ezekiel and Deutero-Isaiah. See ISAIAH.

Chapters ix.-xiv. breathe a different spirit and exhibit another historical environment; accordingly their authorship by the prophet Zechariah is now generally denied. The chief reasons for this are as follows: Chapters i.-viii., despite occasional obscurities, reproduce the historical circumstances of the Return; chapters ix.-xiv. bear no reference to this epoch, but on the contrary indicate periods of very different circumstances, whose details are in general as obscure as those of the genuine Zechariah are clear. There are references to Assyria (a name applied in later times to Syria), Egypt, the Aramean States, and especially to the Greeks (ix. 13) as the militant foes of Judaism, which point to a later period than that of the Persian Empire. The Levites are given a leading place alongside the house of David, and there is a stress laid upon ceremonial holiness, which is rather typical of the reform of Ezra. The prophets are depreciated, a phenomenon characteristic of the later ages, when spiritual activity was in the hands of the scribes and prophets wrote anonymously; in fact, there is a scrupulous anonymity preserved throughout these chapters. An opposition between Jerusalem and Judah is represented, indicating a period when Jerusalem had regained its original political supremacy, a condition which did not ensue until the time of Nehemiah. The last chapters are apocalyptic, a characteristic of thought obtaining from the time of the Exile, to be sure, although chapters i.-viii. are devoid of it. The genuine Zechariah is prosaic in style; the subsequent chapters move in poetic diction. Finally, there is little argument for their authenticity from their present inclusion in the Book of Zechariah, because (as in the case of the Deutero-Isaiah) the simple facts of anonymity and accidental collocation after a work of a known author would tend to their addition to the preceding book. Indeed a comparison of the identical titles of ix. 1, xii. 1, and Malachi i. 1 (which is properly anonymous. See MALACHI) forces the conclusion that these several prophetic sections were so many anonymous publications once grouped together for this very reason; but the third came to be ascribed by mistake to a prophet Malachi, and the first two were then absorbed by Zechariah.

This Deutero-Zechariah may be divided into two sections, ix.-xi. and xii.-xiv. Chapter ix. announces a judgment upon the neighboring nations, the advent of the Messianic King, and Yahweh's interference for the salvation of his people. In chap. x. Yahweh promises to remove the unfaithful leaders of Israel, and himself to take action for the restoration of all Israel. Chap. xi. describes symbolically Yahweh's rejection of the spiritual leaders and his discipline of the people, of whom a remnant is to be saved. Most scholars connect with this section the fragment xiii. 7-9. Chapters xii.-xiii. present an involved and obscure line of events. Judah and Jerusalem are engaged in a dread struggle with the Gentiles, Judah itself being at first arrayed against the capital. Yahweh interferes, and there follows a period of penitent mourning with a purging of the idols and the prophets from the land. In chapter xiv. is given an apocalyptic figure of the last great attack upon Jerusalem, which is at first successful, until Yahweh's personal appearance saves his people. This is accompanied and followed by a transformation of the land of Judah. Finally, all nations are described as going up as worshipers to Jerusalem, a curse resting on those who refuse.

The last three chapters are now generally ascribed to a late post-exilic period. Great uncertainty prevails as to chapters ix.-xi. Some hold to their pre-exilic origin with considerable reëditing; the prevailing view assigns them to the post-exilic age; and many scholars regard the whole appendix as a work of the Maccabæan period. But the problems contained in chapters ix.-xiv. have by no means been satisfactorily elucidated. The Messianic figures of this section are much employed in the Gospels. Consult the general works mentioned in the article Minor Prophets, and Wright, *Zechariah and His Prophecies* (London, 1879); Cheyne, in the *Jewish Quarterly Review*, vol. i. (ib., 1889); Lasane, *Etude sur le livre de Zacharie* (Amsterdam, 1891); Marti, *Der Prophet Zacharja* (Freiburg, 1892); Rubinkane, *The Second Part of the Book of Zachariah* (Basel, 1892); and Perowne, "Haggai and Zechariah," in the *Cambridge Bible for Schools and Colleges* (Cambridge, 1893).

ZEDEKIAH, zĕd'ē-kī'ȧ (Heb. *Sidḳiyyāh*, or *Sidḳiyyāhū*, Yahweh is my vindication). A frequent Old Testament name; especially the last King of Judah (II. Kings xxiv. 17; xxv.; II. Chron. xxxvi. 11 et seq.; Jeremiah, *passim*). At his first capture of Jerusalem (B.C. 597) Nebuchadnezzar deposed King Jehoiachin, carried him away to Babylon, and left as king in his place his uncle Mattaniah, the third of the sons of Josiah, changing his name to Zedekiah. The best part of the people had been carried off into captivity, and Jehoiachin was still the legitimate king to the people, so that Zedekiah's position was a sorry one. Jeremiah openly announces the divine preference for the exiles, and can see no good in the shadow-monarchy of Zedekiah. Upon the withdrawal of the Babylonian army, the neighboring States began a conspiracy against Nebuchadnezzar and attempted to seduce Zedekiah; and within Jerusalem there was a strong party led by fanatical prophets ready to throw off the Babylonish yoke (Jer. xxvii., xxviii.) Zedekiah himself went to Babylon in his fourth year (Jer. li. 59), probably to vouch for his loyalty. But in B.C. 588 he could no longer resist the pressure of the 'Patriots,' and revolted. He still consulted Jeremiah, who, however, resisted all his advances; the latter was finally immured by his enemies, but was released through the favor of the king (xxxii.-xxxviii.). Zedekiah thus appears as a well-meaning but weak man, unfitted for his circumstances. After a valiant defense of a year and a half, Jerusalem was taken by storm. Zedekiah with some followers escaped eastward to the Jordan, but was captured, and carried to the presence of Nebuchadnezzar in Syria, where judgment was given upon him for his treason. His sons were slain before him, his eyes were put out, and he was carried in fetters to Babylon.

ZEDLITZ, tsĕd'lĭts, Josef Christian, Baron (1790-1862). An Austrian poet. He was born at Johannisberg, in Austrian Silesia, and was educated at the gymnasium of Breslau. He served in the army, but resigned in 1809 and devoted himself to literary pursuits. In 1837 he received a position in a department of the Ministry for Foreign Affairs at Vienna, and after 1851 he was in the Austrian diplomatic service. He was one of the leaders of the Romantic movement in Austria. His dramas, such as *Der Stern von Sevilla* (1830), and *Kerker und Krone* (1834) are not of great value, but his lyrics and ballads are characterized by much originality and grace. His most famous work is *Todtenkränze* (1827), a collection of elegies, but many of his best poems are contained in other volumes. such as *Gedichte* (1832) and *Soldatenbüchlein* (1848).

ZEDOARY (Fr. *zédoaire*, Sp., Port. *zedoaria*, from Pers, *zadwār*, *zidwār*, *jadwār*, zedoary). The popular name of certain species of Curcuma (see Turmeric), natives of the East Indies, the root-stocks (rhizomes) of which are aromatic, bitter, and pungent, and are commonly used in the East like ginger. Their use in Europe and America is limited. The round zedoary of the shops is the product of Curcuma Zedoaria and Curcuma aromatica, natives of both India and China, having palmate root-stocks, straw-colored within. Long zedoary is produced by Curcuma Zerumbet, a form of Curcuma Zeodaria, a native of various parts of the East Indies, having long palmate root-stocks, yellow within.

ZEE'LAND. See Zealand.

ZEEMAN (zā'man) **EFFECT.** The name of an interesting phenomenon discovered in 1897 by Dr. Zeeman of the University of Amsterdam. He observed that the spectrum of a source of light was changed by the source being placed in a strong magnetic field. Each line in the original spectrum is split up into several lines, when the source is viewed from a direction at right angles to the lines of magnetic force and also when viewed along the lines, but differently in the two cases. The light in these component lines is polarized also. The great importance of the discovery lies in its bearing upon the ultimate cause of the ether vibrations which produce light. Reference should be made to Zeeman's original papers, which have been translated into English in Lewis, *Effects of a Magnetic Field on Radiation*, "Scientific Memoir Series," vol. viii. (New York, 1900), and to a monograph by Cotton, *Le Phenomène de Zeeman* (Paris, 1900). See Light; Spectroscopy.

ZEILA, zā'lȧ, or **ZAYLAH.** A seaport in British Somaliland, East Africa, near the frontier of French Somaliland (Map: Africa, J 3). It is one of the principal ports of the colony, but its former importance as an outlet for the trade of Abyssinia has been transferred to Jibutil in French Somaliland, which has the advantage of being connected by rail with Harrar. Population, estimated at 15,000.

ZEISBERGER, tsīs'bĕrk-ĕr, David (1721-1808). A Moravian missionary in America, born in Moravia. He was educated in Herrnhut, Saxony, and in 1738 removed to Oglethorpe's colony in Georgia. In 1740 he settled in Pennsylvania, where he became one of the founders of Bethlehem. From 1743 until his death he labored unremittingly among the Indians, and his service has few parallels in the history of the country. He was greatly beloved and trusted by the tribes among whom he lived, and was made a sachem by the Iroquois and adopted by the Monsey-Delawares. His personal influence was the principal factor in restraining the Delawares from joining their former allies during the Revolutionary War. After the massacre of a band of his converts at Gnadenhutten in 1782, he led the rest of his followers into Michigan, thence into Canada, and in 1798 to the Tuscarawas, where the town of Goschen was founded. He published *A Delaware and English Spelling Book* (1776); *A Collection of Hymns for the Christian Indians* (1803), and *Sermons for Children* (1803). Since his death have been published his *Dictionary in German and Delaware* (1887). and *Diary of David Zeisberger, 1781-98* (1888). Consult also

De Schweinitz, *Life and Times of David Zeisberger* (1870).

ZEISSBERG, tsīs'bĕrk, HEINRICH VON (1839-99). An Austrian historian, born in Vienna and educated at the university of that city. He was professor of history at Lemberg (1865-71), Innsbruck (1871-72), and Vienna (1872-97). From 1891 to 1896 he was Director of the Institute for the Study of Austrian History, and in 1896 became Director of the Imperial Library. Among his numerous works were *Die polnische Geschichtschreibung des Mittelalters* (1873), *Der österreichische Erbfolgestreit 1457-1458* (1879), *Quellen zur Geschichte der Politik Oesterreichs* (1882-90), *Zur deutschen Kaiserpolitik Oesterreichs, 1745* (1889), *Belgien unter der Generalstatthalterschaft Erzherzog Karls* (1893-94), *Erzherzog Karl von Oesterreich* (1896).

ZEIST, zīst. A town in the Province of Utrecht, Netherlands, 9½ miles east of Utrecht (Map: Netherlands, D 2). It is the seat of an interesting Moravian community, established here in 1746, which holds property in common and supports a school. Population, in 1899, 8717.

ZEITBLOM, tsīt'blōm, BARTHOLOMÄUS (c. 1460-c.1517). A German painter, the chief master of the school of Ulm, where he is on official record from 1484 to 1517, and painted principally panels for carved altar-pieces. He was the pupil and son-in-law of Hans Schuelein, but seems to have developed under the influence of Schongauer. His principal works, distinguished by the clearness and vigor of their coloring, include the altarpieces from the churches at Hausen (1488) and Heerberg (1497), both in the Collection of Württemberg Antiquities at Stuttgart; four panels with "The Two Saint Johns," the "Annunciation" and "Visitation," in the Royal Gallery, ib.; the great altar-piece with "Scenes from the Passion" and the "History of Saint John the Baptist," in the theological seminary at Blaubeuren; four panels with the "Legend of Saint Valentine," in the Augsburg Gallery; an admirable "Pietà," in the Germanic Museum at Nuremberg; and the "Handkerchief of Saint Veronica," in the Berlin Museum.

ZEITOUN, zȧ-tōōn'. A town of Asiatic Turkey, in the Vilayet of Aleppo, in the eastern Taurus range, 20 miles northwest of Marash (Map: Turkey in Asia, G 4). It is built in a deep gorge surrounded by inaccessible crags, and is inhabited almost exclusively by Armenian Christians, who have made the town famous for having maintained its practical independence of Turkey up to recent times. It was only in 1878 that the Turkish Government succeeded in investing the town and built a fort commanding the position. Even since that year there have been several revolts, the most notable being on the occasion of the Armenian massacres in 1895, when the intervention of the Powers secured honorable terms for the inhabitants. Population, variously estimated at from 5000 to 17,000.

ZEITZ, tsīts. A town of the Province of Saxony, Prussia, 23 miles south-southwest of Leipzig, on the right bank of the White Elster (Map: Prussia, E 3). There are manufactures of cotton, machinery, perambulators, soap, woolens, sugar, bicycles, furniture, pianos, hosiery, and gloves. In the neighborhood are extensive mineral-oil works. Population, in 1895, 24,834; in 1900, 27,389.

ZELKOVA. See PLANER TREE.

ZELL, tsĕl, MATTHÄUS (1477-1548). The first Protestant preacher of Strassburg. He was born in Kaisersberg, studied at Erfurt and Freiburg, and became preacher at Strassburg in 1518. He supported the Reformation, and, when forbidden by the ecclesiastical authorities to occupy the pulpit, preached in the street. Consult his biography by Erichsen (Strassburg, 1878).

ZELLER, tsĕl'lĕr, EDUARD (1814—). A German theologian and historian of philosophy, born at Kleinbottwar, in Württemberg. He studied theology at Tübingen and Berlin, and became privat-docent at Tübingen in 1840. His call to a theological chair at Bern in 1847 was the occasion of fierce controversy and opposition from the orthodox. In 1849 he accepted a chair at Marburg; in 1862 became professor of philosophy at Heidelberg, and in 1872 at Berlin. In 1894 he retired from active professional work and settled at Stuttgart. His principal work is *Die Philosophie der Griechen* (1844-52). Parts of the work have appeared in a fifth edition; others in a fourth; the rest in a third (Eng. tr. of almost the whole work, London, 1881 et seq.). His other works are the notable book on the Acts of the Apostles (1854), *Das theologische System Zwingli's* (1853), his essays (1865-84), his edition of the works of D. F. Strauss (1876-78), and *Geschichte der deutschen Philosophie seit Leibniz* (1872). His early philosophical works were dominated by the Hegelian spirit, but later he broke away and in 1862 demanded a return to Kant. As an historian of Greek philosophy he is unexcelled.

ZELLER, zĕl'lȧr', JULES SYLVAIN (1820-1900). A French historian, born in Paris and educated at the University of Paris and in Germany. He taught history at Rennes, Bordeaux, and Strassburg, in 1854 was appointed professor of history at Aix, in 1858 in the Ecole Normale at Paris, and shortly afterwards to a position in the Sorbonne. In 1863 he became Duruy's successor as professor of history in the Polytechnic School and in 1870 rector of the Strassburg Academy. From 1876 to 1888 he was general superintendent of higher education in France. He was a voluminous, but not a particularly accurate or well-balanced, historian. His publications include *Ulric de Hutten* (1849); *Les empereurs romains* (1863); *Entretiens sur l'histoire* (1865-69); *Les tribuns et les révolutions en Italie* (1873); and *Histoire de l'Allemagne* (1872-91), his most important work.

ZELLER, tsĕl'lĕr, KARL (1842-98). An Austrian composer, born at Sankt Peter in der Au, Lower Austria, and pupil of Sechter in Vienna, where he also studied jurisprudence and, after being employed in several courts of justice, was appointed councilor in the Ministry of Public Instruction. His comic opera *Jaconde* (1876) and the operettas *Kapitän Nicol, Der Vagabund, Der Vagelsteller*, and *Der Obersteiger* all met with signal success. Among numerous songs and choruses may be noted "Das Kölnische Narrenfest" and "Die Thomasnacht," both for soli, male chorus, and pianoforte.

ZELTER, tsĕl′tĕr, Karl Friedrich (1758-1832). A German composer, born in Berlin. He studied music with Kirnberger and Fasch and became the leader in Rellstab's Liebhaber-Concerte. From 1877 he assisted Fasch in conducting the Singakademie, and in 1800 succeeded him. In 1807 he organized a school for orchestral practice, and two years afterwards the Berlin Liedertafel, the first of its kind, for which he composed nearly one hundred male choruses, many of which have continued popular to this day. He also founded—in 1819—the Royal Institute for Church Music, of which he was director until his death. Goethe and he were close friends, and their correspondence, *Briefwechsel zwischen Goethe und Zelter in den Jahren 1796-1832,* was edited by Riemer (Berlin, 1833-34). Felix Mendelssohn was among his pupils. He also wrote the *Life* of Fasch (1801). He is a composer of national importance because of his songs and male choruses. For his biography consult Rintel (Berlin, 1861).

ZEMINDAR, zĕ-mĕn′där (Hind. *zamindār,* from Pers. *zamīn,* land + *dār,* to hold, possess). The title given in India from Mohammedan times to the landlords who held property as a fief from the Government or from a superior lord. Under Mohammedan rule the zemindars were looked upon as collectors of revenues from the ryots, or cultivators in large towns and districts, and as answerable to the authorities, from whom they received a commission of ten per cent. besides other emoluments during the good discharge of their duties. In the course of time their office became practically hereditary and their fiefs came to be regarded as their own property, and they often rose to the position of chiefs, governors, and princes. Under the British Government the zemindar system of tax collection was continued in Bengal, Behar, Orissa, and Madras.

ZENANA, zĕ-nä′nȧ (Pers. *zanānah,* feminine, seraglio, from *zan,* woman; connected with Gk. *γυνή, gynē,* Skt. *gnā,* woman, and ultimately with Eng. *queen*). The name applied in India to the women's quarters. In Bengal, where is the typical zenana, the dwelling consists of two houses built each round its own court. The one on the street is occupied by the men. In the rear building, which contains the zenana, the first floor is for cow-sheds, storage, and cook rooms; above are cells, 10 to 12 feet square, each having a door and a small grated window opening upon piazzas, which, in one, two, or three tiers, surround the inner court. The surroundings and conditions are generally miserable when judged by Western standards, and it has been the special object of the Zenana Mission in India, since 1855, to ameliorate gradually the zenana system and to advance the condition of Hindu women, whom Oriental custom thus secludes within the walls of the seraglio.

ZEND-AVES′TA. See Avesta.

ZENG′ER, John Peter (c.1680-1746). An American publisher. He was born in Germany, came to New York about 1700, and there entered the printing business. In 1733 he began to publish the *New York Weekly Journal,* which he made the organ of the popular party in the colony. So much did the Government feel his attacks that it was resolved in Council that certain numbers of his papers and two ballads should be burnt by the hangman, while he was arrested on a charge of libel and was imprisoned for about eight months. His friends employed to defend him Andrew Hamilton (q.v.), the eminent barrister from Philadelphia. In the trial the defense admitted the fact of publication, but maintained that since the statements were true there was no libel. The Chief Justice, who presided, contended, however, that "you cannot be permitted to give the truth of a libel in evidence." Hamilton, on the other hand, asserted that the jury had the right to determine both the law and the fact. The result was that the jury, which was imbued with popular opinion on the matter, gave a verdict of not guilty. This triumph of freedom of the press has been termed "the morning star of that liberty which subsequently revolutionized America." Consult Rutherfurd, *John Peter Zenger* (New York, 1904).

ZENGER, tsĕng′ĕr, Max (1837—). A German composer, born at Munich. He studied with Stark in his native city, and at the Conservatory of Leipzig. In 1868 he became kapellmeister at Regensburg, and in 1869 was appointed musical director of the Royal Opera in Munich. In 1878-85 he was conductor of the Munich Oratorio Society, and also of the Academische Gesangverein and choral society in the Royal School of Music. His works include the operas *Die Foscari* (1863); *Ruy Blas* (1868); and *Wieland der Schmied* (1880); an oratorio, *Kain* (after Byron, 1867); a secular cantata, *Die Heinzelmännchen,* for mixed chorus and orchestra; music to Goethe's *Faust* (first part, 1887; second part, 1895); a symphony; a Missa Solemnis, a Stabat Mater, and other church music; some chamber music, besides choruses for male and mixed voices, and many songs.

ZENITH (OF. *zenith, cenith,* Fr. *zénith,* from OSp. *zenith,* Sp. *zenit,* zenith, from Ar. *samt,* way, from *samata,* to pursue one's way, especially *samt al-ra's,* zenith, way of the head). The name given to that point of the heavens which is directly overhead. A term defined in astronomy as that point of the celestial sphere where it would be pierced by a plumb-line produced indefinitely upward at the place of observation. It is the opposite of nadir (q.v.).

ZENITH TELESCOPE. An instrument especially adapted for the measurement of small differences in the zenith distances of celestial objects. It consists of a vertical column revolving about a vertical axis and carrying a horizontal axis, to one end of which the telescope is attached and to the other a weight to counterpoise the telescope. To this horizontal axis is also attached a striding level. The vertical column carries also a vernier and a clamp. The distinctive features of the instrument are a spirit level and a micrometer. The spirit level is attached by means of a pivot and a bar to the telescope and at right angles to the horizontal axis so that it is free to move in the plane of the telescope and consequently may be inclined to the optical axis at any angle, read off by means of a vernier attached to the bar carrying the spirit level. When the bubble of the level is in the middle of the tube, this circle, graduated from 0° to 90° in each direction, will give the zenith distance of the star toward which the telescope is directed. The micrometer consists of one or more movable threads carried by a single micrometer screw with a graduated head reading to the required accuracy.

The zenith telescope was invented by Captain Andrew Talcott, of the United States Engineers (1834), to carry out practically the principle that when the meridian zenith distances of two stars (one north and the other south of zenith), at their upper culminations, are equal, the colatitude is the mean of their north polar distances. This method of finding the latitude is known as Talcott's method. Since two stars having exactly the same meridional zenith distance can rarely be found, two having nearly the same are selected. Refraction is consequently almost eliminated. The telescope is first pointed to the star which first comes to the meridian, and the spirit level is set horizontal. As the star passes the field of view its distance north and south of the central horizontal wire is measured by the micrometer. The instrument is then revolved 180° and the second star observed in the same manner. In revolving the instrument care must be taken that the angle between the level and the telescope is not disturbed. The latitude is then given by the formula

$$\phi = \left(\frac{\delta_s + \delta_n}{2}\right) + \left(\frac{\zeta_s - \zeta_n}{2}\right).$$

where δ_s and δ_n are the declinations of the two stars; and $\zeta_s - \zeta_n$, the difference of their zenith distances, determined by the micrometer measurement. Consult Chauvenet, *Spherical and Practical Astronomy* (Philadelphia, 1863).

ZENJAN, zĕn-jän′. A town of Persia. See ZINJAN.

ZENKER, tsĕṉ′kĕr, FRIEDRICH ALBERT VON (1825-98). A German physician, celebrated for his discovery of trichiniasis (q.v.). He was born in Dresden, and was educated in Leipzig and Heidelberg. Attached to the city hospital of Dresden in 1851, he added, in 1855, the duties of professor of pathological anatomy and general pathology in the surgico-medical academy of that city. In 1862 he became professor of pathological anatomy and pharmacology at Erlangen. Three years afterwards he assumed with Ziemssen the editorship of the *Deutsches Archiv für klinische Medizin*. In 1895 he retired from active service. His important discovery of the danger of trichinæ dates from 1860. In that year he published *Ueber die Trichinenkrankheit des Menschen* (in vol. xviii. of Virchow's *Archiv*). This was followed by *Beiträge zur normalen und pathologischen Anatomie der Lunge* (1862); *Ueber Staubinhalationskrankheiten der Lungen* (1866); *Die Krankheiten des Oesophagus* (in vol. vii. of Ziemssen's *Handbuch der speziellen Pathologie und Therapie*, 1877).

ZE′NO (Lat., from Gk. *Ζήνων*, *Zēnōn*) (c.488 B.C.-?). An Eleatic philosopher, born at Elea (Velia), a town of Lucania in Southern Italy. He was a favorite pupil of Parmenides. At the age of forty he accompanied his master to Athens, where he resided some time and numbered among his pupils Pericles and Callias. Tradition says that after his return to Elea he joined a movement to deliver the city from the tyrant Nearchus, and when the attempt failed, he was captured and put to torture. Of this, however, the evidence is not satisfactory. As a follower of Parmenides he supported his doctrines by indirect demonstration, in which he attempted to point out that belief in the real existence of changing phenomena led to contradiction. He tried to establish the truth of the unity of being by showing that the hypotheses of motion, multiplicity, and sense have inherent contradictions. To the real existence of motion he objected that motion cannot begin, because the moving body cannot arrive at any place from that in which it is until it has passed through the unlimited number of intermediate spaces. Now, as it is at any given moment in a particular place, it cannot leave that position, therefore the flying arrow is in reality at rest. His second argument was the famous proof that Achilles cannot overtake the tortoise because at any moment he only reaches the place previously left by the tortoise; his other arguments are similar. He likewise argued against the reality of space, for, if all that exists were in a given space, that space itself would be included in another space, and so on without limit. Against sense perception he said that if a measure of grain in falling produced a sound, every single grain and smallest fraction thereof must produce a sound; but if the latter be not true, then the whole measure, whose effect can be nothing but the sum of the effects produced by its parts, can produce no sound. Zeno's arguments against the reality of motion were answered by Aristotle in his *Physics*, but the argument still had considerable influence on the development of metaphysics in the latter period. Consult: Ritter and Preller, *Historia Philosophiæ Græcæ* (8th ed., Gotha, 1898); Zeller, *Philosophie der Griechen* (4th ed., vol. i., Leipzig, 1900); also, Zeller's *Pre-Socratic Philosophy*, vol. i. (New York, 1881); Ueberweg, *History of Philosophy*, vol. i. (New York, 1887).

ZENO (4th and early 3d century B.C.). The founder of Stoic philosophy, born at Citium, in the island of Cyprus. The exact date of his birth is unknown, as is that of his death, but he is said to have lived to a great age. He was the son of a merchant, and was himself engaged in trade during the earlier part of his life, but according to tradition a shipwreck caused him to reside for a time at Athens, where the works written by the disciples of Socrates in regard to their master filled him with admiration, and he joined himself as pupil to Crates the Cynic. His earliest writings according to tradition contained much that savored of the harshness and bluntness of the Cynic doctrine. Failing to find sufficient satisfaction from Cynic philosophy, he turned to the Megarian Stilpo, from whom he learned the art of disputation, and later to Xenocrates and Polemo of the Academy. Not long after B.C. 310 he founded his own school in the Painted Porch (*Ποικιλη Στοά*), where, according to Apollonius, he taught for fifty-eight years. Diogenes Laertius mentions a number of works by him, no one of which has been preserved. He and his followers strove to realize the virtuous wise man for whom the idealized Socrates was a model. The ethics of the school, which were strongly influenced by Cynicism, were most productive in that they discriminated carefully between what was simply right and good and what was agreeable. Their physics were strongly influenced by Pythagoras and Heraclitus. The Athenians held Zeno in great regard during his life, and after his death honored him with a tomb built at public expense and a bronze monument because of the temperance and virtue which he had shown in his own life as well as teachings. Consult: Ritter and Preller, *Historia Philosophiæ Græcæ* (8th ed., Gotha, 1898); Zeller, *Philosophie der Griechen*, vol. iii. (3d ed., Leipzig, 1880); Zeller, *Stoics, Epicureans, and Sceptics* (London, 1870); Ueberweg, *History of Philosophy*, Eng. trans. (New York, 1887); and Wachsmuth, *De Zenone et Cleanthe* (Göttingen, 1874).

ZENO (426-491). Byzantine Emperor from 474 to 491. He was a native of Isauria. By his marriage with Ariadne, daughter of Leo I., he acquired a powerful position in the Empire as leader of the Imperial guard and the Asiatic troops. In 474 he became regent for his son Leo, after the death of his father-in-law, and in the same year Emperor through the death of his son. In 475-477 he was engaged in repressing the rebellion led by Basilicus, his wife's uncle. At first he was driven from Constantinople, but finally won the victory with the help of the Ostrogoths, whom, however, he was subsequently obliged to fight, until, in 488, he persuaded Theodoric to leave the Eastern Empire for the conquest of Odoacer in Italy. His reign was notable for the peace which he made between the orthodox party and the Monophysites by means of the so-called 'Henoticon' of 482.

ZENO, zā'nō, Apostolo (1668-1750). An Italian poet and historian of literature. He was born at Venice, where he first came into notice as a writer of melodramas. With Maffei and Vallisnieri he founded, in 1710, the first Italian critical journal, the *Giornale de' letterati d'Italia*. He went to Vienna in 1718 at the invitation of Charles VI. as Court poet, and remained there till 1729, when he returned to Venice. He was a prolific writer of melodramas and as an opera librettist did clever work. His dramas were published in 1744 by Gozzi. As a literary historian and bibliographer he did work of more value, as exemplified by *Compendio del vocabolario della Crusca* (1705); *Istorici delle cose veneziane* (1718-22); and *Dissertazioni istorico-critiche e letterarie agli istorici italiqni* (1752-53), which was his chief work. Consult Negri, *Vita di Apostolo Zeno* (Venice, 1816).

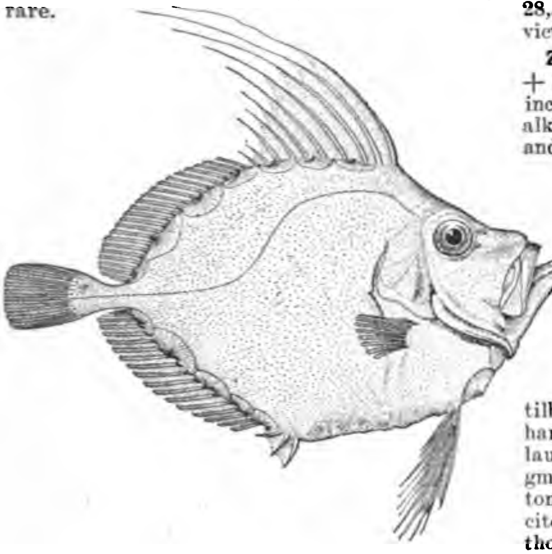
ZENO, Niccolò and Antonio. Two Venetian navigators and adventurers of the fourteenth century. They came of a rich patrician family and late in the fourteenth century (probably between 1375 and 1380) went on a voyage into the North Atlantic, where they were wrecked, and remained for some time on the island of 'Frislanda,' probably one of the Faroe group, although believed by some to be Iceland. They are said also to have visited Engroneland (Greenland). While in the north they met a sailor, who told them a story of having been driven far to the westward to an island where dwelt a civilized people who possessed Latin books and could not speak the Norse tongue. Their country he called Estotiland, variously claimed to be Labrador, Newfoundland, and New England. Farther to the south, he said, lived tribes of cannibals, and still farther people who had great towns and splendid temples. Niccolò died in the north about 1391, and Antonio returned to Venice carrying with him an account of their own voyages and the story they had been told by the sailor, together with a map which they had constructed of the regions mentioned. The manuscript and the map lay unnoticed in the family palace in Venice until 1558, when a descendant collected them and published them under the title, *Dei Commentarii del Viaggio*. The whole question of the Zeno brothers' voyages, the location of Frislanda, the truth of their stories, and the authenticity of their map, has been the subject of much discussion. Consult: Forster, *Geschicte der Entdeckungen im Norden* (1794, Eng. trans.); Zuola, *Dissertazione intorno ai viaggi e scoperte settentrionali di Nicolò e Antonio Fratelli Zeni* (1808); *The Voyages of the Venetian Brothers, Nicolò and Antonio Zeno* (1873), edited by Major, for the Hakluyt Society; and Winsor, *Narrative and Critical History of America*, vol. i. (Boston, 1889).

ZENO'BIA (Lat., from Gk. Ζηνοβία). Queen of Palmyra. She was the wife of Odenathus, lord of Palmyra, who had been recognized in A.D. 264 as king and *imperator* in the East by the Roman Emperor Gallienus (q.v.), and whose sway extended over almost all the eastern provinces. In 267 Odenathus and his son Herodes were murdered, and a younger son, Vahballathus, succeeded his father, though the actual government was in the hands of Zenobia, who ruled as an independent sovereign, caring little for the Roman emperors, with whose armies she repeatedly came into conflict. She even attempted to establish her dominion in Egypt, but in this she failed. When Aurelian came to the throne in 270, he at first continued to recognize the title and rights of Vahballathus, and even permitted Zenobia to assume the title of *Augusta*. In 271 Vahballathus died, and Zenobia continued to rule, in the name of her two younger sons. Attempting to extend her power over Asia Minor, she drew upon herself the anger of Aurelian, who marched against her with a large army and, after twice defeating her troops, besieged her in Palmyra (early in 272). Her hopes of being relieved by the Persians and Arabians being disappointed, she attempted to escape by flight, but was captured (spring of 272). Before the conqueror her courage failed, and she saved her own life by imputing the blame of the war to her counselors, especially the celebrated Longinus (q.v.), who was accordingly put to death. Zenobia was led in triumphal procession at Rome, and was presented by her conqueror with large possessions in the Villa of Hadrian, near Tibur (Tivoli), where in the society of her two sons she passed the rest of her life. She was a woman of great courage, high spirit, and striking beauty. With purity of morals in private life, she combined prudence, justice, and liberality in her administration. Her literary acquirements were considerable; she spoke Latin and Greek, as well as Syriac and Coptic.

ZENOBIA, OR THE FALL OF PALMYRA. A powerful historical romance by William Ware (1836) in the form of letters, originally contributed to the *Knickerbocker Magazine*, New York.

ZENO OF SI'DON (c. 150-c.78 B.C.). An Epicurean philosopher, and after about B.C. 100 leader of the school. In his old age both Cicero and Philodemus were his pupils at Athens. Several of the latter's writings, recovered at Herculaneum, give us the best idea of Zeno's attitude that it is possible to possess in default of his works. His additions to Epicurean philosophy concerned the nature of inductive reasoning. Cicero confirms this by his reference to him in *De Natura Deorum*, where he calls him one of the most logical of the Athenian philosophers.

ZENOPSIS (Neo-Lat., from Gk. *Ζην-*, *Zēn-*, stem of *Ζεύς*, *Zeus*, Zeus, Jupiter + *ὄψις*, *opsis*, appearance). A genus of small pelagic, silvery fishes of the John Dory family (Zeidæ), naked except for several bony and spinous bucklers. The single species known (*Zenopsis ocellatus*) inhabits the North Atlantic, and is excessively rare.



ZENOPSIS OCELLATUS.

ZE′NOS, Andrew Constantinides (1855—). An American biblical and classical scholar, born of Greek parents in Constantinople. He was educated at Robert College in his native city and at Princeton University. He was pastor of the Presbyterian Church at Brandt, Pa., in 1881-83, and afterwards held chairs at Lake Forest University, Hartford Theological Seminary, and the McCormick Theological Seminary, Chicago, where he became professor of biblical theology in 1894. He issued an edition of Xenophon's *Anabasis* (1888, with F. W. Kelsey), a translation of Socrates's *Ecclesiastical History* (1890), and is the author of *Elements of Higher Criticism*, and a *Compendium of Church History* (1896).

ZEN-SHIU, zĕn-shōō′ (Sinico-Japanese, from Chin. *ch'aan-tsung*, from *ch'an*, from Skt. *dhyana*, contemplation, meditation + Chin. *tsung*, school, sect). The Japanese name of a Buddhistic sect, founded in China in A.D. 520 by Bodhidharma, the twenty-eighth Indian and the first Chinese Buddhist patriarch, and in one development of Bodhidharma's doctrines introduced into Japan in 729, and in another in 1168. Those who belong to this school are known as 'Quietists' because their way of attaining to the degree of enlightenment that leads to Nirvana consists not in good works, but in 'fixed contemplation.' "Look carefully within and you will find the Buddha," is the central idea of the system. Bodhidharma himself is said to have sat gazing at a wall in this form of introspection for nine years, until his lower extremities rotted off. There are three principal divisions of the Zen-shiu in Japan—the Rin-zai, Soto, and Obaku. In 1897 their temples numbered 20,824. For the Chinese features of the sect consult Edkins, *Chinese Buddhism* (London, 1880), and for the Japanese, Bunyiu Nanjio, *A Short History of the Twelve Japanese Sects* (Tokio, 1887), and Griffis, *The Religions of Japan* (New York, 1895).

ZENTA, zĕn′tŏ. A town in the County of Bács-Bodrog, Hungary, on the right bank of the Theiss, 120 miles south-southeast of Budapest (Map: Hungary, G 4). Population, in 1900, 28,588, mostly Magyars. It is celebrated for the victory of Prince Eugène over the Turks in 1697

ZEOLITES (from Gk. *ζέειν*, *zeein*, to boil + *λίθος*, *lithos*, stone). A family of minerals including hydrated silicates of alkalies or alkaline earths, usually also containing aluminum and sometimes magnesium. They are all soluble in acids, and most of them gelatinize in acids in consequence of the silica being liberated. Zeolites are all secondary minerals and are found largely in cavities and fissures in basic igneous rocks such as basalt, diabase, etc., and less frequently in granite and gneiss. According to Dana, they may be divided into six groups as follows: mordenite group, including ptilolite and mordenite; heulandite group, including heulandite, brewsterite, and epistilbite; phillipsite group, including phillipsite, harmotome, stilbite, gismondite, laumontite, and laubanite; chabazite group, including chabazite, gmelinite, levynite, analcite, faujasite and edingtonite; natrolite group, including natrolite, scolecite, mesolite; and thomsonite group, including thomsonite and hydronephelite. The zeolites are quite soft, ranging from 3.5 to 5.5 on the scale of hardness. Several of them, including natrolite and thomsonite, take a fine polish, and have occasionally been cut as gems, especially in the form of initials. When heated by means of the blowpipe, the zeolites swell up or boil.

ZEPH′ANI′AH (Heb. *Ṣĕphanyāh* or *Ṣĕphanyāhū*, Yahweh hides or defends). The prophet whose work is contained in the ninth book of the Minor Prophets. Nothing is known of him personally except that he was the descendant in the fourth generation of Hezekiah, and, since this name is not common, it has been supposed by some, without distinct historical warrant, that this Hezekiah was the King of Judah. Zephaniah is said to have prophesied in the reign of Josiah, King of Judah (c.639-608 B.C.). From the allusions to political events and social conditions in the book it appears that the prophet's activity must have fallen before the Reformation in Josiah's eighteenth year. (See Josiah.) The book may be divided into three parts: (a) Chapter i., containing an announcement of a general destruction of the world, which, however, is directed more particularly against the idolaters and apostates in Jerusalem and Judah. (b) In the second part (ii. 1-iii. 7) the prophet urges to repentance as the only means of escaping the threatened doom, which will bring destruction also to the Philistines, to Moab, Ammon, Ethiopia, and even to Assyria.

Turning again to Jerusalem he dwells upon the evils found therein, especially the corruption of her judges and great men. (c) The third part (iii. 8-20) is of a conciliatory character. The purified 'remnant' will dwell in safety in their own land, and a blissful future is in store for both land and people after the reproach now resting upon them shall have been removed. The authenticity of the book has been questioned, and it at least shows traces of editing long subsequent to the period with which it deals. The language is forcible and picturesque, and the contrast between the sombre tone of the first two chapters and the buoyant one of the last is striking evidence of the writer's mastery of style. Consult, besides the works mentioned in the article MINOR PROPHETS: Strauss, *Vaticinia Zephaniæ* (Berlin, 1843); Schwally, in *Zeitschrift für alttestamentliche Wissenschaft* (1890); Budde, "Die Bücher Habakkuk und Sephanja," in *Studien und Kritiken* (1893); Davidson, "Nahum, Habakkuk, and Zephaniah," in the *Cambridge Bible for Schools and Colleges* (Cambridge, 1896).

ZEPHANIAH, APOCALYPSE OF. See APOCRYPHA, section *Old Testament.*

ZEPHAROVICH, tsä'fȧ-rō'vĭch, VICTOR VON (1830-90). An Austrian geologist and mineralogist, born in Vienna. He studied in Vienna and at the mining academy of Schemnitz, Hungary, was employed as section-geologist in the Imperial Geological Institution in Vienna in 1852-57, then was appointed professor of mineralogy in the University of Cracow, in 1861 at Gratz, and in 1864 at Prague, where he established a mineralogical institute (1880). He made valuable contributions to mineralogy and crystallography. His works include: *Mineralogisches Lexikon für das Kaisertum Oesterreich* (1859-72), and *Krystallographische Wandtafeln für Vorträge über Mineralogie* (1877).

ZERAFSHAN, zĕr'ȧf-shän', or ZARAFSHAN ('gold distributor'). A river of Russian Turkestan. It rises at the foot of an enormous glacier in one of the Pamir (q.v.) valleys on the western boundary of Ferghana, and flows westward through the Territory of Samarkand into Bokhara. Here it is diverted into so many irrigating canals that it is completely used up and lost in the desert before reaching the Amu Darya, of which it would otherwise be a tributary. It is about 400 miles long, and the cities of Samarkand and Bokhara lie on or near its banks.

ZERAM', *Port. pron.* zȧ-räN'. An island of the Dutch East Indies. See CERAM.

ZERBINETTE, zâr'bē'nĕt'. The daughter of Argante in Molière's *Fourberies de Scapin.* She is stolen by gypsies and is ransomed by Scapin, who adopts every questionable means to raise the necessary sum.

ZERBST, tsĕrpst. A town of the Duchy of Anhalt, Germany, 68 miles southwest of Berlin, on the river Nuthe, a tributary of the Elbe (Map: Germany, E 3). Close by is the beautiful ducal castle, built in the seventeenth century, containing the archives of Anhalt from 941 on. The Church of Saint Nicholas, begun in the eleventh century, is a fine specimen of Gothic architecture. The chief manufactures are articles in gold and silver, and silk, wax, soap, machinery, chemicals, stoneware, and carriages. There are breweries famous for their bitter beer. Population, in 1900, 17,094. Zerbst is of Slavic origin. The town dates from 1007. From 1603 to 1793 it was the capital of the Principality of Anhalt-Zerbst.

ZERDA. See FENNEC.

ZERMATT, tsĕr-mät'. A celebrated mountain resort in the southern part of the Canton of Valais, Switzerland, situated on the left bank of the Visp at an altitude of over 5000 feet (Map: Switzerland, B 2). It is the starting point for ascents of the Riffelberg and the Gorner Grat, which are connected by an electric mountain railway with Zermatt, as well as of the Matterhorn (q.v.) and the entire Monte Rosa group. Population, in 1900, 752.

ZERO (Fr. *zéro*, from It., Sp. *zero*, from Ar. *ṣifr, ṣafr*, cipher, from *ṣafira*, to be empty). In mathematics, a symbol written 0, and signifying the absence of quantity or number. The term is also applied to the infinitesimal. (See INFINITY AND THE INFINITESIMAL; NEGATIVE QUANTITY.) In thermometry the term is applied to certain fundamental points of temperature on the thermometer scale. In the earliest thermometers (q.v.) the zero point was fixed at the normal temperature of a healthy man, and any variation from this point was indicated on an arbitrary scale. The temperature of spring water was also selected as a fundamental point. A mixture of snow and salt furnished the zero point on Sagredo's thermometer, where the temperature of the hottest summer day was denoted by 360. Fahrenheit also used the mixture of ice and salt to determine the zero in his thermometer, while Réaumur put his zero at the temperature of melting ice. About the same time De l'Isle constructed thermometers in which the zero was the temperature of freezing water, and also instruments where the zero was at the boiling point. The zero of the modern centigrade thermometer is fixed at the temperature of melting ice and is marked by placing the thermometer in a vessel containing cracked ice. For absolute zero, see THERMOMETER.

ZER'RAHN, CARL (1826—). A German-American musician and conductor, born at Malchow, Mecklenburg. He studied music in Hanover and Berlin, and came to America during the Revolution of 1848. Here he became first flute in the Germania Musical Society, which gave concerts in the principal cities of the United States. In 1854 he was made conductor of the Handel and Haydn Society, Boston. For many years he gave at his own financial risk the only orchestral classical concerts in Boston. In 1865 he was appointed conductor of the Harvard Symphony concerts, serving until discontinued in 1882. He was elected conductor of the Oratorio Society of Salem, Mass. (1868), and as the conductor of many of the principal musical festivals held throughout New England exercised an important influence on the musical life of America at large. In addition to his other positions he became a professor at the New England Conservatory of Music. He was especially successful in the presentation of the great oratorios and the management of large choruses.

ZERUB'BABEL, or **ZERUBABEL** (Heb., from Babylonian *Zeru Babel*, seed or offspring of Babylon). The Governor of Jerusalem at the time when the second temple was built. He was born probably in Babylon. In Ezra iii. 2, 8, and Haggai i. 1, he is called the son of Shealtiel, who was a son of Jehoiachin. He may have been the immediate successor of Sheshbazzar (q.v.) or Sin-apal-uzur, the Shenazar of I. Chronicles iii. 18, who was one of the sons of Jehoiachin and was the first Governor of Jerusalem appointed by Cyrus. According to I. Esdras, Zerubbabel was one of Darius's pages who was granted permission to return to Jerusalem and build the temple as a reward for his cleverness in argument. The story is probably without any historic foundation. Through the influence of Haggai and Zechariah the people of Jerusalem were induced to build a new temple more fit to be the house of Yahweh than the single shrine that had served that purpose probably since the destruction of Solomon's temple by Nebuchadnezzar in B.C. 586. The erection of the new sanctuary was begun in B.C. 520, and the temple was dedicated in B.C. 516. During the years it was building the prophets cherished the hope that its completion would usher in a new era of prosperity for Jerusalem and that Zerubbabel would become King of the restored commonwealth. Even in Babylonia the Jews seem to have shared these expectations, and Haldai was sent to Jerusalem, at the head of a deputation, with gold that was made into a crown and held in readiness for the day of coronation. Visions of Zechariah show that in prophetic circles there was some anxiety lest this expected restoration of the Davidic dynasty might interfere with the growing importance attached to the high-priestly office. It is the growing conviction of scholars that the temple was rebuilt, not chiefly by exiles who may have returned from Babylonia in the days of Sheshbazzar, since Haggai and Zechariah make no mention of it, but by the Judeans who were the descendants of the people left in the land when Nebuchadnezzar carried away some of the more important families. As Zerubbabel is not named in the account of the dedication (Ezra vi. 15 sqq.), it has been supposed that he was recalled by Darius, who may have feared the effect of having a descendant of the old Davidic dynasty as Governor in Jerusalem. It is probable, however, that Zerubbabel went to his grave without ever having sat on the throne of his father, and no descendant of David ever seems to have occupied that throne after the fall of the dynasty in B.C. 586.

BIBLIOGRAPHY. Schrader, *Die Dauer des zweiten Tempelbaues* (Leipzig, 1867); Stade, *Geschichte des Volkes Israel* (Berlin, 1888); Ryle, *Ezra and Nehemiah* (Cambridge, 1893); Van Hoonacker, *Zorobabel et le second temple* (Ghent, 1892); Kosters, *Het herstel van Israel in het Perzische tijdvak* (Leyden, 1894); Marquart, *Fundamente israelitischer und jüdischer Geschichte* (Göttingen, 1896); Torrey, *The Composition and Historical Value of Ezra-Nehemiah* (Geneva, 1896); Eduard Meyer, *Entstehung des Judentums* (Halle, 1896); Schmidt, in *The New World* (Boston, 1898); Cheyne, *Jewish Religious Life After the Exile* (New York, 1898); Sellin, *Serubbabel* (Leipzig, 1898); id., *Studien zur Entstehungsgeschichte der jüdischen Gemeinde* (Leipzig, 1901); Siegfried, *Ezra-Nehemia* (Göttingen, 1901); Bertholet, *Ezra-Nehemia* (Tübingen, 1902).

ZERUMBET. See GINGER.

ZESEN, tsā'zen, PHILIPP VON (1619-89). A German poet and romancer. He was born at Priorau, near Dessau, studied at Wittenberg and Leipzig, and in 1643 founded at Hamburg the *Deutschgesinnte Genossenschaft*, a literary society the members of which tried in somewhat naïve fashion to purify the German language of barbarisms. Until 1683, when he settled in Hamburg, Zesen lived the life of a wanderer, and was well known in several courts of Europe. His works on German grammar and versification are forgotten, but one of his novels of adventure, *Die adriatische Rosemund* (edited by Jellinek, 1899), has considerable merit.

ZETLAND. See SHETLAND ISLANDS.

ZETTERSTEDT, tsĕt'ėr-stĕt, JOHAN VILHELM (1785-1874). A Swedish naturalist, born in East Gothland. He was educated at Lund, where he became successively tutor of botany (1810), assistant in the natural history department (1812), and professor of botany (1839). His works include *Dissertatio de Fœcundatione Plantarum* (1810-12); *Orthoptera Sueciæ* (1821); *Fauna Insectorum Lapponica* (1828); *Monographia Scatophagarum Scandinaviæ* (1835); *Insecta Lapponica* (1838-40), and *Diptera Scandinaviæ* (1842-60).

ZETZSCHE, tsĕch'she, KARL EDUARD (1830-94). A German mathematician and physicist, born in Altenburg. He studied in Dresden and Vienna, and in 1856 entered the Austrian telegraph service. In 1858 he became teacher in the industrial high-school at Chemnitz, and in 1876 professor of telegraphy in the Polytechnic Institute at Dresden. In 1880 he was appointed telegraph-engineer in the Imperial Post-office at Berlin, and in 1887 retired from public service. He wrote: *Die Kopiertelegraphen, Typendrucktelegraphen und die Doppeltelegraphie* (1865); *Die elektrischen Telegraphen* (1869); *Katechismus der elektrischen Telegraphie* (6th ed., 1883); *Abriss der Geschichte der elektrischen Telegraphie* (1874); *Die Entwickelung der automatischen Telegraphie* (1875); *Handbuch der elektrischen Telegraphie* (together with Frölich, Henneberg, and Kohlfürst) (1877-1895). Consult: Voretzsch, *Zur Erinnerung an K. E. Zetzsche* (Altenburg, 1894).

ZEUGLODON, zū'glō-dŏn (Neo-Lat., from Gk. *ζεύγλη*, *zeuglē*, strap or loop of a yoke, from *ζευγνύναι*, *zeugnynai*, to join + *ὀδούς*, *odous*, tooth). An extinct whale, the earliest known fossil cetacean, found in Eocene deposits of various parts of the world. It was a great serpent-like creature with body 50 to 70 feet long and from 6 to 8 feet in diameter at the thickest part of the trunk. The head was four feet long, the trunk 10 feet, and the tail had a length of 40 feet. The skull was elongated and flattened, resembling that of the crocodile, and the blow-hole was near its middle. The teeth were like those of the Carnivora, from which the cetaceans are supposed to have evolved, in that

ZEUGLODON TOOTH.

they were disposed in three series (incisors, 3; canines, 1; and molars, 5), and the molars were peculiar in that they had longitudinally compressed, serrated crowns and were attached by double roots. The vertebræ of the tail were much larger than those of the trunk. The limbs consisted of small paddles, like those of the fur seal, just back of the head, and of very much reduced hind limbs, which are supposed to have been hidden under the skin and to have been totally useless. Zeuglodon bones are common in the Eocene marls of the Gulf States of North America, and they are known also from the Eocene deposits of various parts of Europe, Asia, Africa, Australia, and New Zealand. This wide distribution indicates that the animal was a powerful swimmer and capable of a very cosmopolitan existence. Consult: Woodward, *Outlines of Vertebrate Palæontology* (Cambridge, 1898); Lucas, *Animals of the Past* (New York, 1901). See Cetacea; Whale.

ZEUNE, tsoi′ne, Johann August (1778-1853). A German geographer and philanthropist, born in Wittenberg. In 1802 he taught geography in his native city, and then in Berlin from 1803 until 1810, when he became professor of geography in the university. In 1806 he founded an institution for the blind in Berlin, which became well known. He wrote: *Gea, Versuch einer wissenschaftlichen Erbeschreibung* (1808, 3d ed., 1830); *Ueber Basaltpolarität* (1809); *Belisar, über den Unterricht der Blinden* (1808, 4th ed., 1834); a translation of the *Nibelungen* into modern German (1813, 2d ed., 1836); *Ueber Schädelbildung* (1846).

ZEUNER, tsoi′nẽr, Gustav (1828—). A German physicist and engineer, born in Chemnitz. He received his education at the School of Mines, Freiberg, became teacher first in the industrial school at Chemnitz, later in the School of Mines, Freiberg, and in 1855 professor of mechanics and engineering in the Polytechnic Institute at Zurich, and was director of that institution in 1859-68. From 1871 to 1873 he was director and professor of mechanics and mining engineering in the School of Mines at Freiberg, then was called in the same capacities to the Polytechnic Institute in Dresden, the organization of which he completed. He resigned from the directorship in 1890 and from the professorship in 1897, when he retired from public life. He is chiefly known for his work in connection with thermodynamics and steam engines, and wrote: *Die Schiebersteuerungen mit besonderer Berücksichtigung der Lokomotivsteuerungen* (1858, 5th ed., 1888, also trans. into French and English); *Grundzüge der mechanischen Wärmetheorie* (1860; 3d ed., under the title *Technische Thermodynamik,* 1887-90; *Ueber das Wanken der Lokomotiven* (1861); *Das Lokomotivenblasrohr* (1863); *Abhandlungen aus der mathematischen Statistik* (1869). He also edited, together with Weisbach and Bornemann, the *Zivilingenieur* (1853-57).

ZEUS. See Jupiter.

ZEUS OF OTRICOLI. See Jupiter of Otricoli.

ZEUSS, tsois, Johann Kaspar (1806-56). The founder of modern Celtic philology, born at Vogtendorf in Bavaria. He studied at Munich from 1832 to 1839, was a teacher in the gymnasium there, and then became professor of history in a secondary school in Speyer, where he remained till 1847. His *Grammatica Celtica* (1853, 2d ed. by Ebel, 1871) was one of the greatest philological achievements of the century. His other works include *Die Deutschen und die Nachbarstämme* (1837), and *Die Herkunft der Bayern von den Markomannen* (1839). Consult: Glück, *Erinnerung an Kaspar Zeuss* (Munich, 1857).

ZEUX′IS (Lat., from Gk. Ζεῦξις). A famous Greek painter who flourished near the end of the fourth century B.C. He is called a native of Heraclea, though which of the cities of that name is meant cannot be determined. He visited Athens and Lower Italy, but seems to have made his headquarters during a considerable time at Ephesus. He took up the new *chiaroscuro* of Apollodorus of Athens and developed it, excelling rather in his coloring and expression than in fineness of drawing, in which he was surpassed by Parrhasius (q.v.). He seems to have striven earnestly to produce the illusions of nature, and with much success in inanimate objects. His human figures were criticised by some for their large heads and limbs, though others praised these very qualities. Among his famous works were an "Alcmena" given to Agrigentum, a "Pan" presented to Archelaus, and a youthful "Hercules" strangling the serpents in the presence of the anxious Alcmena and Amphitryon. His "Helen" was painted as a present for the Crotoniates, after he had decorated the temple of Hera Lacinia near that city. Lucian describes in detail a painting representing a female centaur suckling her young, while in the background the wild father aroused and frightened his children by holding over them a lion's cub. Zeuxis seems to have studied to find new and strange situations in which to depict mythical personages. His pride is said to have been great. He gave away some of his later pictures, as being beyond price, and appeared at Olympia with his name embroidered in gold on his magnificent robe. It is noticeable that great monumental groups, like those of Polygnotus, do not appear in his works. The nearest approach is perhaps found in his "Zeus Surrounded by the Gods." He belonged to the new school of artists who painted smaller works for private patrons, rather than decorations for public halls.

ZGIERZ, zgyĕrzh. A manufacturing town in the Government of Piotrkow, Russian Poland, about 10 miles north of Lodz. It is noted for its extensive woolen and cotton mills. Population, in 1897, 19,124.

ZHITOMIR, zhĭ-tō′mēr, or **JITOMIR.** The capital of the Government of Volhynia, Western Russia, situated at the confluence of the Kamenka with the Teterev, 85 miles west-southwest of Kiev (Map: Russia, C 4). Zhitomir is noted for its manufacture of gloves and produces also bent wood furniture and ready-made clothes. It carries on a brisk trade in agricultural products. Population, in 1897, 65,452, chiefly Jews and Poles. The town enjoyed many privileges under the Polish rule.

ZHUKOVSKY, zho͞o-kôf′skĭ, Vasili Andreyevitch (1783-1852). A Russian poet and translator, born in the government of Tula. He took part in the campaign of 1812 and in 1826 was chosen as tutor for the Cesarevitch, afterwards Alexander II. From 1842 on Zhukovski lived in Germany. Although some of his poetic efforts met with momentary success, notably the ballad *Liudmilla*, an imitation of Bürger's *Lenore*, he is more especially esteemed as a translator of the English and German poets of the romantic school, which through this medium first became known to his countrymen. Examples of his original poems, rendered into English verse, may be found in John Bowring's *Specimens of the Russian Poets* (1821-23).

ZIANI, zē-ä'ne. A noble Venetian family, now extinct, which furnished many men of eminence to the Republic. Of these the most important were two doges: SEBASTIANO (c.1100-78). He attained distinction as ambassador to Constantinople. After adjusting the difficulties which had at that time risen between Manuel Comnenus and the Republic of Saint Mark, Ziani returned to Venice as successor of the murdered Vitale Michieli II. (1172). He was the first Doge whose election was taken from the people and confided to the newly formed Great Council. It was in his time that the magnificent piazza and piazzetta of Saint Mark began to assume their present appearance. The most important political event of Ziani's brief reign was the final making of peace between the Emperor Frederick Barbarossa and Pope Alexander III. (q.v.). The latter having secretly taken refuge in Venice, the Republic espoused his cause, destroyed the fleet of Barbarossa off the Istrian coast, and so paved the way for the celebrated reconciliation which took place in the Church of Saint Mark (July 25, 1177). Upon the return of the victorious fleet from Istria, the Pope went out to the mouth of the lagoon to meet the Doge, and there, in gratitude for the victory, gave him a ring and instituted the ceremony of wedding the Adriatic, which should be "subject to the rule of the Venetian Republic, as wife to husband." Thereafter the symbolic ceremony of dropping a ring into the sea was observed annually with much splendor. Ziani abdicated in 1178 and retired to the Monastery of San Giorgio Maggiore, where he soon died. PIETRO, son of the preceding, assumed the ducal cap in 1205, in succession to Enrico Dandolo. He occupied himself with the government and colonization of the troublesome island of Cyprus. Venice and Genoa first came to blows on that account, and the Genoese suffered defeat at sea. Ziani proposed the removal of the seat of the Republic to Constantinople, which had been captured by his predecessor. In 1229 the Doge abdicated, like his father, and likewise retired to San Giorgio Maggiore. Consult the authorities referred to under VENICE.

ZICHY, zē'chě, EUGENE, Count (1837—). An Hungarian explorer, born at Mihályi. After studying in Germany and traveling there and in England, he gave his attention particularly to the canalization of the Hungarian lowlands and, as president of the Home Industry Association, was very active in promoting the development of trade. In 1895-96, accompanied by several scholars, he visited the Caucasus and Central Asia, and in 1897-98 Siberia, China, Tibet, and Mongolia. He published *Voyages au Caucase et en Asie centrale* (1897), and the participants in his third expedition issued *Dritte asiatische Farschungsreise des Grafen Eugen Zichy* (1900 et seq.).

ZICHY, GÉZA, Count (1849—). A distinguished Hungarian pianist and composer, born at Sztára. Although deprived of his right arm at the age of sixteen by an accident while hunting, he nevertheless took up music as a profession, chiefly under the guidance of Liszt, and as a virtuoso with the left hand created universal sensation on his appearance in Vienna, Budapest, and Paris. His compositions include the operas *Alár* and *Meister Roland*, choral works, studies and solo pieces for the left hand, and songs. He is president of the National Conservatory, and since 1891 has been intendant of the Royal Opera House and the National Theatre at Budapest.

ZICHY, MIHÁLY (1827—). An Hungarian painter, born at Zala, Somogy County. First instructed by Marastoni at Budapest, he studied afterwards under Waldmüller in Vienna, and in 1847 took up his abode in Saint Petersburg, where Théophile Gautier was impressed with his talent and drew attention to him in his *Voyage en Russie*. Appointed Russian Court painter in 1859, Zichy subsequently increased his reputation by several effective canvases on a large scale. One of his best works is "Empress Elizabeth of Austria at the Coffin of Francis Deák," in the National Museum at Budapest, besides which may be mentioned: "Descent from the Cross," "The Witching Hour of Night," "The Triumph of Destruction," "The Siren's Song," "Effects of Wine," and his drawings illustrating events at the Russian Court.

ZIDON. See SIDON.

ZIEGENBALG, tsē'gen-bålk, BARTHOLOMÄUS (1683-1719). One of the first Protestant missionaries in India. He was born in Pulsnitz, Lusatia, and studied theology at Halle. In response to an appeal of King Frederick IV. of Denmark, who wished to establish a mission in India, Ziegenbalg set out in 1705 for the colony of Tranquebar. There, however, he met with such opposition on the part of the colonial authorities that it was with the greatest difficulty he could carry on his work. He learned the Tamil language, wrote a grammar and two lexicons, and translated much of the Bible. Returning to Europe in 1714, he obtained the protection of the English East India Company. He went back to India in 1716, going first to Madras and later to his former station of Tranquebar. There he died. He left a *Grammatica Damulica* (1716), an *Explicatio Doctrinæ Christianæ Damulicæ* (1719), the *Biblia Damulica* (completed 1723), and the posthumous *Genealogie der malabarischen Götter* (1868). Consult Germann, *Ziegenbalg und Plütschau. Die Grandungsjahre der trankebarschen Mission* (Erlangen, 1868).

ZIEGLER, tsēg'lẽr, JAKOB MELCHIOR (1801-83). A Swiss cartographer, born in Winterthur. He studied mathematics and natural sciences at Geneva and Paris. From 1828 to 1834 he was teacher of mathematics in Winterthur, and in 1834 became inspector of forests. He was known for his excellent surveying and map-making of the mountainous regions of his native country. He published: *Topographische Karte der Kantone Sankt Gallen und Appenzell* (1852); *Atlas über alle Teile der Erde nach Karl Ritters Lehre* (1864); *Hypsometrischer Atlas mit Erläuterungen und Höhenverzeichnissen; Hypsometrische Karte der Schweiz* (1866); *Topographische Karte der Insel Madeira* (1856); *Topographische Karte des Kantons Glarus* (2d ed. 1869); *Topographische Karte des Unterengadin* (1873); *Ueber das Verhältnis der Topographie zur Geologie* (1876). Consult Geilfuss, *Leben des Geographen J. M. Ziegler* (Winterthur, 1884).

ZIEGLER, Klara (1844—). A German actress, born in Munich. Having made her début at Bamberg in 1862, she contracted engagements successively at Ulm, Munich, and at the Stadttheater in Leipzig, where she scored great triumphs, especially as Brunhild (Hebbel's *Nibelungen*), Isabella (*Bride of Messina*), Maid of Orleans, and Elisabeth (Laube's *Essex*). In 1868-74 she was a member of the royal theatre in Munich and in 1876 married her former instructor, Adolf Christen. Since then she appeared in starring engagements on nearly all the principal stages of Germany, Holland, and Russia. Her best rôles, besides those already mentioned, were Iphigenie, Medea, Sappho, Penthesilea, Judith, and Thusnelda (Halm's *Fechter von Ravenna*), and she also impersonated successfully characters in high-class comedy, such as Donna Diana. As a playwright she produced the comedies *Flirten* (1895), *Furcht vor der Schwiegermutter* (1897), and *Der Türmer von Sankt Peter* (1897). For her biography, consult Mayerhofer (Bamberg, 1887).

ZIEGLER, Theobald (1846—). A German philosopher, born at Göppingen, Württemberg. He studied at Tübingen, taught successively at the gymnasia in Heilbronn, Winterthur, Baden-Baden, and Strassburg, qualified at the latter place as privat-docent in 1884, and was appointed professor there in 1886. His most important writings include: *Studien und Studienköpfe aus der neuern und neuesten Litteraturgeschichte* (1877); *Lehrbuch der Logik* (1881); *Geschichte der Ethik* (1881-86); *Sittliches Sein und sittliches Werden* (1890, Eng. trans. 1892); *Die soziale Frage eine sittliche Frage* (6th ed. 1899); *Das Gefühl* (2d ed. 1898); *Die geistigen und sozialen Strömungen des 19. Jahrhunderts* (2d ed. 1901); *Friedrich Nietzsche* (1899); and *Der deutsche Student am Ende des 19. Jahrhunderts* (8th ed. 1902).

ZIEM, zē'äN', Félix (1821—). A French painter, born at Beaune (Côte d'Or). He studied at the art school of Dijon, and completed his artistic education by extensive travels in Italy and the Orient. He is the last representative of the branch of the Romantic school which devoted itself to portraying the life and color of Mediterranean and Oriental countries. His specialty is Venice, and he renders in prismatic and iridescent colors the singular charm of Adriatic scenery; but his style, however attractive in itself, becomes monotonous through lack of variety. He is represented in the Luxembourg, the provincial museums of France, and in the prominent collections of the United States.

ZIEMSSEN, tsēm'sen, Hugo Wilhelm von (1829-1902). A German physician, born in Greifswald. He studied there, at Berlin, and at Würzburg. In 1863 he was called to Erlangen as professor of pathology and director of the clinic, and in 1874 to Munich as director of the general hospital. He made advances in electrotherapeutics, introduced the cold water treatment for typhoid fever and lung inflammation, and became an authority on diseases of the larynx and digestive canal. At the university he founded an institute for clinical medicine, whose valuable reports he published (1884-93). He wrote: *Die Elektricität in der Medizin* (1857; 5th ed. 1887); *Pleuritis und Pneumonie im Kindesalter* (1862); *Die Kaltwasserbehandlung des Typhus* (with Immermann, 1870); *Ueber die Behandlung des Magengeschwürs* (1871); *Klinische Vorträge* (1887-1900). In collaboration with prominent specialists he published his great *Handbuch der speciellen Pathologie und Therapie* (17 vols., 3d ed. 1886 et seq.) and the *Handbuch der allgemeinen Therapie* (1880-84), both of great value to the entire science of medicine.

ZIETEN, tsē'ten (**ZIETHEN**), Hans Joachim von (1699-1786). A Prussian general, one of the ablest of Frederick the Great's soldiers. He was born on the estate of Wustrau, in Brandenburg. His fame was acquired in the first two Silesian wars. As colonel of the celebrated regiment of Hussars he made his way as far as Stockerau, near Vienna, and afterwards covered the retreat of Prince Dietrich of Anhalt into Silesia ((1742). During the second war he became major-general and made his famous march through the enemy's country to Jägerndorf in order to join the Margrave Charles (1745). He then won the battle of Hohenfriedberg. In 1756 the King appointed him lieutenant-general, and during the Seven Years' War he attained the height of his fame. At Reichenberg, Prague, Kolin, and Leuthen he came off victorious, and at Torgau he accomplished the supreme feat of storming the heights of Süptitz. Consult the biographies by Hahn (5th ed., Berlin, 1878) and Count zur Lippe-Weissenfeld (Berlin, 1880).

ZIGZAG (Fr. *zigzag*, from Ger. *zickzack*, variant reduplication of *Zacke*, prong, tooth; probably connected with Eng. *tack*, and with Skt. *daśā*, fringe, or with Gk. δοκός, *dokos*, beam). A decoration characteristic of the Norman style of architecture. It consists of one or more moldings running in zigzag lines, and is used with great effect. The zigzags are employed in great profusion, and are sometimes undercut as well as decorated with various surface patterns. Its most remarkable use is in church portals.

ZIGZAGS. See Siege; Siege Works.

ZILEH, zē-lĕ' (ancient *Zela*). A town in the Vilayet of Sivas, Asiatic Turkey, about 30 miles west-southwest of Tokat (Map: Turkey in Asia, F 2). The hill, called by Strabo the Mound of Semiramis, is crowned by the ruins of a mediæval castle. In ancient times the town was celebrated as the seat of the temple of Anaitis (q.v.) and was inhabited and ruled by priests. Population, 20,000.

ZILLER, tsĭl′lĕr, TUISKON (1817-82). A German educator, born at Wasungen, in Saxe-Meiningen. He studied philology and law at the University of Leipzig. In 1854 he was made professor of philosophy and pedagogy at Leipzig. In 1861 he founded a pedagogical seminary at Leipzig, and in 1868 his pupils established with his help the Society for the Scientific Study of Pedagogy. He was a pioneer in pedagogy, and as such had a profound influence upon later students of the new science. Among his publications were: *Einleitung in die allgemeine Pädagogik* (1856; 2d ed. 1901); *Grundlegung zur Lehre vom erziehenden Unterricht* (1865; 2d ed. 1883); and *Allgemeine philosophische Ethik* (1880; 2d ed. 1886). Consult: Lange, *Tuiskon Ziller* (Leipzig, 1884); and Fröhlich, *Die wissenschaftliche Pädagogik Herbart-Ziller-Stoys* (Vienna, 1892).

ZILLERTHAL, tsĭl′ĕr-täl. A beautiful valley of the Eastern Alps, in Northeastern Tyrol, traversed by the Zillerbach, an affluent of the Inn. The Zillerthal Alps form the northeastern part of the watershed in Tyrol between the Inn and the Adige. They are composed of two chains: The Tuxer Alps on the northwest, the main Zillerthal range on the southeast, the Zillerthal Valley being between the two. Hochfeiler is the loftiest elevation—11,600 feet. There are altogether 130 glaciers. Cattle-raising and cheese-making are the chief occupations of the inhabitants. A railroad reaches up as far as Mairhofen.

ZIMB (Ar., fly). A fly exceedingly destructive to cattle in Abyssinia. It probably belongs to the same family as the tsetse (q.v.), and is little larger than a bee, but thicker in proportion, the wings broader, and without color or spot. The zimb is found only where the soil consists of a rich black loam; but all the inhabitants of the seacoast along the southern shores of the Red Sea, and southward beyond Cape Guardafui, are compelled to remove their cattle in the rainy season to the nearest sands, in order to prevent their destruction by this pest, as well as those of more inland districts from the mountains of Abyssinia northward to the confluence of the Astaboras and the Nile. The camel, the elephant, and the rhinoceros are liable to the attacks of the zimb, as well as the ox; but the elephant and rhinoceros protect themselves by rolling in mud, which, when dry, coats them as with a kind of armor.

ZIMBABWE, zêm-bäb′wâ (Bantu, stone houses). The name of the very remarkable ruins in Southeastern Mashonaland, in latitude 20° 16′ 30″ S. and longitude 31° 10′ 10″ E., also called Great Zimbabwe, to distinguish them from the numerous minor Zimbabwes scattered through the country. The ruins, which cover a large area, are situated upon a high plateau, 3300 feet above sea-level, and consist of a circular structure placed upon a moderate eminence, and a strongly fortified acropolis on the top of a neighboring kopje, with a considerable mass of ruins in the valley between. The circular structure, which seems to have combined the functions of a temple and a fort, is 280 feet in diameter and is surrounded by a stone wall built of small granite blocks laid, as in all buildings of this type, without mortar. The height of the wall varies from 35 to 15 feet, and its thickness from 16 to 5 feet. It is pierced by three entrances and the interior is divided into compartments by a complicated system of inner walls. In an inclosure at the southeastern end stand two solid conical towers, one of which is 32 feet high, while its fellow is much smaller. These towers appear to resemble the great phallic towers described by ancient writers as standing in the sacred inclosures of Phœnician temples. To the north of the circular structure the ground slopes down into a small valley filled with a great mass of ruins and débris, probably the remains of a city. On the opposite side of the valley is a precipitous hill or kopje crowned with the ruins of an ancient citadel or acropolis, which is approached by a narrow way strongly fortified at every step. The hill is of great natural strength, being protected on one side by gigantic boulders, and on the south by a precipice from 70 to 90 feet high; the only accessible side is protected by a massive wall, 13 feet thick at the top and 30 feet high in places. Like that of the circular structure below, the interior of the acropolis is divided by walls into a labyrinthine maze of compartments. From one of these compartments a stairway leads down to a series of caves in which were found a furnace for smelting gold, a number of small crucibles with particles of gold still adhering to them, and a soapstone ingot mold. The ruins of Great Zimbabwe are the most important of a long series of similar ruins extending along the whole length of the west side of the Sabi River. The region in which they occur is rich in gold, and numerous ancient workings attest the fact that the metal was extensively mined here at a very early period. Indeed, it can hardly be doubted, in the light of recent discoveries, that in this auriferous district was the biblical Ophir whence King Solomon is said to have derived large quantities of the precious metal. The Zimbabwe and other similar ruins were undoubtedly the work of the ancient people who operated the gold mines in this district and established colonies for the carrying on of the industry. The strong fortifications of their ruined cities indicate that these colonies were surrounded by a hostile population. The archæological evidence tends to show that the ancient builders and miners were Semites, and probably South Arabians, though the country and its valuable products seem to have been known to the Phœnicians and Egyptians as well. Mediæval Arabic writers frequently mention the gold obtained from this region, and a certain amount is reported to have been mined there at the time of the Portuguese settlement in the sixteenth century. At the present day mining operations are extensively carried on in the district, and a large amount of gold is produced. The ruins of Great Zimbabwe were discovered by Karl Mauch in 1871; they were carefully explored by Theodore Bent in 1891, and have since been visited by several explorers. Consult: Bent, *The Ruined Cities of Mashonaland* (London, 1892); and Peters, *Im Goldland des Altertums* (Munich, 1902).

ZIMMERMANN, tsĭm′*er*-män, ALBERT (1809-88). A German landscape painter, born at Zittau, Saxony. Without any instruction he began to paint at the age of twenty, then studied in Dresden, and from 1832 to 1854 in Munich, was professor at the Academy of Milan in 1857-59, and from 1860 to 1871 at the Vienna Academy. Subsequently he lived at Salzburg, and from 1885 in Munich. At first a prominent exponent of the historic landscape, Zimmermann forms a connecting link between the rigorous manner represented by Koch and Reinhart and modern German landscape painting. As examples of his heroic style may be mentioned: two "Alpine Views" (one dated 1851), in the Städel Institute at Frankfort; the "Rocky Landscape with Centaurs and Tigers," in the Pinakothek at Munich; and the imposing "Primeval Forest," in the Kunsthalle at Bremen. From his middle period, when his manner softened to a broader touch, date a large "Landscape with Combat Between Centaurs and Lions" (figures by Rahl and Genelli), in the Leipzig Museum; the "Faust Scene on the Brocken," in the Schack Gallery at Munich; and "A Storm in the Alps," in the Vienna Museum. Of a more realistic conception are a "Storm Landscape with Waterfall," in the Pinakothek, Munich, and "View on Ammer Lake," in the Hanover Museum.

ZIMMERMANN, Clemens von (1789-1869). A German painter, born at Düsseldorf. Beginning his studies at the academy there under Langer, he continued them from 1808 at Munich, and after a visit to Italy was appointed director of the School of Arts at Augsburg in 1816 and professor at the Munich Academy in 1825. Intimately associated with the creations inaugurated by King Ludwig I., he painted under the arcades of the palace garden the fresco of the "Investiture of Otto von Wittelsbach with Bavaria," and after Cornelius's designs the cyclical representations of the "History of Art," in the corridor of the Pinakothek. In the dining room of the Königsbau he executed the "Scenes from the Songs of Anacreon." Among his oil paintings may be noticed "Cimabue Finding Giotto" (1841, New Pinakothek). From 1846 to 1865 he was director of the royal picture gallery.

ZIMMERMANN, Eberhard August Wilhelm von (1743-1815). A German geographer, naturalist, and philosopher, born at Uelzen, in Hanover. He studied at Göttingen and Leyden, and became professor of physics at the Carolinum in Brunswick (1766). He traveled extensively and visited France, England, Russia, Italy, and Sweden. He wrote: *Geographische Geschichte des Menschen und der allgemein verbreiteten vierfüssigen Tiere* (1778-83); *Ueber die Elasticität des Wassers* (1779); *Allgemeiner Blick auf Italien* (1797); *Frankreich und die Freistaaten von Nordamerika* (1795); *Taschenbuch der Reisen* (12 yearly editions, 1802-13), which also appeared under the title *Die Erde und ihre Bewohner nach den neuesten Entdeckungen* (1810-13).

ZIMMERMANN, Johann Georg von (1728-95). A Swiss philosopher. He was born at Brugg, in what is now the Canton of Aargau. He studied at Göttingen, and after traveling in Holland and France settled at Brugg in 1754 as town physician. He wrote on experimental medicine *Von der Erfahrung in der Arzneikunst* (1764), but is remembered chiefly for his treatises on solitude, *Ueber die Einsamkiel* (1755; revised 1784-85), and on national pride, *Vom Nationalstolz* (1758), both of which made a great impression in their time and were widely translated and admired. He became Court physician at Hanover in 1768 and attended Frederick the Great in his last illness (1786), publishing on this episode several books that throw more light on the doctor's vanity than on the royal patient's character. Consult: *Zimmermann's Briefe an einige seiner Freunde in der Schweiz*, ed. by Rengger (Aarau, 1830); and the biographies by Bodemann (Hanover, 1878) and Ischer (Bern, 1893).

ZIMMERMANN, Reinhard Sebastian (1815-93). A German genre painter, born at Hagenau, on Lake Constance. Although he showed a great talent for drawing as a boy, he was obliged for years to follow a commercial career until enabled in 1840 to frequent the academy at Munich. In 1844 he went to Paris, and in 1847 established his reputation at Munich with the humorous picture "The Three Magi." Of numerous subsequent genre scenes, distinguished by a lively humor, excellent characterization, and brilliant technique, may be mentioned: "Peasants at the Castle" (1853), "Beggar Musicians" (1854), "Corn-Market Day in Munich" (1861, Cologne Museum), "The Love Letter" (Karlsruhe Gallery), "Two Different Opinions" (1868, Barmen Gallery), "In the Antechamber Before an Audience" (Saint Gall Museum), "Visit to His Reverence" (1884, Hanover Museum), and "Kindergarten" (1885, Brunswick Museum). Consult his autobiography, entitled *Erinnerungen eines alten Malers* (Munich, 1884).

His son Ernst (1852-1901), born in Munich, was first instructed by him and afterwards a pupil of Wilhelm Diez at the Academy. After producing some clever genre scenes he turned to historical subjects, and in 1879 won a signal success with "Christ in the Temple." His principal subsequent works include: "Adoration of the Shepherds" (1883, New Pinakothek, Munich), "Satyr Giving Musical Instruction" (1884, Dresden Gallery), "Christus Consolator" (1888, Leipzig Museum), "Christ Appearing to Thomas" (1892), and "Elector Max Emanuel Inspecting the Work at the Türkengraben" (1887, City Hall, Munich). He was appointed professor at the Munich Academy in 1886.

ZIMMERMANN, Robert von (1824-98). An Austrian philosopher, born at Prague. He was educated at the universities of Prague and Vienna, in 1852 he was called to Prague as professor of philosophy, and in 1861 to Vienna, where he became a member of the Academy of Sciences in 1869. He was the founder of the so-called æsthetics of form, and an opponent of the Hegelian school. Among his works are: *Leibniz und Herbart* (1849); *Ueber das Tragische und die Tragödie* (1856); *Aesthetik* (1856-65), his chief work; and *Anthroposophie* (1882).

ZIMMERMANN, Wilhelm (1807-78). A German historian and poet, born at Stuttgart. He studied theology at Tübingen, became professor at the Polytechnical School in Stuttgart in 1847, but was deposed in 1850 on account of his radical political opinions. Subsequently he held pastorates at Leonbronn and Owen. His best-known work is the *Geschichte des grossen Bauernkriegs* (new ed. 1891), besides which may be mentioned *Geschichte Württembergs* (1835-37), *Die Befreiungs kämpfe der Deutschen gegen Napoleon* (3d ed. 1859), *Geschichte der Hohenstaufen* (2d ed. 1865), *Lebensgeschichte der Kirche Jesu Christi* (2d ed. 1869), *Deutschlands Heldenkampf 1870-71* (1872), and *Illustrierte Geschichte des deutschen Volks* (1873-77).

ZIM'MERN, Helen (1846—). An English author and translator. She was born in Hamburg, Germany, but was brought to England at the age of four. She received a careful education at home and at a private school in London. In 1868 she began to write for various journals and reviews, and won almost immediate success. Many of her sketches were afterwards collected in book form, but it was rather as a translator and interpreter of Continental authors than as a story-teller that she became widely known. Among her publications are: *Stories in Precious Stones* (1873); *Schopenhauer: His Life and Writings* (1878); *Half Hours with Famous Novelists* (1880); *Tales from the Eddas* (1882); *The Epic of Kings*, from Firdusi (1882); *Life of Marie Edgeworth* (1883); *Hansa Towns* (1889); a translation of the *Comediès of Goldoni* (1892); the *Pentamerone*, translated (1893); and *Sir Laurence Alma Tadema* (1902), aside from translations from Nietzsche and Lessing.

ZIM'RI. A character intended to represent Villiers, Duke of Buckingham, in Dryden's *Absalom and Achitophel.* The caricature received high praise from Walpole. Buckingham answered it in his *Poetic Reflections on a Late Poem entitled, "Absalom and Achitophel."*

ZINC (Fr. *zinc, from* Ger. *Zink*, zinc; connected with OHG. *zin*, Ger. *Zinn*, AS., Eng. *tin*, and with Goth. *tains*, AS. *tān*, OHG. *zein*, twig, thin leaf of metal). A well-known metallic element. In the isolated state it was unknown to the ancients, but coins of brass, of which zinc is a constituent, have been found dating as far back as A.D. 110. Basil Valentine mentions zinc in several of his writings, but it was not until 1520 that Paracelsus first described zinc as a metal and assigned it to the class of semi-metals. Its character as a distinct substance was not fully recognized until the close of the seventeenth century, and even Lemery, in 1675, refers to zinc as being identical with bismuth. The metal has been reported native in small quantities near Melbourne, Australia, and in the United States in northeastern Alabama, but these discoveries need confirmation. The principal ores are the carbonate, or *smithsonite;* the oxide, or *zincite;* the oxide in combination with manganese oxide, or *franklinite;* the silicate, or *calamine;* and the sulphide, or *sphalerite*, usually called *blende*. Less commonly zinc occurs as the aluminate, the arsenate, the phosphate, and the sulphate.

Zinc (symbol, Zn; atomic weight, 65.41) is a bluish-white metal with a specific gravity of 6.9. It melts at 419° C. (786° F.) and boils at 1040° C. (1904° F.). It is brittle at ordinary temperatures, but becomes malleable between 100° and 150° C. (212° to 300° F.). Commercial zinc has a coarse laminar texture; it is moderately hard, difficult to file, and when bent after fusion emits a crackling noise similar to that of tin. The metal is commonly known in the trade as spelter. It comes into commerce chiefly in the form of sheets and is extensively used in the arts, especially in the manufacture of brass, German silver, and other alloys (see Alloys); also for freeing lead from silver, for galvanizing iron, for electrical batteries, as a chemical reagent, etc. Zinc combines with oxygen to form a monoxide, which may be prepared artificially by burning the metal in air, the product being a slightly yellow pulverulent solid that is known in commerce as zinc-white, and is used as a pigment and in medicine. It was the *nix alba*, 'philosophical wool,' or 'flower of zinc' of the alchemists, and the *tutia* or *pompholyx* of the ancients. Among other commercial zinc compounds is the chloride (*oleum lapidis calaminaris*), first described by Glauber in 1648. It is prepared commercially by treating scrap zinc with hydrochloric acid and evaporating the resulting solution to crystallization. This salt is used in medicine as a caustic, and is a disinfectant and deodorizer. It finds extensive application as a preservative of timber, the chloride in the form of a solution being forced by pressure into the pores of the wood; it is also employed for weighting cotton goods. The bromide and the iodide are both official in the Pharmacopœia, the former being used in the treatment of epilepsy and the latter for scrofula and hysteria. Zinc sulphate, originally known as 'white vitriol,' and found native as goslarite, was described by Basil Valentine. This salt may be obtained by roasting ores containing zinc sulphate, afterwards exhausting with water, and then evaporating to crystallization. It is a white powder used in medicine as an astringent; it is also used in dyeing and calico printing, in the manufacture of varnishes and drying oils, for painting, and for the preparation of zinc-white and other zinc compounds.

Metallurgy of Zinc. Zinc may be extracted from ores and furnace products by (1) the dry process, or (2) the electro-metallurgical process. Metallic zinc can only be obtained in the dry way and by electro-metallurgical processes. As zinc cannot be separated from its solutions by any of the metals that resist ordinary temperatures, the wet method only admits of the production of compounds of zinc from which the metal must be extracted in the dry way. The wet process can, therefore, be considered only as an accessory process to the dry method of zinc extraction. The extraction of zinc from ores and furnace products in the dry way is performed by converting the zinc into an oxide and then reducing the oxide to a metal by means of carbon. Furnace products which consist of mixtures of zinc oxide and metal are submitted to direct reduction. From alloys with metals less volatile than zinc the latter is obtained by simple distillation. The extraction of zinc by the combined wet and dry method is performed by dissolving out the zinc, converting the zinc in solution into an oxide, and then reducing the latter by means of carbon. The electrolytic extraction of zinc is performed by obtaining zinc in the form of aqueous solutions, from which zinc is separated by means of the electric current. If the zinc exists in the form of an alloy this alloy may be used as the anode in the electric current. Of the three methods, the dry method is given the preference whenever the ores or furnace products are sufficiently rich in zinc. In spite of its great deficiencies, no success has attended attempts to replace the dry process by either of the others. The combined wet and dry method has been tried experimentally on poor ores, but has hitherto failed on account of a number of defects and of its expense. It has only been employed in cases in which the object was not the extraction of metallic zinc, but the separation of zinc from other metals or metallic compounds as a by-product in the form of commercial compounds such as sulphate, chloride, basic carbonate, or oxide of zinc. Good authorities, however, think it not impossible that it may find employment in zinc extraction proper as an auxiliary to the dry method for the preparation of compounds rich in zinc from ores or products poor in that metal. The electrometallurgical method has, up to the present, been used only on an experimental scale and with varying results upon zinc proper, containing no other valuable metal except zinc. It can be used with advantage for alloys which form anodes soluble in the electric circuit. Finally, it remains to be noted that the zinc obtained by either the dry process or the combined wet and dry process, is in most cases contaminated by impurities and has to be subjected to a refining process previous to use.

From the preceding general discussion it will be evident that the dry process of zinc reduction is the only one which is much used in the production of this useful metal, and is, therefore, the only one which needs particular mention. Briefly summarized, this process consists of two separate operations: (1) the preparation of the ores for the process of reduction by calcination or roasting; (2) the reduction process proper, or the extraction of the zinc from the calcined ores. The preliminary operation comprises first the crushing of the ore, and, second, its burning or calcining in open heaps or in furnaces to change it into oxidized form. The reduction of the zinc from the calcined ores is performed by heating the latter with carbon to a white heat in fire-clay vessels. Zinc is then separated in the form of vapor and is collected in clay vessels as receivers or adaptors. Two forms of reduction furnaces are now used which are known as the Belgian and the Silesian. The Belgian furnace consists of from 60 to 80 small fire-clay retorts, each about 3 feet 6 inches long, by 8 inches in diameter, and set in a series of rectangular compartments, filling up an arched chamber. There is a clay nozzle or condenser attached to the front of each retort, and on the end of this nozzle there is a sheet-iron receiver for the condensed zinc, with a pit to collect the residue from the retorts. The retorts are charged with ground and roasted ore, mixed with small coal free from sulphur. As the upper retorts receive less heat than the lower ones, they are not so heavily charged, and they are, moreover, supplied with less pure ores. At the end of every six hours the receivers are emptied of their melted zinc.

In the Silesian furnace, fire-clay retorts, about 4 feet long by 1 foot 6 inches in diameter, are arranged in two rows, back to back, and placed horizontally on a flat furnace bed, with a fire-place on a lower level running along between the backs of the retorts. A condensing apparatus comes away with a curve from the upper part of the front of each retort, and descends some two feet below it. From this, the zinc, on condensing, drops on the ground, or into a tray placed to receive it.

Zinc is applied with great success to the coating of sheet iron for roofing and other purposes, and also for coating various kinds of iron wire, especially telegraph wire. See Galvanized Iron.

ZINC ETHYL. See Organo-Metallic Bodies.

ZINCITE. A mineral zinc oxide crystallized in the hexagonal system. It has a sub-adamantine lustre, and is deep red in color. It occurs with other zinc minerals, especially franklinite and willemite, at the various mines in Sussex County, N. J. Artificial crystals of zincite have been found as furnace products in Silesia, and also at the zinc furnaces at Newark, N. J., and Bethlehem, Pa. It is a valuable ore of zinc when found in sufficient quantity, and is commonly known as red oxide of zinc. Zincite, when found with willemite and franklinite, has sometimes been made into paper weights and similar objects. It does not, however, take a high polish.

ZIN'DER, or Sinder. A town of French Sudan, situated near the northern boundary of Nigeria, about 350 miles west of Lake Chad. It is an important trading station on the route across the Sahara from Tunis through Air, and was occupied in 1899 by the French, who established a military post outside the town walls. Population, about 10,000.

ZINGARELLI, zên'gȧ-rĕl'lê, Nicolo Antonio (1752-1837). An Italian composer, born in Naples, where he studied at the Loreto Conservatory. In 1785 his opera *Alsinda* was produced with success, and in 1792 he was appointed maestro at the Milan Cathedral. He was maestro of Saint Peter's, Rome, from 1804 until 1811, when, because of his refusal to permit a Te Deum to be sung in commemoration of the birth of Napoleon's son, he was arrested and taken to Paris. Napoleon received him very graciously, commissioned him to write a mass for the Imperial chapel, and permitted him to return to Italy. During his absence Fioravanti had been appointed his successor at Saint Peter's, and consequently he went to Naples, where in 1813 he became director of the Royal College of Music, and three years afterwards succeeded Paesiello as maestro at the Cathedral. He was a prolific composer and wrote not less than 30 operas, besides 38 masses, and innumerable smaller sacred and secular compositions.

ZINGERLE, tsĭng'ĕr-le, Ignaz Vinzenz (1825-92). An Austrian poet and philologist. He was born at Meran and was educated at Trent and Innsbruck, and at the Seminary of Brixen. In 1848 he was appointed a teacher in the Innsbruck Gymnasium, and in 1859 professor of the German language and literature in the university. He published many works bearing on the history and literature of Tyrol, of which the more important are: *Sagen aus Tirol* (1850; 2d ed. 1891); *Tirol. Natur, Geschichte und Sage im Spiegel deutscher Dichtung* (1852); *Kinder- und Hausmärchen* (1852-54); Litten, *Bräuche und Meinungen des Tiroler Volkes* (1859); and also wrote *Die deutschen Sprichwörter im Mittelalter* (1864), and *Das deutsche Kinderspiel im Mittelalter* (1873). His volumes of verse include: *Frühlungszeitlose* (1848); *Von den Alpen* (1850); and *Gedichte* (1853). Of his tales in prose, *Der Bauer von Longwall* (1874) met with especial favor.

ZINGIBER. See GINGER.

ZINGIBERACEÆ, zĭn-jĭb'ẽr-ā'sē-ē (Neo-Lat. nom. pl., from Lat. *zingiber*, from Gk. *ζιγγίβερις*, *zingiberis*, ginger, from Ar., Pers. *zanjabīl*, from Prak. *singabēra*, from Skt. *śṛngavēra*, ginger). THE GINGER FAMILY. A natural order of tropical, mainly Asiatic monocotyledonous mostly perennial herbs, with fleshy rootstalks or tuberous roots, embracing about 25 genera and 275 species. Several genera contain plants of economic value, as ginger, curcuma, grains of Paradise, cardamoms, and various important fibres. The principal genera are Curcuma, Alpinia, Zingiber, Amomum, Elettaria, Costus, etc. The position of this order has been a subject of dispute; some botanists join it with Scitamineæ, while Bentham and Hooker unite it with Musaceæ, Cannaceæ, and Marantaceæ in the order Scitaminaceæ. See GINGER.

ZINJAN, zĭn-jän', or **ZENJAN.** The capital of the Province of Khamseh, Northwestern Persia, situated at an elevation of 5000 feet on the high road from Teheran to Tabriz, over 200 miles northwest of the former city (Map: Persia, C 3). It is surrounded by gardens and has an extensive bazaar. The town is the former stronghold of the Babi sectarians (see BABISM), who defended it against the Persians in 1850. Population, 25,000.

ZINNIA (Neo-Lat., named in honor of J. G. *Zinn*, a German botanist of the eighteenth century). A genus of plants of the order Compositæ, comprising about 12 species, indigenous to Mexico and the southern portions of the Western United States. They are chiefly annuals which flower freely until fall. The numerous branches are each terminated by a single head of flowers. The best known species is the garden zinnia (*Zinnia elegans*), with variously tinted single and double flowers. Other species sometimes cultivated are *Zinnia pauciflora*, with red-purple rays, and *Zinnia angustifolia*, with showy orange colored flowers. All these plants are easily raised from seeds. They prefer deep, rich, loamy soils, and sunny situations.

ZINNIA (*Zinnia elegans*).

ZINTGRAFF, tsĭnt'gräf, EUGEN (1858-97). A German African explorer. He was born at Düsseldorf where he studied first law and afterwards natural science. In 1884 he accompanied an Austrian expedition to the Lower Congo, and in 1886 he headed an expedition sent by the German Government to explore Kamerun, in West Africa. He established the station of Barombi on Elephant Lake in 1888, and from there undertook a remarkable march to the Binue, crossing for the first time the forests which separate Kamerun from the interior, establishing the station of Baliburg, and arriving again at Barombi in January, 1890. After a short rest in Germany he returned to Kamerun, where he carried out a successful attempt to regulate trade. In 1893-94 he traveled in Zanzibar, German and Portuguese East Africa, and the Transvaal.

ZINZENDORF, tsĭn'tsen-dŏrf, NIKOLAUS LUDWIG, Count von Zinzendorf and Pottendorf (1700-60). Founder of the reorganized Moravian Church or United Brethren. He was born at Dresden, May 26, 1700, and was educated by his grandmother. Spener, the head of the Pietists, was a frequent visitor at her house, and his conversation, and the devotional exercises in which Zinzendorf took part, influenced his character while a mere child. In 1710 he went to Halle, where he spent six years, under the special care of Francke, the philanthropist. (See FRANCKE, A. H.) In 1716 he was sent to Wittenberg, where Pietism was in less repute than at Halle; but he adhered to his early religious impressions. From 1719 to 1721 he traveled through Holland and France, everywhere endeavoring to convert the distinguished persons whom he met to his own religious views. On his return to Dresden, he was appointed a member of the Saxon State Council. But political life was little to his mind, and he returned to his country-seat in Upper Lusatia. While residing there, he accidentally met a wandering carpenter, named Christian David, a member of the old sect of Moravian Brethren. David described the persecutions to which the sect was exposed, and Zinzendorf listened to the request of these Moravians that he would give them a refuge and invited them to settle on his estate; the colony received the name of 'Herrnhut.' In 1734 Zinzendorf went under a feigned name to Stralsund to pass an examination in theology, and was ordained a minister of the Lutheran Church. In 1736 he was banished from Saxony, on a charge of introducing dangerous novelties in religion. He repaired to Holland, where he founded a Moravian colony, and afterwards to Esthonia and Livonia, where he also founded colonies. In 1737, at the request of King Frederick William I. of Prussia, he was ordained bishop of the Moravians. In the same year he went to London, where he was received with much consideration by Wesley. In 1741 he went to North America, and founded the celebrated Moravian colony at Bethlehem, Pa. He labored earnestly to promote unity among the

German settlers in the colony, but unsuccessfully. He returned to Europe in 1743, and for the next twelve years he traveled through Great Britain, Holland, Germany, and Livonia, but made Chelsea, England, his headquarters. In 1747 he was permitted to visit Herrnhut, and in 1755 to return there permanently. He died at Herrnhut, May 9, 1760. Zinzendorf was the author of more than 100 works in verse and prose. His writings are often incoherent or mystical. The best collection of his hymns is by Knapp (Stuttgart, 1845).

The *Life* of Zinzendorf has been written by Spangenberg (Barby, 1772-75; abridged Eng. trans., London, 1838); Verbeek (Gnadau, 1845); Bovet (Eng. trans., *The Banished Count*, London, 1865); Tewick (Heidelberg, 1882); Varnhagen von Ense (Leipzig, 1887); and Römer (Gnadau, 1900). Consult also Schrautenbach, *Der Graf von Zinzendorf und die Brüdergemeinde seiner Zeit* (Gnadau, 1851); Burkhardt, *Zinzendorf und die Brüdergemeinde* (Gotha, 1866); Plitt, *Zinzendorf's Theologie* (ib., 1869-74); Becker, *Zinzendorf im Verhältnis zu Philosophie und Kirchentum seiner Zeit* (Leipzig, 1886). See MORAVIANS.

ZION (Heb. *Ṣiyyōn*). The name of the acropolis of the Jebusites, taken by David, who made it his residence and strengthened and extended it (II. Sam. v. 6-9; I. Chron. xi. 4-8). Christian tradition has located Zion upon the western and higher of the two hills on which Jerusalem is built, and this view is still adhered to by some scholars. An identification with the eastern or temple hill, however, agrees better with the natural conditions, the Old Testament references, and Jewish tradition. Just where on this hill the citadel stood cannot be determined without extensive excavations. In course of time the name Zion lost its narrower significance, and, in the Prophets, often stands for Jerusalem, while 'daughter of Zion' means the Jewish people. See JERUSALEM.

ZIONIST MOVEMENT. A movement which has for its object—to quote Dr. Theodore Herzl, the founder and leader of modern Zionism—"the creation of a home secured by public rights for those Jews who cannot or will not be assimilated by the country of their adoption." It is a direct consequence of the anti-Semitic agitation. (See ANTI-SEMITISM.) The misery caused by the relentless policy of persecution adopted by Russia against a Jewish population estimated at 5,000,000 souls presents in itself a problem for which apparently the Zionists alone have proclaimed a comprehensive solution.

Ever since their dispersion the faithful orthodox of the Jews have found consolation in the religious hope that the promises of the ancient prophets will finally be realized, that the Messiah will appear to lead the children of Israel back to the Holy Land of their fathers. The religious nature of this Messianic Zionism has, in fact, been the ground for strong opposition to the present movement on the part of those who, like Chief Rabbi Dr. Adler of England, have denounced it as an attempt to forestall Divine Providence.

The history of the Jews, however, shows that the Messianic faith was not incompatible with active attempts at repatriation. Thus Bar Cochba (117-138) based his all but successful revolt against the Romans on the Messianic prophecy, and was supported in his claims by the great Rabbi Akibah. At later periods a number of Pseudo-Messiahs were created by the restlessness or mysticism of their times reacting upon the despair of the Jewish people. See MESSIAH.

The most remarkable of all the Pseudo-Messiahs was Sabbathai Zewi, whose self-proclamation at Smyrna (1660) threw the Jewish people into a state of hysteric excitement which long outlasted his downfall, and was not entirely allayed until the influence of Moses Mendelssohn (q.v.) a hundred years later turned Jewish hope into a new direction.

Under the influence of the Mendelssohnian school, and the growing tendency toward toleration, the old Messianic mysticism gave way before the passion with which the Jews turned toward the acquisition of Occidental culture, in the hope of being permitted to become integral parts of the nations among which they lived. The new Jewish culture originating in this period developed, however, a new and broader race consciousness, and correspondingly an historical and sentimental interest in Palestine, which manifested itself in efforts at colonization by philanthropists such as Moses Montefiore and by associations such as the 'Alliance Israélite Universelle,' which efforts were encouraged by a number of British statesmen. After the Russian riots of 1881, and the enactment of the barbarous May Laws, a great impetus was given to the colonization movement by the formation of the international society 'Lovers of Zion,' which, aided by the Rothschild family, and by Baron de Hirsch and his Jewish Colonial Association, succeeded to the extent that in 1898 there were in Palestine 25 Jewish colonies.

The planting of isolated colonies in Palestine failed to hold the general interest of the Jewish people. As a relief for the condition of the Eastern Jews, the colonies in Palestine and elsewhere are insignificant. The Mendelssohnian ideals of culture, too, had apparently failed as a solution of the vexed Jewish problem. Continental Judaism was in despair, when in the spring of 1896 there appeared from the pen of Dr. Theodore Herzl, a Viennese journalist and playwright, simultaneously in English, French, and German, a pamphlet entitled "The Jewish State." It was therein proposed that Palestine should be obtained from the Sultan of Turkey, the holy places made extraterritorial, and a Jewish autonomous State, the organization and government of which were set forth in detail, established under Turkish suzerainty and the guarantee of the Great Powers.

This was the beginning of the present Zionist movement. As a result of the profound sensation created by this pamphlet, the first Zionist Congress was held at Basel, Switzerland, in August, 1897, when 200 delegates represented Jews of all nationalities, and all political and religious convictions. The political programme adopted at this congress, the basis upon which the movement now rests, begins as follows: "Zionism aims at establishing for the Jewish people a *publicly* and *legally* assured home in Palestine." Among the means to be adopted for the attainment of this end, the programme specifies "the promotion of the settlement of Jewish agriculturists, artisans, and tradesmen in Palestine," and "preparatory steps for the attainment of those governmental grants which are necessary for the achievement of the Zionist purpose." Subsequent Zionist congresses were held in 1898 (when the Jewish Colonial Trust, the financial instrument of Zionism, was founded), in 1899, 1900, 1901, and 1903, all in Basel except the congress of 1900, which took place in London.

Dr. Herzl has had a number of audiences with the Sultan of Turkey, who summoned him to Constantinople twice in 1902. Though sympathetically disposed, the Sultan has not yet offered such concessions as Dr. Herzl, standing firmly on the Basel platform, could accept.

Before the last congress (1903) an offer was made to the Zionists by the British Government of a grant of land in British East Africa for the purpose of an autonomous Jewish settlement, under Jewish local administration, and general British control. With the distinct understanding that no abandonment of the Palestinian plans was implied, the offer was referred to a commissioner for investigation. Of great significance, too, is considered the promise of the Russian Government, conveyed in a letter of M. de Plehve to Dr. Herzl, to place no obstacle to the Zionist movement, and to use its influence with the Sultan on behalf of the plan.

The Zionist movement has aroused and continues to hold the devotion of a large part of the Jewish people. There are at present 300,000 paying members of the Zionist organization, which consists of more than 1000 constituent societies, over 900 of these being in Russia. At the last convention of the American Federation of Zionists, under the presidency of Dr. Richard Gottheil, the total number of American Zionist societies was reported as 250. The reformed clergy as a class and the great financiers have shown strong opposition to Zionism; on the other hand, many leaders of thought and literary men, such as Max Nordau and Israel Zangwill, are prominently identified with the movement.

Consult, for early Zionist projects: *Publications of the American Jewish Historical Society*, No. 8; Laurence Oliphant, *The Land of Gilead* (London, 1880); and Graetz, *Geschichte der Juden* (Leipzig, 1853-70). The annals of the Zionist movement since 1895 are to be found in periodical publications: *The Jewish Chronicle* (London); *Die Welt* (Vienna), the official Zionist organ; *The Maccabean* (New York); and in the publications of the American Federation of Zionists. Consult also: Herzl, *Der Baseler Kongress* (Vienna, 1897); Jaffé, *Die nationale Wiedergeburt der Juden* (Berlin, 1897); Farbstein, *Der Zionismus und die Judenfrage* (Berne, 1897); and articles by Dr. Herzl in *Contemporary Review* (London, 1897); by I. Zangwill in *Cosmopolis* (ib., 1897) and *Contemporary Review* (ib., 1899); and by Emil Reich in *Nineteenth Century* (ib., 1897).

ZIRCON (from Ar. *zarkūn*, cinnabar, vermilion, from Pers. *zargūn*, golden, yellow, from *zar*, Av. *zarəna*, Skt. *hiraṇya*, gold + *gūn*, Av. *gaona*, color). A mineral zirconium silicate crystallized in the tetragonal system. It is yellowish to brown in color, and occurs in crystalline rocks, especially granular limestone, various schists, gneiss, syenite, and granite. It is found in the alluvial sands in Ceylon, in the Ural, and in various localities in Norway, Bohemia, France, Italy, and elsewhere in Europe; also in Australia. In the United States it occurs in Maine, New York, New Jersey, Pennsylvania, and largely in North Carolina, Colorado, and California. The mineral finds use in the manufacture of the incandescent mantles of Welsbach burners. The transparent varieties, especially those from Ceylon, are cut into gems and are called variously *jargon* or *jargoon*, *jacinth*, or *true hyacinth*.

ZIRCONIUM (Neo-Lat. from *zircon*). A metallic element found as a new earth in the mineral zircon by Klaproth in 1789, and first obtained in the isolated state by Berzelius in 1824. It occurs in combination with silica in the mineral zircon, and also in certain rarer minerals, including eudialyte, fergusonite, and polymignite. The metal is obtained by reducing the silicate with carbon in an electric furnace, or by heating potassium zirconofluoride with potassium.

Zirconium (symbol, Zr; atomic weight 90.40) is a black amphorous powder which has also been obtained as a lustrous gray brittle crystallized solid. The crystallized variety has a specific gravity of 4.15; its melting-point is above 1300° C. It combines with oxygen to form a dioxide, a white tasteless powder that has been used instead of lime in the oxyhydrogen flame, and with thoria, yttria, and other rare earths for the mantle of the Welsbach burner. The oxide combines with strong bases to form zirconates.

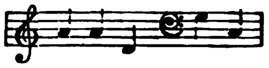
ZIRKEL, tsĕr'kel, FERDINAND (1838—). A German mineralogist, born at Bonn. He was at first interested in mining, visited Iceland in company with Preyer in 1860, and after being employed for two years in the Geological Institution at Vienna, became professor, successively at the universities of Lemberg (1863), Kiel (1868), and Leipzig (1870), where he was also made director of the Mineralogical Museum. He traveled for study in France, Italy, and Scotland; came to America in 1874 to examine the great collections of minerals made during the exploration of the fortieth degree of latitude, and in 1894-95 pursued scientific investigations in Ceylon and India. His more extensive writings include: *Reise nach Island im Sommer 1860* (with Preyer, 1862); *Lehrbuch der Petrographie* (1866, 2d ed. 1893-95); *Die mikroskopische Beschaffenheit der Mineralien und Gesteine* (1873); "Microscopical Petrography," in *Report of the United States Geological Exploration of the Fortieth Parallel* (1876); and *Ueber Urausscheidungen rheinischer Basalte* (1893). After the death of Naumann he edited the new issues of his *Elemente der Mineralogie* (14th ed., 1901).

ZIRKNITZER SEE, tsĭrk'nĭts-ĕr zā, or **CZIRKNITZER SEE**. A small lake in Carniola, Austria, 28 miles northeast of Triest (Map: Austria, D 4). It lies in a depression of the limestone plateau known as the Karst (q.v.), and exhibits some of the most remarkable features of Karst phenomena. The lake, which under ordinary conditions has an area of about 10 square miles and a mean depth of 20 feet, communicates through a number of openings with a series of subterranean reservoirs or caverns, some of which are above the lake-level in the surrounding hills. In the autumn, when the rainfall is slight, the lake is completely drained into the reservoirs lying below its level, and its bed is speedily covered with rich herbage. With the returning heavy rains the surrounding higher reservoirs are filled and discharge suddenly through the subterranean passages into the lake, so that the latter very rapidly regains its ordinary volume and may even inundate the surrounding country. The changes in level are, however, very irregular. Sometimes the lake does not disappear for several years, and once, in 1834-35, it remained dry for over a year. It is rich in fish, which disappear and return with the water.

ZISKA, zĭs′kȧ, Boh. **ZIŽKA,** zhĭzh′kȧ, JOHN (c.1360-1424). A famous leader of the Hussites. He was born at Trocnoy, near Budweis, Bohemia. He became a page to King Wenceslas of Bohemia, and spent his youth at Prague. In 1410 he took part as a volunteer on the side of the Teutonic Knights in the great battle of Tannenberg. Later he fought against the Turks and at the battle of Agincourt. Returning to Bohemia, soon after the burning of John Huss, he became prominent among the leaders of the Hussites. In 1419 the Hussites took up arms against the Emperor Sigismund, and Ziska displayed extraordinary activity in organizing their forces. He was soon recognized as their leader. He built a mountain stronghold which he named Tabor, whence the extreme party among the Hussites took the name of Taborites (q.v.). In 1420 he took up a strong position near Prague on an eminence since known as the 'Zizkaberg,' and with a few thousand men beat off an army of 30,000 (July 14th). On November 1st he won a victory over the Emperor Sigismund and again on January 8, 1422, he was victorious at Deutschbrod. His course was everywhere marked by the destruction of monasteries, the burning of priests' houses, and the introduction of the communion with both elements. (See UTRAQUISTS.) As the leader of the Taborites, Ziska waged a relentless war against the section of the Hussites known as the Calixtines. In 1424 it is said that Sigismund proposed an arrangement with the Hussites, by which full religious liberty was to be allowed and Ziska, who had an interview with the Emperor on the footing of an independent chief, was to be appointed Governor of Bohemia and her dependencies, but if this is true, the war-worn old chief did not live long enough to complete the treaty, for while besieging the castle of Přibyslav he was seized with the plague, and died October 11, 1424. He was buried in a church at Czaslav, and his iron war-club was hung up over his tomb. A story was long current that, in accordance with Ziska's express injunctions, his skin was flayed off, tanned, and used as a cover for a drum, which was afterwards employed in the Hussite army, in order that even when dead he might be a terror to his enemies. From early boyhood Ziska had been blind in one eye and he lost his other eye in 1421. As he has become a popular hero, it is difficult in many parts of his life to separate fact from fiction. Meissner was the author of an epic poem on Ziska which has passed through more than a dozen editions; and George Sand wrote a prose *Life*. Consult Millauer, *Diplomatisch-historische Aufsätze über Johann Ziska* (Prague, 1824); Tomek, *Johann Ziska* (Ger. ed., Prague, 1882).

ZITELMANN, tsĭt′el-mȧn, KONRAD (1854-97). A German poet and novelist who wrote under the pseudonym of Konrad Telmann. He was born at Stettin, and studied law and political science at the universities of Leipzig, Heidelberg, Berlin, and Greifswald. He lived alternately in Italy and Germany, devoted to literary pursuits. He possessed the gift of lyric and narrative expression to a remarkable degree. His works include: *In der Einsamkeit* (1876), *Meereswellen* (1884), and *Aus der Fremde* (1889), volumes of verse; *In Pommern* (1875); *Lichter und Schatten* (1884); *Spinx und andere Novellen* (1886); *Dissonanzen und Accorde* (1888); collections of short stories; and *Götter und Götzen* (1884), *Moderne Ideale* (1886), *Dunkle Existenzen* (1886), *Vom Stamm der Ikariden* (1891), *Lucretia* (1896), *Gottbegnadet* (1897), etc., novels.

ZITHER (Ger. *Zither, Cither*, OHG. *zitera, cithar*, from Lat. *cithara*, from Gk. *κιθάρα*, *kithara*, lyre). A musical instrument, the modern representative of the ancient *cithara* (q.v.). In its modern form it is derived from a peasant instrument of the German Alps. It is a flat stringed instrument, with a shallow resonance box, provided with a sound-hole and 32 or more strings. On the side nearest the player is a fretted fingerboard, while near the right end is a low bridge. Above the fingerboard are five 'melody' strings made of metal and tuned:



These are stopped with the left hand and plucked by means of a ring with a projecting spur, worn on the thumb of the right hand. The 'accompaniment' strings, tuned in fourths, are made of gut or silk and are plucked by the first three fingers of the right hand. There have been various modifications of the zither, among them the double zither and the bow zither. The latter is merely a variety of the viol, having a short neck, fretted fingerboard, and four strings, but it is played with one end resting on a table while the body rests on the lap of the player.

ZITTAU, tsĭt′tou (Slav. *Žitawa*). A town of the Kingdom of Saxony, 49 miles southeast of Dresden, near the Bohemian frontier, on the left bank of the Mandau, near its confluence with the Neisse (Map: Germany, F 3). The town has the notable Byzantine Church of Saint John, finished in 1837; a splendid court-house, one of the finest in Saxony, finished in 1845; and a good library of 40,000 volumes, in conjunction with a museum. Zittau is the centre of the linen and damask manufacture of Saxony. There are bleach fields, dye works, and paper, oil, and saw mills, and there are manufactures of machinery, bicycles, woolens, felt goods, window shades, chemicals, and wooden wares. Population, in 1900, 30,921.

ZITTEL, KARL ALFRED VON (1839-1904). A German geologist and paleontologist, born at Bahlingen, Baden, son of Karl Zittel (1802-71, leader of the Liberal Church Party in Baden). After studying at Heidelberg and in Paris, he was employed by the Geological Institution in Vienna, qualified there as docent at the university in 1863, and in the same year became professor of mineralogy at the Polytechnic School in Karlsruhe, whence he was called to the chair of paleontology at Munich in 1866. He took part in Rohlfs's expedition to Egypt and the Libyan desert in 1873-74. His publications comprise: *Paläontologische Studien über die Grenzschichten der Jura- und Kreideformation* (1868-70); *Aus der Urzeit. Bilder aus der Schöpfungsgeschichte* (2d ed. 1875); *Handbuch der Paläontologie* (1876-93, with Schimper and Schenk), the most important work on this branch of science; *Beiträge zur Geologie und Paläontologie der Libyschen Wüste* (1883 et seq.); *Die Sahara* (1883); and *Geschichte der Geologie und Paläontologie bis Ende des 19. Jahrhunderts* (1899). In 1899 he was made president of the Bavarian Academy of Sciences and head custodian of the scientific collections of Bavaria.

ZIZKOW, zhêzh'kôf. A town of Bohemia, Austria, an eastern suburb of Prague. It has manufactories of matches, metal goods, and ammunition. Population, in 1900, 60,089. Zizkow was made a separate town in 1898.

ZLATOUST, zlȧ'tô-ųst'. A district town in the Government of Ufa, East Russia, situated in the Ural Mountains, 270 miles northeast of Ufa (Map: Russia, K 3). It lies in an extensive mining region and has large Crown works for the manufacture of guns and ammunition. Population, in 1897, 20,973.

ZLATOPOL, zlȧ'tô-pôl. A town in the Government of Kiev, South Russia, about 50 miles southwest of Tcherkassy. It manufactures flour. Population, in 1897, 11,388.

ZNAIM, tsnīm. A town of Moravia, Austria, on the Thaya, 48 miles north-northwest of Vienna (Map: Austria, E 2). The town contains an old castle of the margraves of Moravia. There are manufactures of pottery and textiles. Population, in 1900, 16,261. At Znaim an armistice was concluded between the Austrians and the French after the battle of Wagram (1809), leading to the Treaty of Schönbrunn.

ZO'AN. The Hebrew name of the Egyptian city of TANIS (q.v.).

ZO'AR (Heb. *ṣō'ar*). One of the ancient cities of Palestine, originally called Bela (Gen. xiv. 2, 8). According to the narrative in the fourteenth chapter of Genesis, it was attacked in the expedition of the 'four kings against five.' (See AMRAPHEL.) It was one of the five 'cities of the plain,' and, with the others, was doomed to destruction, but was spared, at Lot's intercession, to afford him a refuge (Gen. xix.). In the account of the death of Moses it is mentioned as visible from Pisgah (Deut. xxxiv. 3). In Isaiah and Jeremiah it appears as a town of Moab (Isa. xv. 5; Jer. xlviii. 34). Zoar probably lay in the vicinity of the other four cities at the southeastern end of the Dead Sea, but its exact location is unknown. Eusebius and Jerome describe a place Zoara, at the south end of the Dead Sea as a Roman garrison with many inhabitants. Stephen of Byzantium calls it a large village and fortress, and it is subsequently spoken of as the see of a bishop. The Crusaders found it under the name Segor, and describe it as pleasantly situated and having many palm trees. Abulfeda, the Arabic historian, also makes frequent mention of a place Zoara, adjacent to the Dead Sea. The identification appears, therefore, to rest upon safe ground, though some scholars are inclined to seek for the biblical Zoar at the northern end of the Dead Sea. Consult G. A. Smith, *Historical Geography of Palestine* (London, 1897). See SODOM.

ZOAR COMMUNITY. A communistic society established in America by a colony of Germans calling themselves Separatists. It was originally composed of about four hundred members, who had suffered persecution in Württemberg as dissenters from the Established Church, and who in 1817 emigrated to America, where they were kindly received by the Quakers of Philadelphia, who aided them in effecting a settlement in Tuscarawas County, Ohio. The Separatist emigration had been primarily for the purpose of securing religious liberty. The idea of establishing a commune was not entertained until after the settlement in Ohio. Early in 1819 articles of agreement for a community of goods were signed. During the earlier years of the life of the society many new members were added from Württemberg. The community was at one time prosperous. The building of the Ohio Canal, in whose construction the Zoarites were largely employed, proved of great benefit to them. About this time they owned several thousand acres of land, and had built up industries and established a considerable commerce with the outside world. The growth and prosperity of the society was, however, largely due to the ability and shrewdness of its leader, Joseph Michael Bäumeler (q.v.). Decline began with his death. In 1898 the question of dissolution was formally discussed, and on March 10th a decision was reached binding all to a division of the property on an equitable basis. This act of distribution abolished the communistic feature of the society, but the municipal incorporation of the Society of Zoar remains intact. It is now more like a rich corporation than a communistic society. Consult Nordhoff, *The Communistic Societies of the United States* (1875).

ZO'BO (Tibetan *mdzopo*, male of the *mdzo*, zobo). A hybrid between the yak (q.v.) and the humped cattle of India. It is not unlike an English ox. It is common in the western parts of the Himalaya, and is valued as a beast of burden, as well as for its milk and its flesh.

ZÖCKLER, tsĕk'lĕr, OTTO (1833—). A German Lutheran theologian, born at Grünberg, Hesse. He studied at Giessen, Erlangen, and Berlin, and became a professor at Giessen in 1863 and at Greifswald in 1866. His works are numerous, including commentaries on both Old and New Testament books: *Kritische Geschichte der Askese* (1863; new ed., *Askese und Mönchtum*, 1897); *Das Kreuz Christi* (1875; Eng. trans., *The Cross of Christ*, 1877); *Die Lehre vom Urstand des Menschen* (1879); *Gotteszeugen im Reiche der Natur* (1881); and *Biblische und kirchenhistorische Studien* (1893). He edited the *Handbuch der theologischen Wissenschaften* (1883-84), and with Strack, the *Kurzgefasster Kommentar* (1866 et seq.).

ZO'DIAC (OF. *zodiac*, *zodiaque*, Fr. *zodiaque*, from Lat. *zodiacus*, from Gk. *ζωδιακός*, *zōdiakos*, zodiac, relating to animals, from *ζῴδιον*, *zōdion*, diminutive of *ζῷον*, *zōon*, animal, from *ζῆν*, *zēn*, to live; so called because the constellations were figured as animals). The name given by the ancients to an imaginary band extending round the celestial sphere, having as its middle line the ecliptic or apparent path of the sun. It was fixed at about 16° in width so as to include the orbits of the sun and of the five planets (Mercury, Venus, Mars, Jupiter, and Saturn) which were then known; and as, of these planets, Mercury has by far the greatest inclination of orbit to the ecliptic, and the value of that element in his case is only 7°, the width given to the zodiac was amply sufficient for the required purpose. But when the career of the planetary discovery commenced in the beginning of the nineteenth century, the first three which were discovered (Ceres, Pallas, and Juno) at once destroyed the idea which had been long seated in men's minds, that no planets existed beyond the limits of the zodiac, by exhibiting orbits inclined to the ecliptic at no less angles than 11°, 35°, and 13°; and a large number since observed have been found to wander beyond the zodiac, from which circumstance they have, along with the three above mentioned, been denominated *ultra-zodiacal* planets.

The stars in the zodiac were grouped into twelve constellations, to each of which 30°, or $\frac{1}{12}$th of the whole circle, was assigned, though it often did not fill up that space, but was only situated in it; and this equable division into *signs* was of great advantage in defining the positions of the sun and planets at any epoch.

The constellations, with the appropriate symbols of the corresponding signs, are as follows:

Aries (*Ram*) ♈
Taurus (*Bull*) ♉
Gemini (*Twins*) ♊
Cancer (*Crab*) ♋
Leo (*Lion*) ♌
Virgo (*Virgin*) ♍
Libra (*Balance*) ♎
Scorpio (*Scorpion*) ♏
Sagittarius (*Archer*) ♐
Capricornus (*Goat*) ♑
Aquarius (*Water-bearer*) ♒
Pisces (*Fishes*) ♓

As one half of the ecliptic is to the north and the other to the south of the celestial equator, the line of intersection of their planes is a diameter of each, and the two points in which this line meets the celestial sphere are known as the equinoctial points (q.v.). The comparative immobility, with respect to the ecliptic, of these points, suggested at once the employment of one or other of them as a point from which to reckon celestial measurements of stars' positions, and accordingly that point at which the sun crosses the equinoctial from south to north was fixed upon, and called the first point (or commencement) of Aries (q.v.). After the sun had advanced eastward through this sign—i.e. 30° along the ecliptic—he entered the sign of Taurus, continuing his course onward through the others in the order in which they are given above, again crossing the equinoctial southward at the point where he emerged from Virgo and entered Libra. This was the case with the sun during the time of Hipparchus (q.v.), but though the equinoctial points move very slowly, yet they do so with great uniformity, and the westerly motion of 50″ annually which they describe along the ecliptic has at the present time separated the sign Aries from the constellation Aries, and caused the former to correspond almost to the constellation Pisces. This gradual retrogression of the signs through the constellations of the zodiac will continue till they accomplish, in about 25,800 years, a complete circuit; after which period the sign and constellation of Aries will again coincide, as they did in the time of Hipparchus. Neither the zodiac nor its constellations are of much use now in astronomy, except as, like the other constellations, affording an easy though somewhat fantastic nomenclature for the stars, and a rude but sometimes convenient mode of reference to their positions.

The zodiac is probably Babylonian in origin. The figures seem to have been based on the resemblance of the lines connecting the stars in the zodiacal constellations to certain pictorial outlines which form the substratum of the Assyro-Babylonian cuneiform alphabets (see CUNEIFORM INSCRIPTIONS), while animal figures and outlines were chosen for animistic reasons. The greater number of the modern zodiacal constellations are identical with the Babylonian, although two or three seem to be of Occidental origin. The signs of the zodiac were carried from Babylonia to Greece, whence they spread throughout the ancient civilized world, and found their way back, along with much other astronomical science, to India and the Far East. Consult for the origin of the zodiac: Epping and Strassmaier, *Astronomisches aus Babylon* (Freiburg, 1889); Jensen, *Kosmologie der Babylonier* (Strassburg, 1890); Jastrow, *Religion of Babylonia and Assyria* (Boston, 1898).

ZODIACAL LIGHT. A faint luminosity extending outward from both sides of the sun along the ecliptic. It is visible only after sunset or before sunrise. It is easily seen to reach 90° or 100° from the sun; and in favorable circumstances of observation in the tropics, it has been recorded as encircling the sky completely. Where this latter observation has been made, a particularly bright spot has been noticed in the zodiacal light, located directly opposite the sun's position below the horizon. This bright spot is called by the German name *Gegenschein*, or 'opposing light,' from its being opposite the sun.

No thoroughly satisfactory explanation has yet been found for this rather puzzling phenomenon. Some think it merely a very extended outer envelope of the sun, inclosing the corona (see SUN) and extending very far beyond it into space. A more plausible theory supposes the whole thing to be caused by a ring of small particles revolving about the sun nearly in the ecliptic plane. Such a ring would have an analogue in Saturn's ring, and in the zone of planetoids (q.v.). And solar light reflected from the countless particles of the ring would give the faint luminosity both of the zodiacal light and the *Gegenschein*. But the whole theory of this phenomenon is still in debatable ground, and invites further attention from astronomers.

ZO'Ë (Lat., from Gk. *Ζωή*) (c.978-1050). A Byzantine empress, the last of the Macedonian dynasty. She was the daughter of Constantine VIII., by whom she was married to the patrician Romanus Argyrus. The latter came to the throne in 1028, but was assassinated by Zoë and her favorite chamberlain, Michael the Paphlagonian (1034). The Empress thereupon married her accomplice, who reigned as Michael IV. until 1041. After his death the Empress elevated to the throne his nephew, Michael V., but was imprisoned by the latter. Released with her sister in 1042, Zoë deposed and blinded the young Michael. She then, after sharing the throne for a few months with her sister Theodora, gave the Imperial power to a third husband, Constantine IX. Monomachus.

ZOËGA, tsô-ā′gȧ, Georg (1755-1809). A Danish archæologist, born at Dahler, in Jutland. He studied at the University of Göttingen, and after teaching and traveling in Italy became a Catholic in 1783, and settled at Rome, where he was appointed Danish Consul-General in 1798, and died in 1809. His studies of coins and manuscripts were of great value. His publications include: *Numi Ægyptii Imperatorii* (1787); *De Origine et Usu Obeliscorum* (1797); a work in Italian on the bas-reliefs of ancient Rome (1808); and *Catalogus Codicum Copticorum Manuscriptorum* (1810), which was his greatest work. Consult Jörgensen, *Georg Zoëga* (Copenhagen, 1881).

ZOËTROPE (from Gk. *ζωή*, *zōē*, life + *τρόπος*, *tropos*, a turning). An optical instrument most often seen in the form of a toy, to exhibit pictures with the appearance of motion. See Kinetoscope, and for illustration Fig. 10 under Illusion. See also Stroboscope.

ZOG′BAUM, Rufus Fairchild (1849—). An American artist and descriptive writer, born in Charleston, S. C. He was specially distinguished for delineation of military and naval subjects. Educated at the Art Students' League, New York (1878-79), and under Léon Bonnat in Paris (1880-82), he made studies of the great European armies in the field and in their garrison life, and wrote a series of articles, illustrated by himself, that were begun in 1884 in *Harper's Monthly* and published in book form (1887) as *Horse, Foot, and Dragoons*. Later works, dealing with naval matters, were *All Hands* and *Ships and Sailors*.

ZOI′LUS (Lat., from Gk. *Ζωίλος*). A Greek rhetorician, born at Amphipolis, in the third century B.C. On account of the severity with which he assailed Homer, he was called *Ὁμηρομάστιξ* (Homer's scourge). Dionysius of Halicarnassus, however, ranks him among the best critics. None of his works are extant. Consult Spindler, *De Zoilo Homeromastige qui Vocatur* (1888-89).

ZOISITE (named in honor of Baron von *Zois*, the discoverer of the mineral). A mineral hydrated silicate of aluminum and calcium crystallized in the orthorhombic system. It has a vitreous or pearly lustre, and is gray to brown, and sometimes green or red in color. It occurs chiefly in crystalline schists, especially those containing the amphiboles, and also in graphite. It is found in Norway, Scotland, Austria, Saxony, Switzerland, and in the United States at various localities in Massachusetts, Connecticut, Pennsylvania, North Carolina, and Tennessee. A rose-red variety, sometimes used for ornamental purposes, is found in Norway, and is called *thulite*, after Thule, an ancient name for Norway.

ZOLA, zô′lȧ′, Emile (1840-1902). A French naturalistic novelist, born in Paris, April 2, 1840. His father was a Venetian with Greek blood in his veins. Zola studied at the Lycée Saint-Louis, but after twice failing to get his bachelor's degree, he found work in 1862 in the publishing house of Hachette in Paris, and at the same time began to write for the newspapers. He had already written a number of novels and tales, his first book being the *Contes à Ninon* (1864), when in 1869 he undertook to relate in a series of connected volumes what he called the "Physiological history of a family under the Second Empire." To this family he gave the name of "Rougon-Macquart." The first novel of the series, *La fortune des Rougon*, was not published until 1871, after the fall of the Empire. Other novels of the series, *La curée* (1870), *Le ventre de Paris* (1873), *La conquête de Plassans* (1874), *La faute de l'Abb! Mouret* (1875), and *Son excellence Eugène Rougon* (1876), succeeded each other until 1876 without arousing much attention. But the seventh novel of the series, *L'assommoir* (1878), achieved instantaneous success. It was a powerful picture of life among the working class of Paris and of the havoc created therein by alcoholism.

The pictures presented by Zola were realistic beyond anything that had been known hitherto in French literature. The ugly side of life was presented with a descriptive fullness and a boldness of vocabulary from which French masters of realism had always shrunk. Zola, of course, was attacked as well as praised. In defending himself he claimed to have ushered in a new literary school, which he called 'naturalistic.' His novels were described by him and the followers whom he soon gathered about him as 'documents' intended to give to the public a complete picture of French contemporary society. The success of *L'assommoir* was repeated in 1880 by *Nana*, and later by several other novels of the series, notably by *Germinal* (1885). The whole series consisted of 20 volumes, the last two of which, *La débâcle*, dealing with the unreadiness of France for the Franco-German War, and *Le Docteur Pascal*, were published in 1892 and 1893.

This series contains Zola's most remarkable productions. It is very uneven; it must be admitted that some of the volumes, *Pot-Bouille* (1882), for instance, which claims to be a picture of the life of the middle class, present hardly anything that is not nauseating and at the same time tedious in the highest degree. Others, *Germinal, La terre* (1887), *La bête humaine* (1890), *L'argent* (1891), *La débâcle* (1892), are works of great power. It need hardly be said that not one of these is free from the features that are known as objectionable. In fact, passages which seem to be quite unnecessary to the development of the story would indicate that Zola took pleasure in introducing into his books, thanks to his literary skill, descriptions which no other writer would have dared attempt. While presenting to the public the productions of his creative imagination, Zola considered it his duty also to develop his literary theories and to attack those of his opponents; this was done in a number of volumes of literary criticism, the most important of which were *Le roman expérimental* (1880) and *Les romanciers naturalistes* (1881), so that it is not very difficult, through a comparison of his theoretical utterances with his practical performances, to see whether Zola achieved exactly what he claimed to do. The enemy against which he loved to direct his sharpest attack is romanticism; the intellectual faculty which he seems most to descant against is imagination; and yet any one who takes the trouble to analyze the literary elements of his style of writing, and carefully to examine the events that succeed each other in the development of his plots, is almost inevitably led to the conclusion that Zola never entirely shook off the influence of the romantic school, and especially of its great master, Victor Hugo. He was himself carried away by his creative imagination more often than he kept it under control.

After concluding the series of the Rougon-Macquart, Zola undertook successively two new series: the Three Cities, *Lourdes, Rome, Paris,* published between 1894 and 1898, and finally the Four Gospels, *Fécondité* (1899), *Travail* (1900), *Vérité* (1902), and *Justice. Justice* remained unfinished at his death. Zola was ambitious also of winning success on the stage, but this ambition of his was not fully gratified.

Had Zola died before the year 1898, he would be remembered solely as a literary character. The date which marks the beginning of his career as a public man is that of the letter to President Faure by which he threw himself into the thickest of the fight connected with Alfred Dreyfus (q.v.). Zola was convinced not only that Dreyfus had been unjustly sentenced, but also that the methods employed to secure his conviction and to shield others, whom Zola considered the real criminals, constituted in themselves crimes deserving of the highest punishment. His letter of January 13th, known by the title "J'accuse . . ." (I accuse), words which were repeated a number of times in the body of the letter, denounced these acts and called for their speedy and exemplary punishment. He at the same time dared the French Government to prosecute him. Prosecution was begun, however, and his trial by jury in Paris lasted from February 7 to February 23, 1898. Zola was convicted of libeling the military authorities and sentence was passed upon him imposing a fine of 5000 francs and six months of imprisonment. Zola appealed to the Court of Cassation, which on April 2d quashed the proceedings and ordered a new trial. This new trial took place at Versailles in July, and Zola was again condemned, but meanwhile he fled to England, where he remained hidden till June 4, 1899, writing *Fécondité*. A few months later, a bill granting amnesty to all offenders connected with the Dreyfus case having been brought forward by the Waldeck-Rousseau Cabinet and passed by the two Houses, Zola, who had kept up his fight, returned to France, where he was received by his friends and admirers as one of the greatest and most eloquent defenders of human rights. On September 29, 1902, Zola was found dead in his bedroom, where he had been suffocated by gas from a defective flue. He received a public funeral. Most of Zola's works can be had in an excellent English translation by Vizetelly. Consult Brunetière, *Le roman naturaliste* (Paris, 1883).

ZOL'LICOF'FER, Felix Kirk (1812-62). An American soldier and politician, born in Maury County, Tenn. After receiving a limited education he learned the printer's trade and for a time published a paper at Paris, Tenn. He served in the Seminole War, but returned in 1837, and resumed editorial work. In 1841 he became associate editor of the Nashville *Banner*, the leading Whig paper of the State. From 1844 to 1849 he was State Comptroller, but resigned and served in the State Senate. From 1853 to 1859 he was a member of the National House of Representatives. He attended the Peace Conference in Washington in 1861, but when hostilities became inevitable, accepted the appointment as major-general of the State troops May 9, 1861. He became brigadier-general in the Confederate Army, and on July 9th was assigned to a command in East Tennessee, where he adopted a conciliatory policy on account of the strong Union sentiment. At Mill Springs, Ky., on January 19, 1862, while reconnoitring, he came upon the Union lines and was killed by a volley from the Fourth Kentucky Regiment.

ZOLLIKOFER, tsôl'lê-kō'fĕr, Georg Joachim (1730-88). A Swiss divine, born at Saint Gall, and educated at the University of Utrecht. In 1753 he took charge of the Reformed Congregation at Leipzig, where he remained till the end of his life. He was an eloquent preacher and was held in high esteem on account of his manly and upright character. He is author of a hymn-book, *Neues Gesangbuch, oder Sammlung geistlicher Lieder und Gesänge* (1766), and his sermons were often published collectively.

ZÖLLNER, tsĕl'nĕr, Heinrich (1854—). A German composer and musical conductor, born at Leipzig, son of Karl Friedrich Zöllner. He studied jurisprudence and from 1875 music at the Leipzig Conservatory under Reinecke, Jabassohn, Richter, and Wenzel.

ZÖLLNER, Johann Karl Friedrich (1834-82). A German astronomer and physicist, born in Berlin. He studied at the universities of Berlin and Basel, and became in 1866 assistant professor and in 1872 professor of physical astronomy in Leipzig. In 1872 Zöllner developed a theory, according to which the comets are not incandescent through heat, but glowing with electricity. He also made observations in regard to the solar constitution, and was one of the first with Huggins to apply the 'open-slit' method to the study of solar prominences (1869). In 1870 he made observations for determining the solar temperature by investigating the intensity of the solar radiations at their source. He also made photometric observations of the Mercurian phases, determined the albedo (reflective capacity) of several of the planets, and observed their thermal conditions. He wrote: *Grundzüge einer allgemeinen Photometrie des Himmels* (1861); *Photometrische Untersuchungen* (1865); *Ueber die Natur der Kometen* (1871, 3d ed. 1883); *Prinzipien einer electrodynamischen Theorie der Materie* (1876); *Wissenschaftliche Abhandlungen* (1877-81). He also edited Schuster's *Gibt es unbewusste und vererbte Vorstellungen?* (1879). In the latter part of his life he also turned his attention to spiritualistic and hypnotic studies. For his astronomical discoveries, consult Clerke, *History of Astronomy* (London, 1893).

ZÖLLNER, Karl Friedrich (1800-60). A German composer, born at Mittelhausen, Thuringia. He studied music under Schicht at the Thomasschule in Leipzig, became an instructor of vocal music at the Ratsfreischule in 1820, and two years later established a musical institute with his friend Hemleben. In 1833 he founded the Zöllner-Verein, a male chorus society. In 1859 twenty of these societies held a grand musical festival at Leipzig, and after his death united and formed the Zöllner-Bund. In 1868 a monument was erected to his memory in the Rosenthal, Leipzig. He deserves to be especially remembered for his compositions for male chorus, besides which his works include motets, songs for mixed chorus, and songs with pianoforte accompaniment. In 1878 he became musical director at the University of Dorpat, and in 1885 was appointed conductor of the Cologne Männergesangverein, the Wagner-Verein, and the Musical Society. With a picked male chorus, in 1889, he made a most successful tour through the principal cities of Italy. In 1890 he was elected conductor of the New York Deutscher Liederkranz. He accepted a call to Leipzig in 1898 to succeed Kretzschmar as musical director of the "Paulinerchor," a university male choral union. His works include the operas *Frithjof* (1884), *Faust* (after Goethe, 1887), the "Kriegsduologie," *Im Jahre 1870,* consisting of two two-act operas, *Bei Sedan* (1895) and *Der Ueberfall* (1895); the musical comedy *Das hölzerne Schwert* (1897); *Die Versunkene Glocke* (1899); and *Der Schützenkönig* (1902). His choral works are: *Die Hunnenschlacht* (1880); *Das Fest der Rebenblüte; Columbus; Hymnus der Liebe; Heldenrequiem,* for soprano solo, male chorus, and orchestra; the cantata *Die neue Welt,* which won the international prize at Cleveland, Ohio, in 1892; and the oratorio *Luther.*

ZOLLVEREIN, tsōl′fe-rīn (Ger., customs-union). Any customs union between several countries, for the purpose of establishing uniform customs tariffs between imports to and exports from the countries within the union and countries outside, while duties between the several contracting countries are reduced below the usual rate or abolished altogether. The term as generally used has reference to the German Zollverein, which was initiated in 1818 and culminated in 1871 in the general customs union of the new German Empire.

The necessity of meeting English competition in manufacture induced Prussia to take the lead in a movement to suppress the burdensome tariffs between the German States. By the law of May 26, 1818, Prussia abolished all internal customs, and enacted a general tariff, to be levied only at the boundaries of the kingdom. On January 18, 1828, Bavaria and Württemberg agreed to adopt a single tariff system, and to divide the net proceeds of the duties in proportion to their respective populations. A little later, February 14, 1828, Prussia and Hesse-Darmstadt entered into a union based on the same principle. On September 24, 1828, the Middle German Handelsverein was formed by Saxony, the Saxon duchies, Hesse-Cassel, Brunswick, Oldenburg, the minor Thuringian States, Hanover, Bremen, and Frankfort, for the purpose of preventing the union of the two former. This Middle German Union differed greatly from the two other unions in that it allowed each of the contracting States to levy such import duties as it chose, except on some enumerated articles which were admitted free.

This movement suggested to Prussia the bold plan of uniting the three unions of the south, north, and middle into a single German Zollverein. On May 27, 1829, a commercial treaty was effected between the North German and the South German unions. Each granted to the other mutual free trade for products of the several States, a uniform duty of 25 per cent. on certain manufactured articles, and it was agreed that there should be a gradual approximation of both systems of duties. On the 22d of March, 1833, the union of the North and the union of the South adopted a system of complete customs and commercial union, which was to go into effect January 1, 1834, for a period of eight years, and might be renewed every 12 years, unless denounced by either party to the agreement. Saxony and the States of Thuringia united in 1833 into a Zollverein having a common tariff of export, import, and transit, and establishing free trade between the contracting States except for certain enumerated articles.

In 1834 Hanover, which had taken an active part in the formation of the union of the Middle German States with Brunswick, Oldenburg, and some other States, organized a rival association to the Prussian Zollverein under the name of the Steuerverein, which fixed duties much lower than those of the Zollverein. The rivalry of the Steuerverein did not check the growth of the Zollverein. In 1835 Baden and Nassau came into the union; in 1836, Frankfort; in 1841, Brunswick, which seceded from the Steuerverein; and in 1842, Luxemburg. The Zollverein concluded treaties during these years with England, Holland, and Belgium.

Austria had consistently opposed the increasing power of Prussia by trying to block every commercial union proposed by the latter Power. Prussia on its part wished to exclude Austria from any part in the proposed all-German Zollverein to be formed by the union of the Zollverein and the Steuerverein. Several States became dissatisfied with the attitude of Prussia, and at length Bavaria, Saxony, Württemberg, and Baden made the ratification of the treaty between the Zollverein and the Steuerverein contingent upon the admittance of Austria into the new customs federation. After much negotiation, during which Austria threatened to form a rival union with the States of the South, Prussia was induced to sign on the part of the Zollverein a treaty granting certain commercial concessions to Austria. This treaty was to go into effect January 1, 1854, for 12 years.

In 1861 a new difficulty arose when France proposed to the Zollverein complete reciprocity and freedom of transit, freedom from export duties, and treatment as the most favored nation. Prussia alone conducted the negotiations, without consulting the other States of the Zollverein. On March 29, 1862, Prussia signed the convention with France, and some time after invited the other members of the Zollverein to stand by the treaty. Saxony, by reason of its commercial interests, accepted the treaty. Bavaria, Württemberg, Hanover, Nassau, and Hesse-Darmstadt, on the contrary, refused to accept the treaty and went with Austria, which renounced all idea of commercial union in 1864, and in 1865 Prussia definitely excluded that State from the Zollverein. During the war between Austria and

Prussia in 1866, the political allies of Austria—Bavaria, Württemberg, Baden, Nassau, and Frankfort—kept the terms of the Zollverein with Prussia, so that there was exhibited the curious spectacle of countries engaged in open hostilities living under the same tariff system and maintaining free exchange. After the War of 1866 Prussia forced upon Württemberg, Baden, and Bavaria a new pact which substituted for the conference of delegates from the sovereign and independent States (Zollkonferenz) an in-and-out assembly consisting of a Zollbundesrat, representing the States, and a Zollparlament, composed of the North German Reichstag and representatives from the South German States. Instead of the unanimous vote for enacting new regulations, a mere majority of each assembly was made sufficient. The representation of the States was not equal, Prussia having 17 out of 58 representatives in the Zollbundesrat and a preponderating influence in the Zollparlament. Besides, Prussia had the presidency of the Zollbundesrat, with the right to make treaties of commerce in the name of the union with foreign powers. This union was replaced by the Zollverein, the German Empire of 1871.

In 1872 Alsace-Lorraine was included in the German Zollverein under the Imperial Government, and in 1888 the free cities of Hamburg and Bremen joined. The new German customs union embraces all the States of Germany, though its limits do not conform exactly to the limits of the Empire, the so-called 'free ports' (parts of Bremen and Hamburg) being excluded, while the Grand Duchy of Luxemburg and the Austrian communities of Jungholz and Mittelburg form part of the union. Duties on exports were abolished in 1873. The customs receipts for the most part go to the Imperial treasury, but one-half of the duties on tobacco in excess of 130 million marks is divided among the federated States according to population.

Among other instances of customs unions may be mentioned that established in 1889 between Cape Colony and other British colonies and the Orange Free State. More recently attempts have been made to bring about a closer commercial union between the several parts of the British Empire. In 1887, at the colonial conference, Hofmeyr, of Cape Colony, for the first time developed a scheme for a uniform extra-differential duty upon all foreign imports into Great Britain. In 1891 this idea was brought before the House of Lords by Lord Dunraven. In 1894 the Ottawa Conference discussed the matter at some length. Since 1899 the matter has been pressed by Joseph Chamberlain, formerly Colonial Secretary of the Empire. It has been suggested that the United States form a customs union with the South American States, Mexico, and Central America, and Mr. Blaine while Secretary of State, 1889-92, attempted to bring about closer commercial relations by means of reciprocity treaties. No appreciable results have been accomplished by this policy, and there are no prospects of a Zollverein being formed among the American countries.

Consult: Dittmar, *Der deutsche Zollverein* (Leipzig, 1867); Worms, *L'Allemagne économique ou histoire du Zollverein allemand* (Paris, 1874).

ZOMBOR, zôm'bôr. A royal free town of Hungary, capital of the County of Bács-Bodrog, situated on the Francis Canal, about 120 miles south of Budapest (Map: Hungary, F 4). The chief industries are the manufacturing of flour and matches. Population, in 1900, 29,609.

ZONA LIBRE, thō'nȧ lē'brȧ (Span., free zone), or Free Zone. A name applied to the strip of country, 20 kilometers wide, extending across the northern frontier of Mexico from the Atlantic to the Pacific. Foreign goods introduced into the Zone pay only 18½ per cent. (formerly only 2½ per cent.) of the regular duties, provided they are used within the district. The Zona Libre at first included only the State of Tamaulipas, and was proclaimed, March 27, 1858, by the Governor, who, in order to meet the competition of the American towns on the left bank of the Rio Grande, especially in food products, remitted all Federal duties on materials consumed entirely within his State—a policy that was sanctioned, in 1861, by the Federal Congress. Almost coincident with this proclamation came the American Civil War. The advantage of neutral ports caused a great increase in the commerce of Tamaulipas, and a resulting prosperity partly (but wrongfully) attributed to the establishment of the Free Zone. Various attempts were made by the Mexican Congress to regulate matters within the Zone. In 1885 it was extended across the whole frontier; in 1887 the privileges within the Zone were greatly increased. In 1891 duties were levied on manufactures within the Zone, if they were sent into the interior of Mexico, in the same manner as upon foreign goods; but in 1896 these duties, with certain restrictions, were removed. The general complaint from the interior of Mexico is that other manufacturers cannot compete with those of the Zona Libre, who obtain their raw products at a much lower rate; but this advantage has been largely neutralized by the decline in the value of silver. Shortly after the Civil War there was great opposition to the Free Zone along the United States border, it being claimed that its existence promoted smuggling and built up the Mexican towns at the expense of their American neighbors. The necessity for maintaining the Zone, in order to secure cheap food products in the Rio Grande Valley, no longer exists.

ZON'ARAS, Joannes (Lat., from Gk. *Ἰωάννης Ζωναράς*). A Byzantine annalist of the first half of the twelfth century. He lived at Constantinople, where he was commander of the Imperial guard and private secretary to Alexius I. and Joannes Comnenus. In the reign of the latter he became a monk at Mount Athos, where he devoted himself to writing. His most important work is the *Chronicon* or *Annales*, which relates the history of the world from the creation to 1118, the date of the death of Alexius I. He drew upon Josephus, Xenophon, and Plutarch; but the chief value of his works, in view of the fact that his contemporary record is meagre, is in that he follows the first twenty books of Dion Cassius, which are known to us only in this way. He also wrote an *Exposition of the Apostolical Canons*. A *Lexicon*, edited by Tittmann (1808), is falsely attributed to him. The *Chronicon* was edited by Dindorf (Leipzig, 1868-75).

ZONE (Fr. *zone*, from Lat. *zona*, from Gk. *ζώνη*, girdle; connected with Lith. *justa*, OChurch Slav. *po-jasŭ*, girdle, Alban. *ngeš*, I gird, Av.

yāsta, girded). A subdivision of the earth's surface, determined by certain astronomical conditions. The boundary lines of the zones are parallels of latitude, so that a zone includes all of the earth's surface lying between two given parallels of latitude. The *torrid zone* lies between the parallels of 23° 28′ N. and 23° 28′ S. This number corresponds to the inclination of the earth's orbital plane to the equatorial plane; the sun is always vertically overhead over some point within that zone.

The *polar* or *frigid zones* lie between the poles and the parallels of 66° 32′ N. and S. Within them the solar rays always strike the earth very obliquely, and great cold results. The *temperate zones* lie between the polar and torrid zones. See CLIMATE, EARTH; SEASONS; ECLIPTIC; SOLSTICE; TROPIC.

ZONE (in mathematics). See SPHERE.

ZOÖGEOGRAPHY, or GEOGRAPHICAL ZOÖLOGY. See DISTRIBUTION OF ANIMALS.

ZOÖLOGICAL GARDEN. The rapid decrease of wild life throughout the world, and the steadily increasing desire of mankind to become acquainted with living wild animals, has led to the development of three distinct types of vivaria. The term 'zoo' commonly indicates a small and unpretentious menagerie, located in a public park. A 'zoölogical garden' usually is a compact establishment occupying from 20 to 60 acres of park land in a city, easy of access, but with relatively limited areas for its animals. A zoölogical park usually occupies from 100 to 260 acres of picturesque land and water situated in the suburbs of a city, wherein the hardy animals are provided with large areas amid natural surroundings appropriate to their wants, and the tropical species are housed in heated buildings. The movement which began in Paris in 1804, in the Jardin des Plantes, has splendidly culminated in the magnificent gardens of Berlin, London, Amsterdam, Antwerp, Vienna, Copenhagen, Hamburg, Frankfort, Cologne, Dresden, Breslau, Hanover, and Rotterdam. Even remote foreign cities, such as Cairo, Calcutta, Tokio, Melbourne, Buenos Ayres, and Rio de Janeiro, have established zoölogical gardens for the free exhibition of living animals. Of all nations, Germany is far in the lead in the development of zoölogical gardens. Ten of her cities now possess them, and the one at Berlin, both in buildings and collections, is the leading zoölogical garden of the world, but the London garden is a close second. Throughout Europe generally, the zoölogical garden is a sort of family institution. Excepting the Jardin des Plantes, in Paris, and the Royal Garden at Vienna, all are owned, maintained, and operated by zoölogical societies, or stock corporations, which pay no dividends, and charge admission to all visitors who are not members. In most cases, however, the cities benefited have furnished public park lands free of rental, and free of control other than respecting the cutting of trees. The funds for maintenance are derived from the annual dues of members, gate receipts, lease of restaurants and other privileges, and the sale of animals. The Zoölogical Society of London had in 1903 a membership of more than 3000 persons who paid annual dues of $15. The Amsterdam Society contained 4500 members who paid $10 each, and the Royal Zoölogical Society of Antwerp led all with a membership of 7000, yielding an annual income of $70,000.

In America the public desire for better acquaintance with wild creatures had, up to 1903, resulted in two regularly established zoölogical gardens, at Philadelphia and Cincinnati; two zoölogical parks, at New York and Washington; and municipal 'zoos' in the public parks of nearly twenty other cities. The establishments in Lincoln Park, Chicago, and in Highland Park, Pittsburg, are the largest and most important of the municipal 'zoos.'

Of the four most important zoölogical institutions in the United States, that of the Philadelphia Zoölogical Society was the pioneer, having been founded in 1871. The equipment of buildings and other improvements in this fine garden, and the animal collections they contain, are surpassed only by the oldest and wealthiest gardens of Europe. The Cincinnati garden is a great credit to Cincinnati, and is as large a garden as can expect adequate support in a city below the size of a great metropolis.

The New York Zoölogical Park represents one of the latest and greatest undertakings in vivarium development and maintenance. A private corporation, called the New York Zoölogical Society, having, in 1903, about 1400 members, made in 1895 an agreement with the city of New York to expend $250,000 of its own funds on buildings and other installations for live animals, to supply perpetually all the animal collections, and admit the public without charge on all days save Mondays and Thursdays. In return the city gave a free site, agreed to pay for all ground improvements and additional buildings, furnished free water and police protection, and an annual maintenance fund, but gave the society absolute freedom in management. The land granted by the city consists of 261 acres in Bronx Park, by far the largest area occupied anywhere in a city for the exhibition of live animals. The funds of the Zoölogical Society are derived from the annual dues of members ($11,000), and larger membership fees, and special subscriptions. The New York Zoölogical Park is a fair illustration of the American idea of an institution for the exhibition of wild animals, which in space and comfort for the collections should stand midway between the zoölogical garden and the great private game preserve. For the hardy animals that live in the open air, green turf, water, rocks, shade, and sunlight have been provided to the limits of reasonable liberality. Thus far this experiment has been regarded as successful, and already its influence is noticeable.

The National Zoölogical Park, at Washington, was established by Congress in 1889 through the initiative of William T. Hornaday, and the joint efforts of G. Brown Goode, S. P. Langley, James B. Beck, then United States Senator from Kentucky, and Senator Knute Nelson, then a member of the House of Representatives. It is under the direction of the Secretary of the Smithsonian Institution, and is supported by Congressional appropriations. Through the lack of a comprehensive general plan of development, the Congressional sympathy and support, which only such a plan and its gradual fulfillment can enlist, have been weak, and the development of this park has been retarded. Its animal collections, however, are in admirable condition, and contain many rare and valuable species.

ZOÖLOGICAL STATION. An institution for the study of living animals. Such stations are of three principal sorts: marine, fresh water, and inland. The first to be developed was the marine station, the great importance of the study of marine animals and the comparative expensiveness of apparatus for marine investigation leading to the establishment of great laboratories on the seashore. The most famous and finest of the marine laboratories is the one founded by Anton Dohrn (q.v.) at Naples in 1870. The Berlin Academy of Sciences and the German Government aided in building this institution, and granted it an annual subsidy of $40,000. Tables are rented by various European governments and societies and by the many educational institutions. In the United States the earliest zoölogical laboratory was that founded in 1873 by Louis Agassiz on the island of Penekese, in Buzzard's Bay, Mass. Later Alexander Agassiz founded a private laboratory at Castle Hill, Newport, R. I., and in 1877 Prof. W. K. Brooks, of Johns Hopkins University, opened a provisional laboratory first at Fort Wool, Va., then at Crisfield, Md., and in 1880 at Beaufort, N. C. In 1889 the United States Fish Commission established a station at Beaufort. The Marine Biological Laboratory was founded at Woods Hole, Mass., by the Woman's Education Association of Boston, and in 1890 a large public marine laboratory was founded by the United States at Cold Spring Harbor, L. I. On the Pacific Coast the Leland Stanford University has established a laboratory at Pacific Grove. In Europe there are laboratories in the Isles of Solovetsky in the White Sea, at Tromsö, Norway, and at other points on the Scandinavian peninsula; at Copenhagen, at Heligoland, at Kiel, at Saint Andrews, Scotland, at Port Erin (Isle of Man), at Plymouth, at Wimereux (near Boulogne), at Saint-Vaast-la-Hogue (Tatihou Island), at Roscoff (Finistère), at Villefranche (near Nice), and at many other points. Freshwater zoölogical stations in America include those established at Havana, on the Illinois River, by the Illinois State Laboratory of Natural History; on Winona Lake, by the University of Indiana; at Sandusky, Ohio, on Lake Erie, by the Ohio State University; and at Put-in-Bay, on Lake Erie, by the United States Government. See LABORATORY.

ZOÖLOGY (from Gk. *ζῷον*, *zōon*, animal + *λογία*, *-logia*, account, from *λέγειν*, *legein*, to say). The science which treats of animals. It is divided into morphology and histology, physiology and psychology, reproduction and embryolgy, systematic zoölogy or classification, paleontology, zoögeography, evolution, and bionomics.

THE HISTORY OF ZOÖLOGY. The earliest zoologist was Aristotle (B.C. 384-322). Down to the period of Ray and Linnæus he was the only naturalist worthy of the name. His works, *The History of Animals, The Generation of Animals*, and *The Parts of Animals*, contain, besides erroneous facts and views, many singularly correct statements. He recognized some of the more important groups, which he called 'genera.' Such were the Malakia or cephalopods, Malacostraca or soft animals with shells (the higher crustacea), Entoma (insects, arachnids, myriapods, and the higher worms), etc. He also dissected the cuttlefish, octopus, and other animals.

Zoölogy as a descriptive science dates from the time of Linnæus (q.v.), but it was not until the rise of comparative anatomy, embryology, morphology, paleontology, and the evolution theory that it became a well-grounded science. The predecessors of Linnæus were Malpighi, Leeuwenhoek, Swammerdam, Redi, and Harvey (q.v.). Harvey in 1616 discovered the use of the heart and the mode of the circulation of the blood in arteries and veins, and from his observations on the development of the chick declared that all living things arise from an egg by a gradual process of growth and differentiation (epigenesis). The invention of the microscope by the Janssens (1590-1600) and its improvement during the seventeenth century enabled Malphigi to discover the organs named after him. Leeuwenhoek (q.v.) discovered the blood-corpuscles, striated muscle-fibres, dentinal canals, epidermal cells, and described certain infusoria, rotifers, and Hydra. Swammerdam dissected insects and snails, and worked out the metamorphosis of certain insects. Redi was the first to combat the notion of spontaneous generation (q.v.), while Hamen (1677) discovered the sperms of animals. The history of zoölogy may be roughly divided into four periods:

(1) Toward the end of the seventeenth century Ray, basing his ideas of the classification of animals mainly on the work of Aristotle, was the first to arrive at some conception of species and of specific characters. But it was Linnæus to whom we are indebted for binomial nomenclature; and the first genuine though very imperfect classification of animals (q.v.) dates back to the *Systema Naturæ*, the tenth edition of which appeared in 1758. He recognized genera, orders, and classes, dividing the animal kingdom into six of the latter. As the result of his influence, his own pupils, and also Pallas, did much to advance zoölogy, while the anatomists and physiologists of this period were Camper, Wolff, Spallanzani, Hunter, and Vicq d'Azyr, the latter of whom proposed the term 'comparative anatomy,' also previously used by Leibnitz. Lamarck (1744-1829) divided animals into 'vertebrate' and 'invertebrate,' and reorganized the latter division, founding the classes of Infusoria, Radiata (Echinodermata), Annelida, Arachnida, and Crustacea. He was far in advance of any other zoölogist from the time of Linnæus to that of Cuvier. Geoffroy Saint-Hilaire also advanced our knowledge of the vertebrates by establishing the orders Monotremata and Marsupialia, the latter forms having been distributed among the rodents and primates.

(2) Cuvier (q.v.) was the founder of comparative anatomy and vertebrate paleontology, while Lamarck founded invertebrate paleontology. Cuvier's work as a comparative anatomist, showing the importance of structure as the basis of all classifications, was most important. In dividing the animal kingdom into four branches, he led the way for the recognition of the more numerous phyla constituting the animal world. Early in the nineteenth century Geoffroy Saint-Hilaire advanced embryology, and founded the doctrines of the unity of organization and of homologies, which paved the way for the theory

of descent. Vicq d'Azyr established the principle of serial homology. Bichat was one of the founders of histology. France at this time led the scientific world, though Germany had her Blumenbach, who founded anthropology, her Döllinger, the teacher of later embryölogists, Tiedemann, Bojanus, and Carus. Meckel, in his time the leading German anatomist, studied at Paris with Cuvier, as did Milne-Edwards, while Owen felt his influence.

The great activity shown by Cuvier in building up the Jardin des Plantes led to the French exploring expeditions sent out from 1800 to 1832 to all parts of the globe, resulting in enlarged views regarding the number and distribution of species, and their relations to their environment. The zoölogists of these expeditions were Bory de Saint-Vincent, Savigny, Péron, Lesueur, Quoy, Gaimard, Le Vaillant, Eydoux, and Souleyet. From 1823 to 1850 England fitted out exploring expeditions under Beechey, Fitzroy, Belcher, Ross, Franklin, and Stanley, the naturalists of which were Bennett, Owen, Darwin, Adams, and Huxley. Russian explorations (1803-29) were accompanied by Tilesius, Langsdorff, Chamisso, Eschscholtz, and Brandt, all of them of German birth and education. The United States Exploring Expedition under Wilkes (1838-42) was, in scientific results, not inferior to any previous ones, the zoölogists being Dana, Couthuoy, and Peale. Of a later voyage under Ringgold, Stimpson was the naturalist, but the rich final results were lost by fire. At or near the close of this period, from Germany, Humboldt, Spix, the Prince of Wied, Natterer, Perty, Reugger, Tschudi, Schomburgk, Burmeister; from France, De Azara, D'Orbigny, Gay, Castelnau; and from Denmark, Lund, traveled at their own expense, an evidence of the spirit of scientific research then dominating the centres of civilization. Their followers were Wallace, Bates, Semper, Belt, Michlucho-Macleay, Przhevalski, the brothers Sarasin, and many others. The voyage (1872-76) of the *Challenger* (q.v.) was momentous in its results, which are published in 30 quarto volumes, mostly containing reports on the zoölogical results contributed by the leading systematic zoölogists of the last half century.

(3) A third period has been distinguished (1) by the discovery by Schleiden and by Schwann (1838) that all organisms are formed of cells, and by the studies of Dujardin, of Mohl, and of Schultze on the nature of protoplasm (q.v.), proving that the cell is the unit of organization, and that protoplasm is the basis of life; (2) by the application of histological discoveries and methods to embryological research; and (3) by the use of the doctrine of evolution as a working theory to account for the common origin of animals from a single simple primitive organism. The first great steps in the explanation of the mode of reproduction and development were the discovery of spermatozoa by Hamen, a student of Leeuwenhoek, and that of the mammalian egg by De Graaf in 1673. The old theory of preformation was overthrown and that of epigenesis, or formation by the differentiation of the egg-protoplasm, was established by Wolff in 1759. In 1829 Von Baer showed that all mammals develop from eggs, while Coste, Valentin, and Jones proved that these eggs are homologous with those of the lower vertebrates. The real nature of fertilization was not finally settled until Barry in 1843 observed the union of ovum and spermatozoön in rabbits, and Kölliker in 1846 proved that spermatozoa develop from the cells of the testes. The next important advance was the discovery in vertebrates by Von Baer of the germ layers; Huxley identified two of these layers in the cœlenterates. Later steps were the recognition by the brothers Hertwig of the mesoblast and the cœlomic cavity, the observations of Lang and Sedgwick on metameric segmentation, and the homology of the blastopore in the embryos of all many-celled animals. All these discoveries gave an impetus to morphology (q.v.) and established it on a thorough and broad basis of facts. Von Baer also showed that the tissues arise from embryonic cells, their formation going on simultaneously with the process of differentiation and development of organs. He thus discovered what is known as 'Baer's law,' i.e. that the development of the individual is an epitome of that of the class to which it belongs; and that while the embryos of the animals he studied are at first very similar, they diverge more and more as growth and differentiation advance. These laws did not suggest to him the theory of the blood-relationship of the vertebrate and other classes, but led him, as it afterwards did Agassiz, to support Cuvier's view that the animal kingdom was divided into four distinct, unrelated branches or subkingdoms, and that consequently there was no unity of type, as Cuvier asserted in his famous debate with Geoffroy Saint-Hilaire before the French Academy of Sciences.

The school of transcendental anatomists founded by Oken (1807) and Goethe (1739-1832), succeeded by Carus and Owen, resulted in the so-called vertebrate theory of the skull; which, though crude and speculative, yet had its philosophical *raison d'être.* Although the skull of vertebrates, as first shown by Huxley, is not truly a series of modified vertebræ, yet, as in worms and especially in arthropods, the head of vertebrates is segmented, as shown by the serial homology of the embryonic gill-arches and of the cranial nerves. Moreover, Goethe, as did Lamarck, recognized the significance of vestigial structures, and Goethe made the truly scientific prediction of the presence of the premaxillary bone in the head of man, the supposed absence of the homologue of that bone having been before his time supposed to be a decisive feature separating man from the apes. Owen's *Report on the Archetype and Homologies of the Vertebrate Skeleton* (1846) was the outcome of this preëvolutionary method and point-of-view. The old doctrine of archetypes and plans of creation reached its culmination in this book, in which, without reference to the lowest vertebrates and to the early mode of development of animals of this type, Owen (q.v.) considered that the shoulder and pelvic arches were modified ribs, the shoulder arch belonging to the 'occipital vertebra,' and the limbs themselves being 'diverging appendages' or 'uncinates.' Yet this theory was the fault or erroneous way of thinking of the period in which he lived, and Owen was the greatest of English comparative anatomists, his works giving a great impetus to zoölogy.

The first epochal step in unraveling the morphology of the arthropod classes was taken by

Savigny (1816), who showed that the mouthparts of insects, crustaceans, etc., were modified limbs, and this gave a clue to the segmental nature of the head of these animals, which is composed of a number of segments, different in each class, as shown by the later researches of embryologists. Savigny also taught that as a rule a segment bears but a single pair of appendages, while Audouin showed that the form of the arthropodan body was due to the atrophy of certain segments, or parts of segments, and the correlated hypertrophy of others. Other important advances in classification and anatomy were made by the labors of H. Milne-Edwards, the successor of Cuvier, who established the principle of the division of physiological labor, separated the Tunicata from the Mollusca, divided vertebrates into those with and without an allantois, and confirmed De Blainville's separation of amphibians from reptiles.

During the middle of the nineteenth century the great German anatomist, Müller, made extensive investigations on the embryology and metamorphoses of the echinoderms, revolutionized the classification of the fishes, and placed physiology on a new and higher basis. Meanwhile Vaughan Thompson (1836), by his discovery of the nauplius larva of the barnacles, had shown that instead of being worms they were genuine, but greatly degraded, crustaceans. In 1848 Leuckart broke up the Radiata of Cuvier, and separated the Cœlenterata from the echinoderms, regarding them as a distinct branch or type. Wiegman transferred the Rotifera from the Protozoa to Vermes; Siebold (1848) having established the group of Protozoa, showed their one-celled structure, and founded the type of Arthropoda; while Rudolphi, Leuckart, and Siebold pointed out the worm-like nature of the flatworms, now referred to a separate phylum.

The animal nature of sponges was not proved until after the middle of the nineteenth century, through the researches of Lieberkühn, Carter, Clark, and finally Haeckel, who, however, placed them with the cœlenterates, while their true position as a distinct phylum was assigned them by Hyatt. Through the investigations of Morse the Brachiopoda were removed from the Mollusca, as also were the Molluscoidea, and regarded as more nearly allied to the Annelida. Louis Agassiz (q.v.), one of the foremost zoölogists of his time (1807-73), greatly advanced our knowledge of the cœlenterates, among his discoveries being that of the hydroid nature of Millepora. He worked on the embryology of the fishes and reptiles, his great work on fossil fishes bringing order out of a chaotic mass of unclassified material. He also indicated the chief faunal divisions of North America. From the middle of the nineteenth century there has been published an uninterrupted series of monographic anatomical and embryological works on single animals in the line of those of Réaumur, Lyonnet, Strauss-Durckheim, and Herold, among which should be indicated those of the numerous students of Johannes Müller and Leuckart; the works of Agassiz and his students; of Huxley and his pupils; and of Lacaze-Duthiers and his successors.

Among the most remarkable and fruitful advances in embryology is Kowalevsky's discovery (1866) of the presence of the notochord and hollow nervous system in the embryo and larva of ascidians, which resulted in the removal of the Tunicata from the Molluscoida, and afterwards from the worms, to the neighborhood of the vertebrates; and to the establishment of the phylum of the Chordata, as well as the breaking down of the distinction between vertebrates and invertebrates; these, with the later researches of Semper, indicating the origin of vertebrates from some primitive annelid worm. The fact that the embryos of all animals above the Protozoa pass through a gastrula stage led Haeckel to suppose that his hypothetical gastrea was the ancestral form of all the many-celled animals.

The two founders of modern histology were Kölliker and Leydig. The former, besides his early discovery of the mode of development of sperm cells, and the proof he afforded of the existence of animal cells destitute of a cell-wall, gave a great impulse to the general histology of vertebrates, and the latter to that of the invertebrates, especially the sense-organs. Their pupils and successors, by the invention of refined methods and the use of reagents, especially by the invention of the microtome, have pushed fruitful investigations in embryological and morphological directions, greatly extending our knowledge of reproduction and cell-division, and laying the foundation for future special research in comparative physiology, especially of the brain, and in psychology, bearing especially on reflex, instinctive, and mental actions.

The studies of the earlier histologists and embryologists led to the foundation of cytology, or cell-science, and to a realization of the complex nature of protoplasm; work in which Fleming, Strasburger, E. Van Beneden, the two Hertwigs, Roux, Boveri, Wilson, and others took a leading part. On the results of their labors are based the theory elaborated by Weismann that the particles of the chromatin of the nuclear substance (chromosomes) are the bearers of heredity. A new department of cytology is that of the mechanics of development (q.v.), which is in the line of mechanical or dynamic evolution, taught by Lamarck, H. Spencer, Ryder, Cope, Hyatt, Roux, and others.

The metamorphoses of animals, especially those of insects, were in the beginning described by Lyonnet, Roesel, De Geer, Réaumur, and others, and in recent times by Fritz Müller, who pointed out the fact that the caterpillar and maggot form of larva are secondary, the most generalized and primitive insects not undergoing a metamorphosis. Müller also worked out the metamorphosis of certain Crustacea, and our knowledge of the larval forms of these animals has been greatly extended by Dohrn, Brooks, Smith, and others, with the result that the nauplius stage is now regarded as also an acquired one, and not a primitive feature. The most notable advance in our knowledge of the exact mode of metamorphosis in the most highly specialized insects, especially the flies, was made by Weismann in 1864. His demonstration of the making over of the body by the histolysis of the larval tissues, and the formation of the tissues of the adult from imaginal buds, brought about the final overthrow of the preformation notion. Through the labors of Barrande, Beecher, and others, the larval stage of trilobites and of Limulus is recognized to be a third arthropod larval type, the protaspis, perhaps the most primitive and trochosphere-like of all.

The problem of the ancestry of insects, the solution of which is based on our knowledge of larval forms and of the anatomy of primitive types, has been attacked by Brauer, Packard, Lubbock, Sylvestri, and others. Indeed, the latest results of work on the arthropods tends to show that this vast assemblage of forms is polyphyletic, and recently it has been subdivided into several phyla, each having a separate origin from some unknown worm allied to existing annelids, and each with a different type of structure. The heterogeneous group of Vermes has also been disintegrated into several phyla. These changes have in great part been necessitated by the advance made by the two Hertwigs, Lankester, and others in our knowledge of the cœlomic or body-cavity of different zoölogical groups.

Fresh attention is now being paid to a study of the life-history of the Sporozoa (q.v.). The story of the manner in which the germs are conveyed from one host to another, told by Grassi, Ross, and others, is one of the triumphs of modern zoölogy and medical skill. Here likewise the discovery of phagocytes by Metschnikoff, also by Kowalevsky, and of their action in destroying disease-germs or bacteria, and Metschnikoff's theory of inflammation, are among the most notable advances made in the nineteenth century.

As to vertebrate morphology the most important advances made during the last half of the nineteenth century are those contributed by Huxley, Gegenbaur, O. Hertwig, and others. While Huxley demolished the old view that the vertebrate skull consists of modified vertebræ, the skull elements being in reality dermal bones derived from scales, the German anatomists named, as well as Dohrn, Loey, and others, have shown that the head of vertebrates is made up of segments, as proved by the actual segments revealed in the embryo of the lower vertebrates, by the segmental arrangement of the muscles (myotomes), of the arteries, and of the cranial nerves. Apropos of the segmental arrangement of the organs of the vertebrate head, Loeb, as well as Schrader, from the point of view of experimental physiology, claim that no localization of functions exists, either in the brain or in the spinal cord of the cold-blooded vertebrates, and that the reactions observed are "only segmental reflexes, just as in the annelids and arthropods."

Another problem attacked by morphologists in late years is that of the origin of vertebrate limbs. Gegenbaur derived them from the archipterygion or primitive portions of the shark's fins. While Thatcher, Mivart, Balfour, Dohrn, and Wiedersheim have traced them back to the two primitive fin-folds of the lowest vertebrates. Here also belongs Dohrn's principle of change of function, one lying at the basis of the mechanical evolution of limbs and other organs. Another research started by Baldwin Spencer is the origin of the pineal gland and its nature as a third or median eye, a feature with little doubt inherited from amphioxus by the ganoid fishes, amphibia, reptiles, mammals, and even man, whose so-called pineal body or gland, was by the ancient anatomists supposed to be the seat of the soul. Its complex homologies were indicated by Gaup in 1901. And here might be mentioned the great advances in the anatomy of the brain both of arthropods and of vertebrates, particularly the recent thorough-going researches of Golgi on the rods of Corti, and of Ramon-y-Cajal on the minute anatomy of the cerebellum; all such very special work laying the foundations for modern physiology and psychology, and resulting in the neurone theory established between 1890 and 1900.

On the whole the most remarkable single discovery in zoölogy, and one of great moment to anthropology, is the detection of the remains of the Pithecanthrpus by Dubois (in 1891-92) in the late Tertiary strata of Java.

The aim and methods of modern paleontology, which is in reality the study of the ancestors of the forms now living, has come to be one of the main supports of the theory of descent. And this not only for the reason that it has revealed to us the remains of numerous extinct groups, families, and orders, connecting those previously supposed to be wide apart, but because our museums now contain rich series of forms illustrating not only the geological succession, but also the gradual, and at times sudden, modifications and evolution of series of types from the generalized to the specialized. The chief factors also of this process of divergent evolution are quite clearly seen to have been geological and climatic changes, and the use and disuse of organs. Examples are the genealogy of the horse family, partly worked out by Huxley, Gaudry, Kowalevsky in Europe, and more perfectly, owing to the greater completeness of the series, by Marsh in America. Other groups, as the Camelidæ, etc., have had their ancestry elucidated by Cope, Osborn, Scott, Wortman, and others. The phylogeny of the ammonites and nautiloids has been elaborated by Hyatt, that of Brachiopoda by Beecher and others.

Among the Crustacea, two orders, the Phyllocarida and the Syncarida, have been recognized by Packard, and the latter group also recognized by Ortman, as being generalized forms which have given rise to the higher more specialized groups represented by the modern shrimps, lobster, and crabs.

Perhaps the most important paleontological discovery in the last half century, as regards arthropod animals, is that of the appendages of trilobites, which we owe to Walcott, Matthew, and especially to Beecher. Finally, the view has of late years been rendered clear that nearly every class of invertebrate animals originated in Precambrian times; the vertebrates with limbs and lungs, Amphibians and reptiles, appearing near the close of the Paleozoic Age, while birds and mammals diverge from some reptilian stock in the early Mesozoic.

(4) The fourth period is that of evolution and bionomics. The history of evolution (q.v.) is now a twice-told tale. How much we are indebted to Darwin (q.v.), Wallace (q.v.), Herbert Spencer (q.v.), and others has been recounted elsewhere. It remains only to point out some salient features in the history of the theory of descent and its modifications during the nineteenth century. A noticeable circumstance in the history of the rise and spread of the doctrine is the way in which the once almost forgotten or misunderstood views of Lamarck (q.v.) have been either unearthed or hit upon

independently by others, as Cope, Hyatt, Jackson, Eimer, etc., proving that the Lamarckian factors of change of environment, use and disuse, even if we throw out use-inheritance as applied to mutilations, etc., are the primary agencies in modifying organisms and in bringing about not only varieties and species, but also families, orders, classes, and even phyla.

Natural selection also has its foundation in the struggle for existence and competition. And here it is interesting to observe that Darwin and Wallace, who independently thought out the selection idea, both acknowledge their indebtedness to Malthus's "Essay on Population" (1798) for the idea which dominates their theory. It is not, perhaps, generally known that Malthus on his part freely acknowledged in the opening pages of his essay his indebtedness to Benjamin Franklin for the motif of his work. In 1755, in his *Observations Concerning the Increase of Mankind and the Peopling of Countries*, Franklin enunciated the principle of struggle for existence, and the evil effects of overcrowding if any single species were allowed to multiply unchecked by competition with other forms. "There is, in short," he says, "no bound to the prolific nature of plants and animals, but what is made by their crowding and interfering with each other's means of subsistence. Were the face of the earth vacant of other plants, it might be gradually sowed and overspread with one kind only, as, for instance, with fennel, and were it empty of other inhabitants, it might in a few ages be replenished from one nation only, as, for instance, with Englishmen." (Sparks's edition of the *Works of B. Franklin*, vol. ii., p. 319.)

The theory of descent has aroused attention and given a decided impulse to the study of bionomics, ethology, or the habits and instincts of animals and their relations to the world around them. The pioneers in this captivating phase of biology were Huber, Réaumur, Reimarus, Siebold, and Leuckart, and, to come down to later times, Lubbock, Romanes, Wyman, Plateau, Forel, Fabre, Moggridge, Cook, G. W. and E. G. Peckham, Loeb, Wasmann, and Wheeler deserve special mention.

One great difference between plants and animals is that the latter move from one place to another; and how animals orientate themselves and the means or sense-organs by which they move in reference to surrounding objects or organisms, find their food, or their mates, has engaged and is now engaging much attention. Here might be cited recent work on the otocysts of the invertebrates, and the views now held as to the origin of the vertebrate ear and the lateral sense-organs of fishes and salamanders from organs of orientation in the worms. The mechanics of locomotion worked out by the older anatomists and physiologists have, by the ingenious inventions and use of photography, been greatly extended by Marey.

Finally, our knowledge of the physiology of nerves and ganglia, as well as of the brain, of the more specialized animals and of man, has had its bearings on comparative psychology, and under the influence of the experiments of Loeb, Bethe, and others we are coming into a position to discriminate between simple physiological or reflex acts and instinctive acts, and to compare them with the acts of human reason. And here again we see that plants and animals approximate, in that the reflex acts of the lowest animals, those without nerves or ganglia, are akin to the restricted movements of certain plants.

As is well known, Darwin's theory of selection is based on his assumption of the universal tendency to variation, a phenomenon he did not at the outset attempt to explain. The Lamarckian factors of change of the conditions of life, of climate, and soil, are what we rely on to account for variations, as indicated by Darwin later in life, strongly insisted on by Herbert Spencer, by Sachs, Semper, Kerner, and their successors. Within the past few years the study of variation, from a general as well as statistical point of view, has already reached very considerable proportions. According to the results obtained by J. A. Allen, Wagner, Wallace, and others, a very large proportion of existing varieties and species are local, geographical, or climatic forms, due to migration, geographical changes, and resulting isolation. Bateson has collected in a thick volume all the known cases of discontinuous variations, and many species, as claimed by Galton, also by De Vries, owe their origin to sports or aberrations. Statistical variations, consisting of the minute measurements of multitudes of individuals, studies initiated by Gould, Baird, Allen, Weldon, Pearson, Davenport, and others, all tend to show that the variations are due to local differences in climate, soil, temperature, the nature of the medium, etc., with the result that the doctrine of the essential unfixity of species, the high degree of unstable equilibrium of organisms, is a fundamental fact with which the biologist has more and more to deal.

Consult: *Geschichte der Zoologie* (Munich, 1872); Packard, in *Standard Natural History* (1885); Packer and Haswell, *Zoōlogy* (New York, 1897).

ZOÖPHYTE (Gk. *ζωόφυτον*, *zōophyton*, zoöphyte, animal-plant, from *ζῷον*, *zōon*, animal + *φυτόν*, *phyton*, plant). A term employed by Cuvier to designate the lowest primary division of the animal kingdom, which includes many animal organisms that are fixed to a definite spot or rock, shell, etc., and have the form of plants. The group was a very artificial one, and the term gradually fell into disuse and is no longer employed except as a semi-popular term to describe hydroids, corals, sea-anemones, and some other forms, which superficially bear some resemblance to flowers.

ZOÖSPORE (from Gk. *ζῷον*, *zōon*, animal + *σπορά*, *spora*, seed), or 'swarm-spore.' The ciliated or motile asexual spores common among the algæ and aquatic fungi. See SPORE.

ZOQUE, sō′kâ. A Mexican tribe of low culture occupying portions of eastern Tabasco and the adjacent districts of Chiapas and Oaxaca, and, together with the neighboring Mixe and one or two other tribes, constituting the Zoquean linguistic stock. They were formerly a numerous and formidable people, brave, savage, and addicted to cannibalism, but are now reduced to less than 3000, described as agricultural and industrious, but stupid, coarse featured, and great drunkards. Like other tribes of Mexico, they retain many of their ancient beliefs and customs under a thin veil of civilization. Consult: Sanchez, *Gramática de la lengua Zoque* (Mexico, 1877); Grasserie, *Langue Zoque et langue Mixe* (Paris, 1898).

ZORILLA, thō-rē'lyä, MANUEL RUIZ (1834-95). A Spanish statesman, born at Burgo de Osma. He studied at Valladolid, became an advocate, and in 1856 was elected to the Cortes, where he joined the Progressists. In 1866 he took part in an uprising which led to his banishment until the revolution of 1868. In that year he was made Minister of Commerce and Public Instruction under Serrano. In 1869 he became Minister of Justice and in 1870 president of the Cortes. He was instrumental in the election of Amadeus of Savoy to the throne, was Minister of Public Worship in his first Cabinet, and in 1871 formed a Progressist Cabinet. He was the chief adviser of Amadeus till the latter's abdication in 1873. After the accession of Alfonso XII. (December, 1874) he retired to France, and later to Geneva, whence for eighteen years he directed the plots of the Republican conspirators. In 1884 he was sentenced to death, *in contumaciam*, for his part in the military rising of March, 1884. At last he tired of the struggle, gave up his leadership, and was permitted to return to Spain.

ZORN, tsōrn, ANDERS (1860—). A Swedish painter. He was born at Utmedal, and studied first sculpture and then painting at the Stockholm Academy. His success in portraiture enabled him to travel in Italy and Spain, and in 1882 he established himself in London, continuing his success. In 1889 he removed to Paris, whence he made frequent journeys to Sweden, England, and America (1893). He paints portrait, genre, landscape, and marine subjects with equal success. Among his best known paintings are: "Italian Street Scene" (Luxembourg, Paris); "Summer in Sweden" (National Gallery, Berlin); "The Omnibus"; "A Toast"; and the portraits of Renan, of himself, and of King Oscar of Sweden. He is also an etcher of great ability, his plates being mainly after his pictures.

ZORNDORF, tsōrn'dōrf. A village of Prussia, in the Circle of Königsberg, noted as the scene of a victory gained by Frederick the Great of Prussia over a Russian army under General Fermor, August 25, 1758. The battle was decided by two splendid cavalry charges under General Seydlitz and ended in a panic rout of the Russians, who lost nearly 24,000 men out of a total strength of 50,000. The Prussians, who numbered 37,000 men, lost somewhat more than 11,000 men.

ZO'ROAS'TER (Lat. *Zoroastres*, from Gk. *Ζωροάστρης*, from Av. *Zaraθuštra*). The prophet of ancient Iran, a representative of the faith of the Magi (q.v.), and one of the great religious teachers of the East. The tenets of his creed are preserved in the Avesta (q.v.), in the Pahlavi literature (q.v.), and in later writings, and they are still kept up by the small community of Guebers (q.v.) in Persia and by the Parsis (q.v.) in India. The fact that Zoroaster was a historical character, not a mythical personage, is now generally accepted, and the outlines of his life have been made comparatively clear by recent investigations.

Much uncertainty formerly prevailed regarding his date because of the statements of some of the classical authors that he flourished six thousand years before the Christian era, but these reports were due to a misunderstanding of the Persian chronology, which recognizes the existence of Zoroaster's spiritual essence or unborn substance at an era corresponding approximately to such a date in the world's history, although his birth did not take place till a time shortly before the middle of the seventh century B.C. On the basis of the traditional chronology of the Parsis, as found in the Bundahishn and elsewhere in Pahlavi literature, the probable dates of Zoroaster's birth and death may be reckoned as falling respectively about B.C. 660 and B.C. 583.

The etymology and precise meaning of Zoroaster's name, *Zarathushtra* in the Avesta, is not wholly certain, although the last element (Av. *uštra*) means 'camel'; but there is a dispute whether the first element signifies 'old,' 'teasing,' or 'plowing,' or has a different force. The place of his birth is now generally accepted as being in the northwestern part of Persia, Azerbaijan (q.v.), to the west of the Caspian Sea, although a great part of his religious activity must have been in Eastern Iran. Tradition makes Azerbaijan (corresponding to the *Airyana Vaējah* of the Avesta) the home of his father Pourushaspa, and it connects incidents of Zoroaster's early life with Lake Urumiah, which answers to *Caēcista* in the Avesta, and associates the religious devotee also with Mount Savalan. Various cities, however, are mentioned directly or indirectly as his birthplace or as connected with him, and the ancient town of Rei (Avesta *Raγa*, the Rhages of the Book of Tobit), near the modern Teheran, is said to have been originally the home of his mother, Dughedha. Legend has gathered a number of miracles about Zoroaster's birth and childhood, and tradition leaves space for a period of religious preparation from his fifteenth to his thirtieth year, when he received a revelation of the faith and came forward as an opponent and reformer of the superstitious beliefs and heresies that existed in the old creed. Seven visions of heaven, the divine being, and the archangels were revealed to Zoroaster in the following ten years of his life. He then is said to have undergone the final test by a temptation from the evil spirit Ahriman (q.v.), but came off triumphant from the encounter with the archfiend. If we follow tradition we may identify, with some degree of likelihood, the scenes of these supernatural and actual experiences. They tend to show that Zoroaster traveled over a considerable part of Iran, for mention is made of his having been at one time in Seistan and even in Turan. The place where he made his first convert, his cousin Maidhyoi-maonha, or Medyomah, after the conflict with the spirit of evil, is probably the district of the great forest of reeds near the southwest shore of Lake Urumiah.

Zoroaster's first real success, however, was achieved when he converted King Vishtaspa (Av. *Kavi Vištāspa*). This was accomplished in the prophet's forty-second year, or B.C. 618, if we accept the traditional chronology. As it is generally believed that Vishtaspa ruled in Eastern Iran, Bactria, Seistan, and Khorasan, fresh support is given for the claim that Zoroaster's teaching was largely in the east, even though he arose in the northwest of Persia, and his creed ultimately spread over all Iran. After the King's conversion the religion was adopted by the Queen, Hutaosa, who has the same name as Atossa, the wife of Hystaspes, father of Darius, although there is absolutely no historic ground for identifying Vishtaspa and Hutaosa with Hystaspes and Atossa, as has been done on the basis of identity of names. The nobles of the Court likewise adopted the religion of Zoroaster, and we may trace the history and propaganda of the faith down to the time of the prophet's death, which occurred in B.C. 583, at the age of seventy-seven, if we accept and correctly interpret the traditional chronology. Zoroaster's end seems to have been a violent one, and to have taken place during the invasion of Iran by Turan when Arejat-aspa, or Arjasp, of the latter hostile country, waged a religious war against Vishtaspa. Firdausi (q.v.) and other later writers locate the scene where Zoroaster was slain at Balkh or Bactria (q.v.). A full account of the life and legend of Zoroaster and of all the sources of information regarding him as a historic personage may be found in Jackson, *Zoroaster the Prophet of Ancient Iran* (New York, 1899). Consult also Tiele, *Geschichte der Religion im Altertum* (Gotha, 1898); Lehmann, *Zarathustra* (Copenhagen, 1899-1902).

ZOROASTRIANISM. The designation generally employed to denote the ancient religion of Persia prior to the Mohammedan conquest of Iran. Other terms are sometimes substituted, such as Mazdaism from its supreme god, Magism from its ancient priests, Parsiism from its modern adherents, and again fire-worship or dualism from certain characteristic tenets. The historical development of the religion will be found briefly sketched under the separate titles AVESTA, GHEBERS, MAGI, PAHLAVI LANGUAGE AND LITERATURE, PARSIS, ZOROASTER.

One of the most striking features of Zoroaster's faith, as taught in his metrical psalms or *Gāthās* (q.v.), is a pronounced but modified dualism. It is pronounced because belief in a constant warfare between the good and evil principles that pervade the world is everywhere present, and is markedly emphasized. Ahura Mazda or Ormazd (q.v.), 'the Lord Wisdom,' the supreme god of Iran, created the universe and rules it; Anra Mainyu or Ahriman (q.v.), 'the Spiritual Enemy,' or devil, invaded the world and ever disorders it. To the latter being, or rather to the evil principle whose wicked spirit he embodies, the name Druj, 'Deceit, Satan,' is also given. The dualism is modified because it regards the power of evil as limited in time. Although nature is divided and rent asunder by the two conflicting principles, nevertheless man, as a free agent, will bring about the ultimate triumph of right by choosing right and extending the power of good for the overthrow and annihilation of evil. This result in the end will establish the 'good kingdom' (Av. *vohu xšaθra*), where evil shall be banished and good shall reign supreme after the general resurrection. To accomplish this end is the aim of the prophet's teaching; and the views which he maintains of the contending forces of right and wrong, the empires of light and darkness, are remarkable for their sharpness and logical precision.

According to Zoroaster's belief the heavenly hierarchy that rules the realm of good is headed by Ahura Mazda (q.v.). Six attendant spirits, besides lesser divine beings, join with him in administering the kingdom. These six presiding divinities, who with Ormazd make up his court, are called Amesha Spentas, 'Immortal Holy Ones,' the later Persian Amshaspands. They represent personifications of virtues, good thought, righteousness, wished-for kingdom, harmony on earth, salvation, immortality. The allegory beneath their names and the various domains in the physical world—animal life, fire, metals, earth, water, plants—over which they preside, are easy to recognize and not difficult to understand. Next in rank to these, and but little if at all below them, stands a company of angels, Yazatas, 'Worshipful Ones,' who guide the force of nature and perform the duties incumbent upon their offices in the divine organization. Chief among these is Mithra (see MITHRAS), a personification of light and truth. Atar, the fire, Apo, the waters, and several idealized representations of the sun, moon, and stars, together with a variety of lesser divine creations, fulfill the heavenly decrees in the management of the universe. To offset these, on the side of evil, is a vast host led by Ahriman and composed of a disordered rabble of archfiends, fiends, demons, and evil spirits, who contend against the well-organized ranks of the good and strive to destroy the soul of man. Foremost among this troop is the demon Aeshma-daeva, whose name is generally considered to be reflected in the fiend Asmodeus (q.v.), of the Apocryphal Book of Tobit. The names and number of the hosts of evil are legion; it would be idle to try to enumerate them.

The struggle between these two conflicting kingdoms forms the history of the universe whose duration lasts for a world-period of 12,000 years. The Pahlavi Bundahishn gives us a notion of the Zoroastrian ideas of cosmology and chronology. Ormazd and Ahriman are co-existent, though not co-eternal, in the realm of light and darkness. Space primevally separated them. Time began with their conflict. During the first three thousand years the universe existed only in a spiritual state; everything was represented by its *fravaši*, or heavenly prototype, in a transcendental form. Ahriman, not knowing this, arose from the abyss of darkness, but when he beheld the light he was dazzled and driven back, baffled by its radiancy and splendor. He at once created the infernal hosts to wage war against the realm of light. In the second 3000 years Ormazd created the world and primitive man in a material form to fight against the powers of evil. During the third 3000 years, which is the historic period of the world known to Zoroaster, Ahriman invades the earth, mingles evil with good, marring all till the coming of Zoroaster drives him and the demons for a time away. The last three thousand years are millennial periods. Each of these three millennia is presided over by a prophet or savior, to be born from the seed of Zoroaster. The final one of these shall preside at the general resurrection, when the world shall be renewed and eternity shall begin. It is then that the powers of evil, united for a final struggle, shall be utterly routed by the forces of good; wickedness shall vanish at this final crisis, and righteousness shall reign supreme as Zoroaster foretold. See SAOSHYANT.

The essence of Zoroaster's moral and ethical teachings may be summed up in the three cardinal Avestan words *humata, hūxta, hvaršta,* 'good thoughts, good words, good deeds,' which form the watchword of the faith of the modern Parsis and Guebers. The idea of goodness implies largely the choice of the good religion of Mazda and following its precepts, in preference to devil-worship, or the cult of the demon. This implies scrupulously preserving the purity alike of body and soul, and is chiefly to be obtained through religious observances and ceremonial rites that are extreme in their exactions. The elements of earth, fire, and water, moreover, must be carefully shielded from defilement, especially from contact with dead matter. It was this prescription which led to the peculiar Zoroastrian method of exposing the dead bodies on Dakhmas or Towers of Silence (q.v.), to be devoured by dogs and birds—a custom which the modern Zoroastrians quite strictly observe. Furthermore, the care of useful animals, particularly of the cow and the dog, is enjoined; and the importance of agricultural pursuits as a religious duty is strongly inculcated. There are many minor observances and beliefs found, especially in the Avestan *Vendīdād,* that recall the Pentateuch. These features and others were noticed by the classical writers, such as Herodotus, Plutarch, and Strabo, as characteristic of the Persian religion. The main points of Zoroaster's philosophy may be gathered from the Gathas and supplemented by other portions of the Avesta and Pahlavi literature. A summary of the orthodox beliefs of the ancient Zoroastrians will be found in Yasna 12, which is sometimes called the Avestan creed.

Comparisons of Zoroastrian with other religions show more resemblances to Judaism and Christianity than to other Oriental faiths, and the possibility of mutual influences, direct and indirect, has been the subject of much discussion. The affinities of the religion of Iran with the ancient faith of India, for example, with regard to likenesses between the divine ideas of Mithra and Mitra, Verethraghna and Vritrahan, and the like, or in the cult of Haoma and Soma (q.v.), or in the differences between Ahura-Asura, Daeva-Deva, are striking, and point back to the period of common Indo-Iranian or Aryan unity. Parallels also have been sought between ancient Babylonian and Zoroastrian beliefs, which may be due in part to the proximity of the two peoples. With regard to primitive ideas, moreover, we may recognize in the Zoroastrian faith and in some of its ceremonies a few traits that recall possible survivals of primitive animism, spiritism, fetishism, and ancestor worship. As a rule, however, the ideality and lofty spirituality of Zoroaster's teachings have been generally recognized; and the efficiency of the faith as a working religion may be seen in the fruits which it has borne in various ways through history and in its present followers, the Parsis and Guebers.

BIBLIOGRAPHY. Jackson, "Die iranische Religion," in Geiger and Kuhn, *Grundriss der iranischen Philologie,* vol. ii. (Strassburg, 1900-03); Haug, *Essays on the Sacred Language, Writings, and Religion of the Parsis* (3d ed., by West, London, 1884); Hovelacque, *L'Avesta, Zoroastre et le Mazdéisme* (Paris, 1880); Castartelli, *The Philosophy of the Mazdayasnian Religion under the Sassanids,* transl. from the French (Bombay, 1889); Bharucha, *An Essay on the Zoroastrian Religion and Customs* (ib., 1883); Lehmann, "Die Perser," in Chantepie de la Saussaye, *Lehrbuch der Religionsgeschichte* (2d ed., Freiburg, 1897); Stave, *Ueber den Einfluss des Parsismus auf das Judentum* (Haarlem, 1898); Tiele, *Geschichte der Religion im Altertum,* vol. ii. (Gotha, 1898); Söderblom, *La vie future d'après le Mazdéisme* (Paris, 1901); Böklen, *Verwandtschaft der jüdisch-christlichen mit der parsischen Eschatologie* (Göttingen, 1902); Tiele, *Kompendium der Religionsgeschichte* (3d ed., by Söderblom, Breslau, 1903). Consult also the authorities referred to under AVESTA; GUEBERS; MAGI; PAHLAVI LANGUAGE AND LITERATURE; and ZOROASTER.

ZORRILLA Y MORAL, thôr-rēl′yȧ ē mô-räl′, JOSÉ (1817-93). A Spanish poet and playwright, born in Valladolid February 21, 1817. After studying law for a while at Toledo and Madrid, he first gained notice (1837) by his verses on the satirist Larra (Fígaro). Many lyrics and poetic legends followed these verses; then came dramas in the same abundance. He composed and published his incomplete poem, *Granada* (1852), in Paris. Always in straightened circumstances, he went to Mexico to try his fortunes in 1855, and, going back to Spain for a visit in 1866, was cut off from returning to Mexico by the disasters that befell Maximilian. From 1871 to 1883 he suffered want, though the theatres, as he complains in his *Recuerdos del tiempo viejo* (1880), were making fortunes by his plays. His last years were freed from want by a Government pension of 30,000 reals. He died at Madrid January 23, 1893.

The *Soledad del campo* and the *Indecisión* are his most important lyric works. But he shows to greatest advantage in his various *leyendas,* in which he has embodied the history of Spain, not as it is to be found in the written records, but such as a poetic genius, working under the inspiration given by association with the monuments and ruins of mediæval Spain, could reconstruct from the Christian and chivalrous traditions of the Middle Ages. In thus turning back to the Middle Ages, Zorrilla obeys one of the chief tendencies of the Romantic movement in Spain as elsewhere in Europe. Poetic eloquence, descriptive force, patriotism, religious fervor, and strong idealism characterize his legends, and these qualities are found already in the *Cantos del trovador* (1840-41). The *Granada* (1852) would, if completed, be the great epic of modern Spain. The legends that followed the appearance of this fragment are inferior to it in worth, viz., the *Leyenda del Cid* (1882), and *El cantar del Romero.*

Zorrilla's first play, written in collaboration with García Gutiérrez, was the *Juan Dándolo* (1839). A long series of plays followed, and of these the best are *El zapatero y el rey; Traidor, inconfeso y mártir; A buen juez mejor tertigo;* and *Don Juan Tenorio.* The great success of these plays in Spain was due to the fact that they are inspired by Spanish poetic tradition, by Spanish history and legend. The *Don Juan Tenorio* treats the tradition which Tirso de Molina's *Burlador de Sevilla* had made famous on the Spanish stage. Zorrilla's Don Juan differs from the general conception of that scoundrel in that he is made to die repentant. The *Don Juan Tenorio* is so great a favorite of the Spanish race that a performance of it has become a necessary element of a national celebration. The author, however, detested this product of his own genius, and he showed his contempt for it by working it over into *zarzuela* or vaudeville.

Consult the *Obras dramáticas y líricas de D. José Zorrilla* (Madrid, 1895) and the biography by I. Fernandez Florez, published with the drama *Traidor* in Novo y Colsón's *Autores dramáticos contemporáneos*, vol. i. (Madrid, 1881).

ZOS'IMUS (Lat., from Gk. Ζώσιμος). A Greek historian who lived in the time of the Emperor Anastasius I. (A.D. 491-518). His history is still extant in six books, dealing with the history of the Roman Empire to the capture of Rome by Alaric, A.D. 410. Inasmuch as Zosimus's work is a continuation of that of his predecessor Dexippus, the earlier history to the year 270 is sketched briefly in the first thirty-six chapters of the first book. The rest of the period is treated in detail. From internal evidence it seems clear that the work was composed after 501. Of the details of Zosimus's life nothing is known, but he shows himself a thorough-going Roman and finds the cause of the decline of Rome's power in the neglect of the earlier faith of the Romans which attended the progress of Christianity. As a pagan he assails the various Christian emperors, especially Constantine, with great severity. His work is our chief source for the history of the fourth excerpted by Constantinus Porphyrogenitus. It also contains many valuable notices of the earlier period, one of the most important of which is the account of the secular games of Augustus in the second book. The history was freely excerpted by Constantinus Porphyrogenitus. It is best edited with a prolegomena by Mendelssohn (Leipzig, 1887). On the characteristics of Zosimus, see Ranke, *Weltgeschichte*, vol. iv. (Leipzig, 1883).

ZOS'IMUS. Pope, 417-18. He was a Greek by birth. The main interest of his pontificate lies in his relation to the Pelagian controversy. The African bishops had condemned the opinions of Pelagius, and this judgment had been ratified by Pope Innocent. In the interval, however, Pelagius appealed to the Pope; and his disciple, Celestius, came in person to Rome, where he presented a confession of faith in his own justification. Zosimus, having convoked a council of bishops and submitted this to them, was induced by the specious explanations of Celestius to suspend judgment, and even to write to the African bishops, recommending a reconsideration of the case. On further examination of Celestius, Zosimus became aware that he had been deceived; and even before the reply of the African bishops, confirmed and renewed their original condemnation of the Pelagian doctrine. His letters, which are curious and interesting, are found in Migne, *Patrologia Latina*, xx.

ZOSTEROPS. See WHITE-EYE.

ZOUAVES. A body of troops in the French Army whose organization dates from 1830, when two battalions were formed by General Clausel from a tribe of Kabyles dwelling in Algeria. The name of the tribe was Zouaoua, which in French gave rise to the term zouave. The organization of these tribesmen as a part of the French Army was brought about to establish a friendly feeling between them and the conquerors, and inasmuch as they had been for years mercenary soldiers, they were considered an important addition to the army. French officers were placed in charge and a certain number of French soldiers were included in the companies, which were formed into two battalions. The mingling of the French and natives did not prove satisfactory, and after 1839 none of the latter were recruited, though regiments of Algerian tirailleurs were subsequently (1842) formed. The Moorish costume originally adopted was retained, and the zouaves, who were recruited from veterans of exceptional physique and courage, achieved a high reputation, serving not only in Africa, but also in the Crimea, Italy, Mexico, and more recently in Tunis and Tongking. The zouaves accordingly became an integral part of the French Army and are now organized into four regiments of five battalions each, divided into four companies, the total strength being somewhat in excess of 13,000 men. The Papal or Pontifical zouaves, under the command of General Lamoricière, served in Rome from 1860 to 1870, and played an important part in resisting the Italian occupation of Rome. In the United States during the Civil War a number of Northern volunteer regiments adopted the zouave uniform and were known as zouaves. Many of these organizations acquired great proficiency in drill and gave exhibitions throughout the Northern States.

ZRINYI, zrē'nyê, MIKLÓS (Nicholas), Count (1508-66). A famous Hungarian general, descended from the old Slavic family of Subič who, in 1347, had adopted the name of Zrinyi from Castle Zrin in Croatia. He distinguished himself at the siege of Vienna (1529) and afterwards in the campaigns against John Zápolya and Sultan Solyman. Since 1542 governor of Croatia and Slavonia, he successfully defended that territory against the Turks for many years, and in 1563 was appointed commander-in-chief of the royal forces on the right bank of the Danube and commandant of Sziget. When Solyman, at the head of an army of 65,000 men, attacked that fortress in 1566, Zrinyi offered a most stubborn resistance. Although his garrison consisted of only 2500 troops, he managed to hold his own from August 6th till September 7th. Neither the Sultan's promise to make him Governor of the whole of Illyria and hereditary possessor of Bosnia, nor the threat to kill his only son George, whom Solyman pretended to hold as a prisoner, could induce him to surrender. On September 5th the Turks succeeded in setting fire to the outer castle, whereupon Zrinyi took refuge in the inner castle, and when this also was fired on the 7th, met his death fighting heroically at the head of his force now reduced to 600. More than 20,000 Turks had been killed during the siege, and Sultan Solyman died on September 4th in a paroxysm of rage at the terrible repulses he encountered. The tragic end of Zrinyi was graphically described by his great-grandson Miklós (1616-64) in the epic *Szigeti veszedelem* (The Fall of Sziget, 1651). The catastrophe was also repeatedly made the subject of dramatic productions, notably by Theodor Körner.

ZSCHOKKE, chôk′e, Heinrich (1771-1848). A German-Swiss novelist and miscellaneous writer, born in Magdeburg. Zschokke ran away from school at seventeen, and was for a time a strolling playwright. He studied afterwards in the University of Frankfort-on-the-Oder, where he became privat-docent, and wrote his novel *Abällino* (1794), which was successfully dramatized. Then he traveled for a time and kept a boarding-school at Reichenau, in Switzerland, of which country he presently became a patriotic citizen. In 1798 he removed to Aarau, where he filled with energy and sound judgment several public and diplomatic offices. Besides editing several popular periodicals, Zschokke published the lucid and rationalistic religious manual, *Stunden der Andacht* (1806, twice translated, 1843 and 1862), and several popular studies in Bavarian and Swiss history, of which *Des Schweizerlandes Geschichten* (1822) was translated in 1855. Zschokke wrote also many novels and tales, from which three selections have been translated (Philadelphia, 1845; New York, 1848; London, 1848). His *Works* have been collected in 35 volumes (1854). He published an autobiographical *Selbstschau* (1842, trans. 1847). There are *Lives* by Emil Zschokke (3d ed., Berlin, 1876); and Born (Basel, 1885). Consult also Keller, *Beiträge zur politischen Thätigkeit Zschokkes* (Aarau, 1887); and Wernly, *Vater Heinrich Zschokke* (ib., 1894).

ZSOMBOLYA, zhôm′bôl-yŏ. A town of Hungary. See Hatzfeld.

ZUB′LY, John Joachim (1725-81). A Swiss-American clergyman, born at Saint Gall, Switzerland. He was ordained to the Presbyterian ministry about 1744, subsequently emigrated to America, held a pastorate for some time in South Carolina, and in 1760 became the first regular pastor of the Independent Presbyterian Church in Savannah, Ga. He was a man of profound learning, was an able speaker and a skillful writer, and had a great influence among the people of Georgia. In the pre-Revolutionary controversies between the American colonies and the British Ministry, he was a vigorous partisan of the colonists, and both as a speaker and as a pamphleteer greatly aided their cause in Georgia. He was an active member of the Provincial Congress of Georgia in 1775, and was sent as one of Georgia's delegates to the Continental Congress in the same year. Though opposed to the acts of the British Ministry and in favor of armed resistance, he contended against independence, and, after being detected in a questionable correspondence with Sir James Wright, the royal Governor of Georgia, he fled from Congress, and became an open Loyalist in Georgia. In 1777 he was banished from Savannah, and his property was confiscated. He then lived in South Carolina for a time, and after Wright was reinstated as Governor of Georgia returned to Savannah, where he remained until his death. His publications include: *The Real Christian's Hope in Death* (1756); *The Stamp Act Repealed* (1766); *An Humble Inquiry into the Nature of the Dependency of the American Colonies upon the Parliament of Great Britain and the Right of Parliament to Lay Taxes on the Said Colonies* (1769), his best known pamphlet; and *The Law of Liberty* (1775).

ZUBR. See Bison.

ZUCCARO, tso͞ok′kȧ-rō, Taddeo (1529-66). An Italian painter, born at Sant' Angelo in Vado, near Urbino. In 1548 he began a career of fresco painting for Julius III. and Paul IV., as well as for great nobles like the Duke of Urbino, which was only ended by his early death in Rome. He was a mannerist of the post-Raphaelite school, though he excels most of his contemporaries in breadth of treatment and dignity of composition, as exemplified particularly by his frescoes in the Palazzo Farnese at Caprarola, near Viterbo. His faults were transmitted to his brother and pupil, Federigo (c.1542-1609), born at Sant' Angelo, who soon became the most popular painter of his generation, was called upon to complete the "Last Judgment" begun by Vasari in the dome of the Cathedral of Florence, and upon his return to Rome was commissioned by Gregory XIII. to carry out Michelangelo's designs for the decoration of the Pauline Chapel. As the result of a quarrel he left this task and visited Flanders, Holland, and in 1574 England, where he made portraits of Queen Elizabeth, Mary Stuart, and many high personages. In 1582 he painted several huge frescoes for the Doge's Palace in Venice, and on his return to Rome completed his work in the Pauline Chapel. From 1585 to 1588 he was engaged in decorating the Escurial for Philip II., and afterwards lived in Italy. In 1595 he founded the Academy of San Luca at Rome, and shortly before his death at Ancona was knighted by the Pope. His frescoes have all the exaggeration and artificiality of the school which he led. He depended for effect on enormous size and grotesque massing of contorted figures. His easel paintings are, however, more pleasing.

ZUG, *zo͞og or* tsụg. A small canton of Switzerland, situated between Zurich, Schwyz, Lucerne, and Aargau. Area, 92 square miles (Map: Switzerland, C 1). It is mountainous in the southeast and mostly flat in the northwest. The canton comprises the Lake of Aegeri and the larger part of the Lake of Zug. The chief occupations are stock, breeding, dairying, and the manufacturing of cotton, silk, and paper products. The Constitution provides for an elected legislative assembly (one member to every 350 inhabitants) and an elected executive council. Proportional representation, the initiative, and the referendum are in force. Population, in 1900, 25,045, largely German-speaking Catholics. Capital, Zug (q.v.). The town of Zug with a part of the surrounding territory was acquired by the House of Hapsburg in 1264 and was annexed by the Swiss Confederation in 1352. At the formation of the Helvetic Republic (1798) it became a part of the Forest Cantons. It was constituted an independent canton in 1803.

ZUG. The capital of the Canton of Zug, Switzerland, 19 miles by rail south of Zurich, at the northeast corner of the Lake of Zug (Map: Switzerland, C 1). The town, a pleasant summer resort having an elevation of about 1400 feet, affords a fine view of the Bernese Alps and is quaint in appearance. There are a fifteenth-century Gothic church, the Church of the Capuchins, an historical museum, a museum of antiquities, and a fine late-Gothic town hall. Cotton goods, enamel wares, and wood-carvings are shipped out, and there is an important fish-breeding establishment. In the vicinity is the Bee Museum of Switzerland. Population, in 1900, 6508.

ZÜGEL, tsụ′gel, HEINRICH (1850—). A German genre and animal painter. He was born at Murrhardt, Württemberg, and studied in Stuttgart, Vienna, and Munich. He took the first medal at the Munich exhibition of 1888. In 1894 he was appointed professor in the Carlsruhe art school, and the next year in the Academy of Munich. His best known pictures include: "Sheep in the Woods" (1872, Leipzig Museum); "Sheep in an Alder Grove" (1875, National Gallery, Berlin); "Span of Oxen" (1875); "Summer Sun" (1888, Rudolfinum, Prague); "Oxen at the Plow" (1886, Pinakothek, Munich).

ZUIDER ZEE, zoi′dẽr zā. An arm of the North Sea. See ZUYDER ZEE.

ZUKERTORT, tsụk′ẽr-tôrt, JOHANNES HERMANN (1842-88). A Polish chess-master, born in Lublin, Russian Poland. In 1867 he began to edit the *Neue Berliner Schachzeitung*, with the German expert Anderssen. Zukertort's first notable public chess-playing was in London, in 1872, and in 1878, at the Paris International Tournament, he won the first prize. He defeated Rosenthal in 1880, Blackburne in 1881, and at the London Tournament of 1883 he won first place over Steinitz and a large field of other chess-masters. Steinitz defeated him, however, in America, in 1885. He displayed at all times remarkable skill in simultaneous games and in play without the board. Besides conducting the English *Chess Monthly*, he wrote *Sammlung der auserlesensten Schachaufgaben* (1869); and published, with Jean Dufresne, *Grösstes Schachhandbuch* (2d ed. 1873), and *Leitfaden des Schachspiels* (5th ed. 1897).

ZULOAGA, so͞o′lō-ä′gȧ, FÉLIX (1814-76). A President of Mexico, born at Alamos, in Chihuahua. In 1854 he was sent against the rebels in Ayutla, and in the following year was captured, but gained the favor of Comonfort, the Liberal leader, who, when he became President, intrusted to him the military operations in the Sierra de Querétaro, employed him in the two campaigns of Puebla, and made him Councilor of State. In 1857 he declared against the new Constitution and in favor of giving Comonfort dictatorial power, but as Comonfort hesitated, Zuloaga's troops occupied the capital (January, 1858). Comonfort went into exile, and Zuloaga was declared President. Soon afterwards began the 'War of Reform' between his followers of the Church and military parties and the Liberals under Juarez (q.v.). In December, 1858, Zuloaga was overthrown, and though he was afterwards for a short time reinstated, he was at length declared an outlaw. When the French invaded Mexico, Zuloaga did not assist them but went to Europe. He returned in 1864, and in the following year joined in an unsuccessful plot to overthrow Maximilian and establish Santa Anna.

ZULU, zo͞o′lo͞o. Tribes of Bantu stock, South Africa, divided into five gropus: Ama-Fonga, Ama-Azwazi, Ama-Zulu, Ama-Ponda, and Ama-Kosa. They are a well-proportioned, muscular, powerful, and active people above middle height. (See Colored Plate DARK RACES OF AFRICA, with article AFRICA.) They live on curdled milk, flesh of cattle, and vegetables, and in cooking and other domestic arts are well advanced. The house is a framework of poles, beehive in form, thatched, and plastered. Among other arts, they make beer, tan hides, smelt iron, and weave basketry. Their weapons are the assegai, knobkirri, and shield. Polygamy and wife-purchase are customary. They have an extensive folklore. Consult: Fritsch, *Die Eingeborenen Süd-Afrikas* (Breslau, 1872); Kropf, *Das Volk der Xosa-Kaffern* (Berlin, 1889); Grout, *Isizulu, Revised Edition of a Grammar of the Zulu Language* (London, 1893); Roberts, *Zulu-Kafir Language Simplified for Beginners* (3d ed., ib., 1895); id., *English-Zulu Dictionary* (2d ed., ib., 1895).

ZULULAND, zo͞o′lo͞o-lănd. A province of the British colony of Natal, bounded on the north by Swaziland and Portuguese East Africa, on the east and southeast by the Indian Ocean, and on the southwest and west by Natal. The former Transvaal district of Vryheid, now a part of Natal, borders directly on the west. Tongaland was annexed to Zululand December 27, 1897, and forms the northeastern neck of it. (See TONGALAND.) The present area of Zululand is about 10,450 square miles. The population was estimated in 1900 at 185,000, including 1200 Europeans. Zululand proper represents about 8450 square miles and has about 140,000 inhabitants. It is traversed by mountains and lines of hills, but is capable of great agricultural productiveness, being well forested and well watered. The leading rivers are the Tugela, on the southern boundary, and the Umlatusi, Umvolosi, and the Mkusi, all flowing eastward into the ocean. The important Saint Lucia bay and lagoon are on this coast. The climate is healthful save along the fever-stricken coast. The big tropical animals are not frequent, except leopards. The water areas swarm with crocodiles. The antelopes are protected by law. The mineral possibilities have been little examined into. The heavy forests in different sections of the land are protected by law from ruthless destruction. The natives cultivate corn and beans, and tend their extensive herds of cattle and sheep. The low districts bordering the ocean produce sugar, cotton, coffee, etc. Zululand offers splendid facilities for stock-raising. In order to protect the interests of the natives, public lands are sold to Europeans with the approval of the British authorities. The inhabitants are the warlike Zulu-Kafirs. Their tribal customs are carefully respected by the Imperial Government so far as practicable. Zululand sends one member to the legislative council of Natal and two members to the legislative assembly. The seat of the resident commissioner is at Ekowe.

Toward the close of the decade 1870-80 the warlike Zulus under their King, Cetewayo, became a grave danger to the neighboring British colonies. At the beginning of 1879 the British made war on them. On January 22d a British army met with a great disaster at Isandlana (Isandula). On April 2d the Zulus were repulsed at Gingolovo, and on the following day the British force besieged in Ekowe was relieved. Prince Louis Napoleon, who had entered the British service, was slain in a reconnoissance on June 1st. On July 4th the Zulus were completely defeated at Ulundi and on August 28th Cetewayo was captured. The British restored Cetewayo to his rank in 1883 to end local difficulties with the native princes. The district south of the Tugela, however, Great Britain reserved for its own uses, and another part on the northeast was also set off, so that the King was limited to the middle portion of the land. Difficulties arose, and Cetewayo was deposed again before the close of 1883. He died the next year. His son, Dinizulu, headed a large party of Zulus, and aided by the Boers, who had received from him a strip of land in the west, he maintained a hostile rôle. The Boers established the 'New Republic' in the district, and extended their control to the Umlatusi and Saint Lucia Bay. In 1886 the Boers and British arrived at the terms of an understanding by which the New Republic was recognized. In return the Boers pledged themselves to vacate the rest of Zululand and renounce recognition of Dinizulu's protectorate. The New Republic was annexed to the South African Republic in 1888, the remainder of Zululand having been declared a British Crown colony in 1887. In 1888 Dinizulu attempted an insurrection, but was taken prisoner, and exiled to Saint Helena. He was later, however, sent back to his country. After 1889 small districts in the north, including those of the chiefs Sambana and Umtegiza, were added to British Zululand. On December 30, 1897, the whole Province of Zululand, including Tongaland, was annexed to Natal. Consult: Haggard, *Cetywayo and His White Neighbors* (London, 1896); Jenkinson, *Amazulu, the Zulus, Their Past History, Manners, Customs, and Language* (London, 1882); Tyler, *Forty Years in Zululand* (Boston, 1891).

ZUMALA-CÁRREGUI, thōō-mä'lȧ-kä'rȧ-gē, Tomas (1789-1835). A Spanish Carlist leader. He was born at Ormaiztegui, in the Biscayan province of Guipúzcoa. He served against Napolean, leaving the study of law at Pamplona to enter the army. He was loyal to Ferdinand VII., but in 1832, being suspected as a Carlist, was dismissed from the army. In October, 1833, he was called to lead the Carlist forces in the Basque Provinces. He was the ablest of the Carlist leaders, and won many successes against the Cristinos, displaying marked talents as a guerrilla leader, as well as fine capacity for leading large bodies of men. On June 15, 1835, while besieging Bilbao, he received a gun-shot wound and died ten days afterwards. With Zumalacar-Regui's death, all hope of success for the Carlists was extinguished; and though the war dragged on for some years longer, the result was never doubtful. Consult Henningsen, *Twelve Months' Campaign with Zumala-Carreguy in Navarre and the Basque Provinces* (London, 1836).

ZUMÁRRAGA, thōō-mä'rȧ-gȧ, Juan de (1468-1548). A Spanish prelate, first Bishop of Mexico, born in Durango (Biscay). He entered the Franciscan Order, was nominated Inquisitor of Biscay by Charles V., became a provincial of his Order, and went by royal appointment as bishop to Mexico in 1528. There he distinguished himself by his kindly treatment of the natives, his removal of various administrative abuses, and his foundation of religious and educational institutions. His religious zeal, however, caused the burning of many Aztec manuscripts. With the exception of one return to Spain (1532), when he was formally consecrated and obtained means from Charles V. to build his cathedral, he passed the remainder of his life in Mexico. Shortly before his death he was promoted to be archbishop. Many of the papers and translations left by Zumárraga were republished in the great *Cartas de Indias* (Madrid, 1877).

ZUMBUSCH, tsōōm'bu̥sh, Kaspar von (1830 —). A German sculptor, born at Herzebrock, Westphalia. He studied at Munich and Rome. After his return from the latter city he won the competition for a monument to Maximilian II. of Bavaria (unveiled 1875). In 1873 he was called to Vienna as professor in the academy. His most important works are a statue of Count Rumford, Munich; a monument to Prince August of Prussia (Park of Bellevue Palace, Berlin); a monument to the Sager family (Munich); a soldiers' monument (1877, Augsburg); the monuments to Beethoven (1880, Vienna), Maria Theresa (1889, ib.), and Field-Marshal Radetzky (1892, ib.); a statue of Emperor Francis Joseph (New University, Vienna); and a monument to Emperor William I. (1896, Wittekindsberg, Westphalia).

ZUMPANGO, su̥m-pän'gô. A town of the State of Mexico, on the banks of Zumpango Lake, 25 miles from the capital. In the foothills, near which it lies, are many interesting fossil remains. Municipal population, in 1895, 9090.

ZUMPE, tsu̥m'pe, Hermann (1850-1903). A German composer, born at Taubenheim, Upper Lusatia. He studied music at Leipzig, then was a pupil of Wagner at Bayreuth, assisting in the preparation of the *Nibelung* scores, from 1873 to 1876, and afterwards was kapellmeister at theatres in Salzburg, Magdeburg, Frankfort, and Hamburg. In 1891 he was appointed kapellmeister at Stuttgart, where in 1893 he succeeded Faiszt as conductor of the Society for the Cultivation of Classical Church Music. In 1895 he was called to Munich to conduct the Philharmonic concerts, went as Court kapellmeister to Schwerin in 1897, and returned in the same capacity to Munich in 1901. His works include: the opera *Anahra* (1800); the romantic comic opera *Die verwunschene Prinzessin;* the operettas *Farinelli* (1888), *Karin* (1888), and *Polnische Wirthschaft* (1891); and an overture to *Wallensteins Tod.*

ZUMPT, tsōōmpt, August Wilhelm (1815-77). A German classical philologist, born at Königsberg, nephew of the following. Educated at the University of Berlin, he spent his life in teaching at the Joachimsthal (1837-38), the Friedrich Werder (1838-51), and the Friedrich Wilhelm (1851-77), gymnasia of that city. His work dealt chiefly with Roman epigraphy. His publications include an edition of *Rutilius Namatianus* (1836-46); *Honorum Gradus sub Imperatoribus Hadriano et Antonino Pio* (1843); *Ueber die Entstehung und historische Entwickelung des Kolonats* (1843); an edition of the *Monumentum Ancyranum* (with Franz, 1845); *Commentationes Epigraphicæ ad Antiquitates Romanas Pertinentes* (2 vols., 1850-54); *Studia Romana* (1859); *Das Kriminalrecht der römischen Republik* (1865-69); *De Monumento Ancyrano Supplendo* (1869); and *Der Kriminalprozess der römischen Republik* (1871).

ZUMPT, Karl Gottlob (1792-1849). A German classical philologist, born in Berlin. After studying at Heidelberg and Berlin, he was appointed professor of the classics in the Joachimsthal Gymnasium, and later became professor of history in the military school. In 1827 he was appointed extraordinary professor of Roman literature in the University of Berlin, and in 1837 became full professor. His *Latin Grammar*, first published in 1818, passed through many editions; he also edited Quintilian (1831), Quintus Curtius (1849), certain of Cicero's writings, and published among other works, the following: *Annales Veterum Regnorum et Populorum, Imprimis Romanorum* (1819; 3d ed. 1862); *Ueber den Stand der Bevölkerung und die Volksvermehrung im Altertum* (1841); *Ueber die bauliche Einrichtung des römischen Wohnhauses* (2d ed. 1851); *Ueber den Bestand der philosophischen Schulen in Athen und die Succession der Scholiarchen* (1843); and *Die Religion der Römer* (1845). Consult A. W. Zumpt, *De C. Zumptii Vita et Studiis Narratio* (Berlin, 1851).

ZUMSTEEG, tsụm′stāg, Johann Rudolf (1760-1802). A German composer, born at Sachsenflur, in the Odenwald. Under the instruction of the kapellmeister Poli and others, he developed into a brilliant 'cellist and composer. He succeeded Poli, in 1792, as Court kapellmeister at Suttgart, where he produced eight operas, of which *Die Geisterinsel* and *Das Pfauenfest* are best known. A school-mate and intimate friend of Schiller's, he composed choruses to the poet's *Räuber*. He is known chiefly as the first German composer of ballads, and the precursor of Löwe. His *Leonore, Des Pfarrers Tochter von Taubenheim, Ritter Karl von Eichenhorst, Die Büsseude,* and *Ritter Toggenburg* are of lasting merit, as are also his songs and romances.

ZUÑI, zo͞o′nyē. The largest of the Pueblo villages, situated on a small stream about 40 miles southwest of Fort Wingate, near the west boundary of New Mexico. The inhabitants, who constitute a distinct linguistic stock, call themselves Ashiwi and are identical with the people of Cibola of the earliest Spanish explorers. They are peaceable, industrious in their native arts, agricultural, and extremely tenacious of their ancient beliefs. In their house-building, agriculture, pottery, weaving, social organization, and ceremonial observances they resemble the Pueblos generally, of whom they and the Hopi (q.v.) may be considered the most typical tribes. Their authentic history began in 1539, when they first became known to the Spaniards. At a later period they were brought under subjection and missionary influence, but in the great Pueblo revolt of 1680 they drove out or massacred the missionaries and other Spaniards and remained independent of Spanish authority until 1692. They have always kept peace with the Americans. They number now about 1540, and are slowly decreasing. See Pueblo, and accompanying plate showing Zuñi Pueblo. For examples of their handicraft see Colored Plates under Blanket and Pottery.

ZUNZ, tsụnts, Leopold (1794-1886). A distinguished Jewish scholar. He was born at Detmold, and after studying in Göttingen and Berlin, accepted in 1820 a post as preacher in Berlin; while there he was also one of the editors of the *Spenersche Zeitung*. In 1835 he became preacher in Prague, but in 1839 returned to Berlin to take charge of the normal school there, and in 1845 was a member of the commission appointed for the investigation of the congregational and educational interests of the Jews. In 1818 he published *Etwas über die rabbinische Litteratur,* which was the inauguration of the scientific study of the Jewish rabbinical writings, and exerted a wide influence. He founded the *Zeitschrift für die Wissenschaft des Judentums* (1822-23). His most important work was *Die gottesdienstlichen Vorträge der Juden* (1832; 2d ed. 1892), an investigation of the religious homily and of biblical exegesis as embodied in rabbinical literature, which is still the authoritative work on the subject. Other important works were: *Die Namen der Juden* (1836); *Zur Geschichte und Litteratur* (1845); *Die synagogale Poesie des Mittelalters* (1855); *Die Ritus des synagogalen Gottesdienstes geschichtlich entwickelt* (1859); and *Litteraturgeschichte der synagogalen Poesie* (1865; appendix 1867). In 1839 he served as one of the editors of a translation of the Old Testament, in association with M. Sachs, Julius Fürst, and H. Arnheim. Zunz's writings are marked by great learning, a marvelous grasp of details, and an admirable method.

ZUPITZA, tso͞o-pē′tsȧ, Julius (1844-95). A German philologist and student of Anglo-Saxon. He was born at Kerpen, in Upper Silesia, and was educated at the universities of Berlin and Breslau. In 1872 he was called to Vienna as professor of Germanic languages, and in 1876 he went to Berlin as profesor of English language and literature. After 1889 he was vice-president of the German Shakespeare Society. Zupitza was not less remarkable as a teacher than as a scholar, and thus had a wider influence on scholarship than can be shown by a list of his works. Aside from very numerous contributions to philological journals, his important publications include: *Rubins Gedichte Kritisch bearbeitet* (1867); *Einführung in das Studium des Mittelhochdeutschen* (1868); *Dietrichs Abenteuer von Albrecht von Kemenaten* (1870); *Alt- und mittelenglisches Uebungsbuch* (1874; 6th ed. 1902); *The Romance of Guy of Warwick* (1875-91); *Cynewulfs Elene* (1877; 4th ed. 1899): *Ælfrics Grammatik und Glossar* (1881); *Beowulf Autotypes* (1882); and *Specimens of All the Accessible Unprinted Manuscripts of the Canterbury Tales* (1890-92).

ZURBARAN, tho͞or′bȧ-rän′, Francisco de (1598-1662). A celebrated Spanish painter of the Andalusian school, born at Fuente de Cantos, Estremadura. A pupil of Juan de las Roëlas at Seville, he also studied diligently from nature and adopted a vigorous realistic style, akin to the chiaroscuro effects of Caravaggio, whence he is often styled the Spanish Caravaggio. For the Cathedral of Seville he painted in 1625 a series of "Scenes from the Life of Saint Peter," and soon after executed one of his most celebrated works, the "Apotheosis of Saint Thomas Aquinas," now in the Seville Museum, a grand altar-piece, rich and effective in coloring, the heads all being admirable studies and the street view in the centre remarkable for its atmospheric depth. Called to the Monastery of Guadalupe, he painted there eleven pictures on the life of Saint Jerome, and after his return to Seville was employed in the Carthusian Monastery of Santa Maria de las Cuevas, in depicting the three remarkable scenes, now in the Seville Museum, "Saint Bruno Conversing with Pope Urban II.," "Saint Hugo Surprising the Monks at an Unlawful Feast in the Refectory," and "The Virgin Extending Her Mantle Over a Group of Carthusian Monks." For several other convents and churches he painted a number of pictures, the most notable of which is the "Crucifixion" (1627), in San Pablo, extolled for its wonderful plastic effect. Before 1633 Zurbaran was appointed painter to the King. Summoned to the Court of Madrid by Velazquez, in 1650, by desire of Philip IV., Zurbaran was employed to decorate a room in the palace of Buonretiro with the "Labors of Hercules," now in the Madrid Museum, and stood in high favor at Court to the time of his death. Besides his works in the Seville Museum, which are undoubtedly his finest, there may be noted a large "Adoration of the Kings" in the Cathedral of Cadiz; "Two Episodes in the Life of San Pedro Nolasco," and an exquisite "Infant Jesus Asleep on a Cross," in the Madrid Museum; a kneeling "Franciscan Holding a Skull," in the Louvre; "Saint Bonaventura and Thomas Aquinas," in Berlin; and "Saint Bonaventura Elected Pope," in Dresden. Others are to be found in most of the great galleries of Europe. Zurbaran is especially the painter of monks, whom he depicted with as much relish as did Titian the Venetian noble or Vandyck the English gentleman. Yielding precedence only to Velazquez and Murillo, he stands in the front rank of Spanish painters. Consult Stirling, *Annals of the Artists of Spain*, ii. (London, 1848).

ZURICH, zo͞o'rĭk (Ger. *Zürich*). A canton of Switzerland, bordered on the north by Baden and the Canton of Schaffhausen, on the east by Thurgau and Saint Gall, on the south by Zug and Schwyz, on the west by Aargau (Map: Switzerland, C 1). Area, 666 square miles. The northern part of Zurich is mostly undulating. The southern part is traversed by several parallel ranges of mountains running from northwest to southeast and inclosing deep and narrow valleys. The canton belongs to the basin of the Rhine and is watered by the Thur, the Töss, and the Sihl. It comprises a large part of the Lake of Zurich. The soil is not very fertile, but is carefully cultivated and supplies about one-half of the cereals needed for domestic consumption. The vine is cultivated extensively in the northeastern as well as in the lake region. The manufacturing industries have attained in Zurich a very high degree of development and give occupation to about 50 per cent. of the population. Especially developed are the cotton and silk industries, but the manufactures of machinery, paper, leather, straw goods, and embroideries are also important. The government of Zurich is democratic. The legislative power is vested in the legislative assembly, elected in the ratio of one member for every 1500 inhabitants. The executive council is also elected directly. The initiative and referendum are in force. Population, in 1888, 337,183; in 1900, 431,036, almost entirely composed of German-speaking Protestants. Capital, Zurich.

ZURICH. The capital of the Canton of Zurich, and the largest city in Switzerland, situated at the northern end of Lake Zurich, 25 miles north-northeast of Lucerne (Map: Switzerland, C 1). Altitude, 1506 feet. Zurich is rapidly growing in size and in financial importance, and is much frequented by foreigners. The site is exceptionally attractive. The beautiful lake, the richly gardened shores, and the snow-crested Alps in the background, afford a great variety of inspiring scenery. The Limmat, which discharges from the lake, separates the larger town on the right—the Grosse Stadt—from the smaller on the left—the Kleine Stadt. Bordering the latter on the northwest is the Sihl, a small stream which empties into the Limmat within the city.

The old, traditional town, with its narrow, steep streets and its high, dark houses, lies on both banks of the Limmat. The rest of the city has spacious thoroughfares and splendid buildings. The lake quays in the Kleine Stadt are very attractive. Near their northern end is the fine Tonhalle, a popular modern concert building and pleasure palace. In the vicinity of their southern end is the beautiful Belvoir Park. Near the Tonhalle, the stately main street of the city —the Bahnhofstrasse—leads from the lake north to the railway station. The bridges are striking. Adjacent to the fine Münster Bridge is the Wasserkirche, on the right bank, containing the city library with 130,000 volumes, and over 5000 manuscripts. It preserves many valuable objects, including the Codex Vaticanus. The Grossmünster, dating from the eleventh century, is close by. It is Romanesque, with Gothic features. Zwingli was pastor of this church, and his statue stands here. Farther north is the Rüden, with the national educational exhibition and the Pestalozzi cabinet. The modern Catholic Church of Our Lady is a magnificent basilica. The Church of Saint Peter holds the tomb of Lavater, who was its pastor. The town hall, in German Renaissance, dates from 1694. The new post-office is imposing, and there is an elegant new theatre. The university and the famous federal polytechnic with their numerous institutions, laboratories, and clinics are in the northern part of the Grosse Stadt. The splendid polytechnic building was erected in 1861-64 from designs by Semper. Toward the south is the Künstlergut, with some good pictures of the local Artists' Union.

On the tongue of land, formed by the confluence of the two rivers, are the decorative grounds of the Swiss National Museum. The Platz Promenade is here—a majestic avenue lined with trees, and bordering the Limmat. The museum is of great interest. The magnificent edifice, in mediæval style, dates from 1898 and is filled with historical and art-industrial objects from all ages. It is the chief museum of Switzerland. Its collection of stained glass is considered the best in the world. The finest excursion from Zurich is that to the Uetliberg, a few miles southwest of the city. It is the northern peak of the Albis chain. The view from the top, which is reached by a railway, is of surpassing loveliness.

In addition to the university (q.v.) and the Polytechnic (which has about 1500 students and hearers), Zurich possesses a gymnasium, an industrial school with a museum, an agricultural school, a school of forestry, the cantonal high school, an ethnographical museum, a botanic garden with a fine collection of Alpine plants, and an astronomical observatory. The cantonal hospital, an orphan asylum, and numerous other charitable institutions are found here. Zurich is the most important commercial and manufacturing city of Switzerland. Its chief product is silk, but it produces also large quantities of cotton goods and machinery. Pianos, paper, soap, and candles are also manufactured. The population, in 1901, was 152,942, nearly all German-speaking Protestants.

The district which now forms the canton of Zurich passed from the rule of the Romans to that of the Alemanni about the beginning of the fifth century. About a century later the Alemanni were subdued by the Franks. After the partition of the Frankish dominions in the Treaty of Verdun in 843, the district was included in the Kingdom of Germany. The town of Zurich early became prosperous as the seat of richly endowed ecclesiastical foundations and early in the thirteenth century, after having been for a time under the rule of the House of Zähringen (q.v.), appears as a free imperial city. The peoples of Zurich allied themselves with Schwyz and Uri in 1291, and in 1351 their State became a canton of the Swiss Confederation. Zwingli began here his reformation in 1519. Zurich was the scene of a battle on September 25-26, 1799, between the French under Masséna and the Russians under Korsakoff, in which the former were victorious. The Treaty of Zurich between Austria, France, and Sardinia was signed on November 10, 1859. By its terms Victor Emmanuel II. acquired Lombardy, with the exception of Mantua and Peschiera.

ZURICH, Lake of. A lake of Northern Switzerland, chiefly within the canton of Zurich, but bordering in its southeastern part on the cantons of Saint Gall and Schwyz (Map: Switzerland, C 1). It is crescent-shaped and very elongated, with a length of 25 miles and a maximum width of 2½ miles, narrowed in one place to less than one mile. It has a depth of 470 feet, receives the Linth at its southeastern end, and discharges into the Aar through the Limmat. Its banks rise in gently sloping hills covered with vineyards and dotted with numerous villages, and the scenery, though not grand, is very charming.

ZURICH, University of. A Swiss university founded in 1832. In 1833 it opened with an attendance of 163 students. Its endowment amounts to over one million and a half francs. As early as 1860 women sought admission to the different faculties, and in 1872 a law was passed legalizing their attendance. Since 1892 women have been allowed to teach in the university. In 1902 the university consisted of the following faculties: (1) Theology; (2) Law; (3) Medicine; (4) Veterinary Medicine; (5) Philosophy, the last divided into the sections of philosophy-philology and mathematics-natural sciences. The university had in 1902 an attendance of over 900 students and hearers. The university library, including the city, canton, law, and medical libraries, contains over 250,000 volumes and several thousand manuscripts.

ZURITA Y CASTRO, thōō-rē′tȧ ē käs′trō, Jerónimo de (1512-80). A Spanish historian, born at Saragossa. He was sent in 1543 by the Inquisitor General on a mission to the Emperor Charles V., then absent in Germany, was made a secretary to the Inquisitor in 1547, and in 1548 was nominated contador general of the Inquisition in Aragon, and also historian of the kingdom. In the meantime he began publishing his monumental *Anales de la corona de Aragón* (6 vols. 1562-80). This work was remarkable for its departure from the old uncritical method of the chroniclers. It was reëdited in 1585, 1610, and 1669. Zurita published also *Indices Rerum ab Aragoniæ Regibus Gestarum ab Initu Regni ad Annum MCDX.* (1578 and 1582, including an account of the Normans in Sicily).

ZUR STRASSEN, tsụr sträs′sen, Melchior (1832-96). A German sculptor, born at Münster, Westphalia. As a pupil of Imhof at Cologne he attracted (1853) by some sterling work in high relief the attention of Rauch, who took him into his studio in Berlin. There he settled after having spent six years in Rome, and among other works executed twenty-eight medallion portraits of "Celebrated Men of Science," for the library of the Rathaus, and the group of "King William and the Crown Prince on the Battlefield of Königgrätz." In 1870-75 he was professor at the School of Arts in Nuremberg, and later at the Academy of Leipzig, where the statues of Rembrandt and Rubens, in the Museum, and those of "Frederick the Warlike," Maurice of Saxony, Lessing, and Goethe are of his workmanship. For the new museum at Linz, Upper Austria, he designed a frieze, representing the "Progress of Culture in Upper Austria from the Earliest Times to its Occupation by the House of Hapsburg," and ten statues.

ZUTPHEN, zŭt′fĕn. A town in the province of Gelderland, Netherlands, situated at the confluence of the Berkel and the navigable Yssel, 19 miles by rail northeast of Arnheim (Map: Netherlands, E 2). Portions of the mediæval fortifications may still be seen. The twelfth century Gothic church of Saint Walpurgis well merits attention. The old chapter house has a small but valuable library dating from mediæval times. There is an active trade in grain, but the chief trade is in the timber floated down the rivers from Southern Germany. Zutphen has some tanneries and manufactures of textiles, and there are paper and oil mills. Population, in 1899, 18,381. North of Zutphen is the interesting and successful Nederlandsch Mettray, a Protestant agricultural and reformatory colony for boys, founded in 1851. It is supported by private contributions.

ZUYDER ZEE, zoi′dẽr zā, or **ZUIDER ZEE.** A large arm of the North Sea, penetrating deeply into the northwestern part of the Netherlands (Map: Netherlands, D 2). It consists of an oval inner portion 44 miles long and about 30 miles broad, separated by a strait about ten miles wide from the horn-shaped outer portion, which in turn is separated from the North Sea by the line of sandy islands consisting of Texel, Vlieland, Terschelling, and Ameland. Northeast of Ameland the sea is connected by the shallow channel known as the Wadden with the estuary of the Ems. The total area of the sea, including the Wadden, is 2027 square miles. The largest river flowing into it is the Yssel, an arm of the Rhine. The Zuyder Zee was originally an inland lake, the outer portion being dry land connecting the present peninsulas of North Holland and Friesland, and having a continuous coast-line now indicated by the outer line of the Frisian Islands. The lake received the River Yssel, and had a narrow outlet between the present islands of Vlieland and Terschelling. Several severe storms, the principal occurring in the thirteenth century, caused the North Sea to break through the line of dunes at several places and inundate the lowlands between it and the lake, converting the latter into an arm of the sea. This origin explains the remarkable shallowness of the Zuyder Zee, especially of the outer portion, where large sand and mud flats are exposed at low tide. The mean depth of the inner portion is about 12 feet and the maximum 20, while over large areas the depth is three feet or less at low tide. The strait connecting the inner and outer portions, and the main channels leading into the open sea have, however, a depth of 30 to 40 feet. Since the Zuyder Zee is accordingly unimportant for navigation, the main ship-route to Amsterdam being through canals leading directly from the North Sea, and since the fisheries have also declined, it has been proposed to reclaim the inner sea by damming and draining it. A commission rendered favorable reports in 1894 and 1897; and in 1900 a bill was introduced providing for the work, but it was withdrawn in the following year. The work was estimated to require 32 years for completion and to cost about $36,000,000, which the Government expected to recover by the sale of the reclaimed land.

ZVENIGORODKA, zvȧ'nyė-gȧ-rôt'kȧ. A district town in the Government of Kiev, Russia, 125 miles south of Kiev (Map: Russia, D 5). Population, in 1897, 16,972.

ZWEIBRÜCKEN, tsvī-bryk'*en* (Fr. Deux-Ponts). A town of the Rhenish Palatinate, Bavaria, on the Schwarzbacn, 66 miles southwest of Mainz (Map: Germany, B 4). It is well built, its principal building being the Alexanderskirche, with the ducal burial vaults. The chief manufactures include silk-plush, steam engines, and agricultural machinery, paper, chains, and leather. Population, in 1900, 13,716. The town was the capital of the Duchy of Zweibrücken, which arose in the Middle Ages and existed down to the close of the eighteenth century.

ZWICKAU, tsvĭk'ou. A town in the Kingdom of Saxony, situated on the left bank of the Zwickau Mulde, 20 miles by rail southwest of Chemnitz (Map: Germany, E 3). It is a quaint old city. The Gothic Church of Mary, dating from 1453 and restored in late times, is a notable structure. Other features of Zwickau are the house where Schumann was born, several fine old edifices, and the ancient chateau used as a penitentiary. There are a mining school and a collection of paintings. The manufacturing interests are important. Machinery, paper, and glass are among the varied productions. Trade is active. The adjacent coal mines are extensively exploited. The annual output is $5,000,000. Population, in 1900, 55,825.

ZWIEDINECK VON SÜDENHORST, tsvē'-dė-nĕk fôn zụ'd*en*-hôrst, Hans (1845—). An Austrian historian, born in Frankfort. He was educated at Gratz, became privat-docent in the university there (1875), and in 1885 was appointed professor of history. He completed Adam Wolf's *Oesterreich unter Maria Theresia, Josef II. und Leopold II.* (1882-84). Independently he published *Dorfleben im 18. Jahrhundert* (1877); *Die Politik der Republik Venedig während des dreissigjährigen Krieges* (1882-85); *Die öffentliche Meinung in Deutschland im Zeitalter Ludwigs XIV.* (1888); *Deutsche Geschichte im Zeitraum der Gründung des preussischen Königtums* (1890-94); *Deutsche Geschichte von der Auflösung des alten bis zur Gründung des neuen Reichs* (1895-1903). The last two appeared in the *Bibliothek deutscher Geschichte*, which the author began to issue in 1887. *Venedig als Weltmacht und Weltstadt* (1899) is his most recent work.

ZWINGLI, tsvĭng'lė, Ulric or Huldreich (1484-1531). The leader of the Protestant Reformation in Switzerland. He was born at Wildhaus, in the Toggenburg Valley, where his father was the Ammann of the village, a man of substance, who gave his son the best available education. Zwingli was directed from an early stage to the liberal humanistic methods of study, and formed his taste and judgment in this enlightened school. He spent two years at the University of Vienna and then studied at Basel, where he took his bachelor's degree at twenty and his master's degree at twenty-two. In 1506 he was made parish priest at Glarus and held this place for ten years. Glarus was one of the most important centres for the recruiting of young men for the various armies of Europe, and Zwingli entered into this foreign service as a field chaplain. This experience gave him at once an intimate acquaintance with Swiss public life and a settled conviction that the service in foreign armies was ruining the character of his countrymen. He opposed it so vigorously that he roused the enmity of all those classes who were thriving on this industry and was compelled to leave Glarus. At Einsiedeln he found new opportunities for study and began to shape his views on the questions afterwards to be of most importance in the Reformation. His conclusions on these matters were reached quite independently and before Luther had begun to express himself publicly.

In comparison with other Reformation leaders Zwingli appears primarily as the man of plain common sense, repelled by the abuses of the Church, inclined to remove from the daily practice of religion whatever seemed to interfere with the purity of original Christianity as he understood it, but, on the other hand, steadily opposing every form of fanaticism. His feeling of identity with his people was intense and governed his action throughout his life. His first opportunity to express his views of reform came, as it did with Luther, on the preaching of an indulgence. It is characteristic of the popular character of the Swiss reform that Zwingli was requested by the Bishop of Constance to preach against the abuse, and he did it with such effect that the commissioner was obliged to leave the canton. In 1519 he accepted a call to become 'priest of the people' at the Gross-Münster in Zurich, a place of much importance, where his novel method of preaching according to the Scripture itself rather than according to formulas derived from the Fathers attracted the widest interest. Again he succeeded in driving out the Papal indulgence agent, and such was the dependence of the Papacy on the men of Switzerland for its troops that the Pope especially authorized them to send the offender back to Italy and did not attempt to renew this form of exaction in the cantons. Thus supported by the temporal authorities, Zwingli was enabled to continue his studies and to enlarge the circle of his connections in such ways as would best contribute to the advance of the ideas of the Reform. No thought of a permanent separation from Rome seems to have occurred to him as yet, but his language in regard to the Papal power and the usages of the Church became increasingly liberal. An exhortation to support the position of Luther, written in 1520, is probably his work, and may be regarded as the first open declaration of hostility to Rome. Instead of laying down certain general principles and bringing the issue directly on these, Zwingli began to suggest definite measures of reform, speaking of the diminution of tithes, the revision of the breviary, the folly of fasts, the evils of image-worship, and above all the right and duty of the priests to marry openly, rather than to live, as he frankly confessed he was himself doing, in secret concubinage. The Swiss Diet was slow to accept these suggestions, but they commended themselves at once to the great body of the people, and this approval was soon reflected in the action of the cantonal and general governments. Zwingli was easily the leader of the nation in religious matters, but he found himself warmly supported by the strongest elements among the men of learning everywhere except in the original Forest Cantons, where the devotion to the ancient faith and to the political practices that went with it remained practically unshaken.

As a theologian Zwingli did not make any pretense to special originality. He believed himself to be in substantial agreement with Luther, and accepted heartily the efforts of Philip of Hesse and others to bring about an effective alliance of the two movements. Unfortunately for this result, Luther had convinced himself that the Swiss were moving along the line which had led already to the social upheaval in Germany and to the extravagances of the Anabaptist Party. The famous conference at Marburg in 1529 between the leading theologians of the German and the Swiss parties failed, because, on the test question of the Eucharist, Luther refused to make any admission which might have seemed to commit him to a spiritual or figurative interpretation of the doctrine of the sacraments. Zwingli was not afraid to trust the common sense of men to make a sound use of their right of interpretation, so long as they should admit the supreme authority of Scripture. Moreover, he did not dread, as Luther did, the formation of alliances to strengthen the position of the reformed faith. He saw Switzerland surrounded by eager enemies who were doing all they could to foment the dissent between the Catholic Forest Cantons and the other members of the Confederation, and he felt that these two objects, the integrity of the Confederation and the reform of religion, must go hand in hand. It was on this account that, man of peace as he was, he threw himself with all his energy into the internal quarrel. Zurich became the active agent of the Confederation in combating the Forest Cantons, and Zwingli took the side of the war party. Twice, in 1529 and in 1531, bloody encounters ensued, the first time to the advantage of the Confederation, but the second time to their total defeat. Zwingli had supported his principles by his action and had gone into the campaign of Kappel (q.v.) as a fighting chaplain. His death on the field of battle, October 11, 1531, was the logical outcome of his teaching and was the seal of the permanent religious cleavage between the Catholic and the Protestant cantons.

The *Life* of Zwingli was written shortly after his death by his friend and associate, Myconius (ed. Neander, in *Vitæ Quatuor Reformatorum*, 1841). His complete works were published by Schuler and Schulthess Zurich, 1828-61); a new edition is in progress. Consult the modern lives by Christoffel (Elberfeld, 1857); Mörikofer (Leipzig, 1867-69); Stähelin (Basel, 1895-97); Jackson, (New York, 1901); Simpson (ib., 1902); also Thomas, *Das Erkenntnisprincip bei Zwingli* (Leipzig, 1902); Baur, *Zwinglis Theologie* (Halle, 1885-89); Finsler, *Zwingli-Bibliographie* (Zurich, 1897).

ZWIRNER, tsvĕr'nĕr, ERNST FRIEDRICH (1802-61). A German architect, born at Jakobswalde, Silesia, and educated at Breslau and Berlin. Intrusted in 1833 with the superintendence of the restoration of Cologne Cathedral, he submitted to King Frederick William IV., in 1841, a project of completing the structure, which was approved of and afterwards carried to the end by Richard Voigtel (1829-1902). Among other edifices erected by this thorough master of the Gothic style may be mentioned the Apollinariskirche at Remagen on the Rhine (1839-53), and the synagogue at Cologne (1859-61).

ZWOLLE, zvŏl'le. The capital of the Province of Overyssel, Netherlands, on the Zwarte Water, 53 miles east-northeast of Amsterdam (Map: Netherlands, E 2). Its most notable structures are the Gothic Saint Michael's Church (1406), with a famous organ, and the town hall. The town is an important centre of railway and canal trade, with manufactures of iron and cotton. Population, in 1899, 30,560. The neighboring monastery of Agnetenberg was for sixty-four years the residence of Thomas-à-Kempis (q.v.). Zwolle was an important Hanseatic town and joined the United Provinces in 1580.

ZYGOBRANCHIATA, zĭg'ō-brăn'kĭ-ā'tà. See AZYGOBRANCHIATA.

ZYG'OPHYLLA'CEÆ (Neo-Lat. nom. pl., from *Zygophyllum*, from Gk. *ζυγόν*, *zygon*, yoke + *φύλλον*, *phyllon*, leaf). A natural order of dicotyledonous plants, containing about 150 known herbs, shrubs, and trees, chiefly natives of subtropical countries. The most important genus is Guaiacum (q.v.). The abundance of species of Zygophyllum and some other genera constitutes one of the most striking features of North African and Arabian deserts. The flowers of Zygophyllum Fabago are employed as a substitute for capers, under the name of bean-capers. The best known representative of this order in the United States is the creosote bush, common from Texas to California.

ZYLONITE (from Gk. ξύλον, *xylon*, wood). A substitute for ivory, made by treating vegetable fibre or cellulose with a mixture of nitric and sulphuric acids, dissolving the resulting pulp in a suitable solvent, such as camphor, and drying the product. In 1855 such a compound was invented by Alexander Parkes of Birmingham, England, and put on the market under the name of *parkesine*. Factories were established in various places in Europe for the manufacture of similar compounds, which were generically called zylonite, but they were not successful. In 1869 John W. Hyatt, of Newark, N. J., began the manufacture of a product made similarly to the foregoing and called it celluloid. This has since largely superseded all other varieties of zylonite. See CELLULOID.

ZYMASE (from Gk. ζύμη, *zymē*, leaven). An enzyme (q.v.) discovered by Büchner in the common yeast (*Saccharomyces cerevisiæ*). It acts upon the products of inversion by invertase (q.v.) and breaks up these sugars into carbon dioxide, alcohol, water, and some less important products.

ZYMOTIC DISEASE (Gk. ζυμωτικός, *zymōtikos*, causing to ferment, from ζύμωσις, *zymōsis*, fermentation, from ζυμοῦν, *zymoyn*, to ferment, from ζύμη, *zymē*, leaven, from ζέειν, *zeein*, to boil). An old term for a disease supposed to be caused by fermentation of a substance received into the body, and formerly applied to smallpox, typhoid fever, plague, influenza, etc. Under the influence of the new science of bacteriology the zymotic was transformed into the zymotoxic theory of infectious disease, and the former term has largely fallen into disuse. See DISEASE, GERM THEORY OF; MIASMA; NOSOLOGY.

ZYRIANS. A Finno-Ugrian tribe, numbering 30,000, living on the headwaters of the Dwina and Petchora, in Russia, where they are settled along the navigable streams. They are brachycephalic, the index being 82.2. Hunting is the chief occupation, but as traders they visit the fairs of North Russia over a wide radius. They are now Russianized, and the old nature worship which they formerly practiced has almost passed away, one of the traces of it being the sacrifices of animals before the churches. Formerly these sacrifices were made in birch groves, which were held sacred, and in them was carried on the worship of a being called the 'Old Woman of Gold.'